Medical Physics in the Breast Screening Programme

Kath Schofield & Anne McCurrach
NSS Medical Physics
Who we are

John Wright
Assistant Director
Facilities Services

Katherine Schofield
Lead Mammography Physicist
& MPE

Anne McCurrach
Deputy Lead
Mammography Physicist,
RPA & MPE

John Robertson
Mammography Physicist,
RPA & MPE

Gordon Mitchell
Clinical Technologist
& Product Specialist

Michael Lemmon,
Clinical Technologist
& Product Specialist

MPE – Medical Physics Expert
RPA – Radiation Protection Adviser

NSS Medical Physics
What we provide

- Comprehensive medical physics service to
  - Scottish Breast Screening Programme (SBSP)
  - NSS
Once for Scotland
Comprehensive Medical Physics Service

- Technical quality assurance of imaging equipment
- Expert professional advice on radiation safety
- Training of NSS and mammography staff
Technical quality assurance of imaging equipment

- Performing physics surveys
- Setting up and oversight of user tests
- Audit of performance across all units
  - E.g. doses to patients / clients
Imaging equipment

- Mammography X-ray
- Biopsy attachment
- Reporting workstation
- Ultrasound scanner
Growth of Digital X-ray Units in Scottish Breast Screening Programme (SBSP)

Total no. of units 40-42
The SBSP mobile fleet

- 21 X-ray units located on 20 mobile units
- One double unit with pullout pod
- Powered by generators and electrical hook-ups

Looked after by:

John Greig
Maintenance Engineer

Trevor Perry
Fleet Engineer

Transport Officers
Quality Assurance Standards

Routine quality control tests for full-field digital mammography systems
Fourth edition

October 2013
The life cycle of X-ray imaging systems

- Maintenance and routine QA
- Critical examination/commissioning
- Acceptance (on behalf of purchaser)

- Equipment specification
- Tender
- Purchase contract
- Installation
- Critical examination (on behalf of installer)

- Replacement
- Disposal

- Physics QA
- User QA
Routine QA - Users

Daily mAs Variation

Daily SNR* Variation

Suspension Level

Remedial Level
Routine QA - Users

Daily mAs Variation

Daily SNR* Variation

Suspension Level
Remedial Level

AEC recalibration
Detector lifespan

Detector Ages of Hologic Dimensions & Fuji units in Scotland

Increasing age of unit
Routine QA - Physics

Image Quality

CDMAM test object
Routine QA - Physics

Threshold gold thickness values for 0.1mm details

Number of systems

Threshold gold thickness (um)

Improving image quality

Acceptable

Achievable
Routine QA – Physics
Patient Dose Survey 2017

Units by screening centre

MGD (mGy)
Routine QA – Physics
Dose Surveys 2005 - 2017

Mean Dose (mGy)

YEAR

2005
2008
2011
2014
2014
2016
2017

2005
2008
2011
2014
2014
2016
2017

ANALOGUE

DIGITAL
Routine QA – Physics
Dose Surveys 2005 - 2017

Mean Dose (mGy)

YEAR


National Reference Level 3.5 mGy

Proposed Reference Level 2.5 mGy

Scottish Level 1.75 mGy
Routine QA - Physics

Threshold gold thickness (um) at 0.1mm

Increasing image quality

Achievable

Acceptable

Decreasing Dose

Achievable

Acceptable

MGD (mGy)
Expert professional advice on radiation safety

Ionising Radiation (Medical Exposure) Regulations 2017
- Protecting patients
- Medical Physics Expert

Ionising Radiations Regulations 2017
- Protecting staff & others
- Radiation Protection Adviser

Regulatory Compliance

Cooperation between employers
RPA

Employer must consult RPA on radiation.

If in doubt just ask!

New technologies / techniques

Radiation Risk assessment

Staff Dosimetry

Radiation incidents
Room specification
The life cycle of X-ray imaging systems

- Disposal
- Maintenance and routine QA
- Clinical use
- Commissioning
- Critical examination/commissioning
- Replacement
- Equipment specification
- Tender
- Purchase contract
- Installation
- Critical examination (on behalf of installer)
- Acceptance (on behalf of purchaser)
Full range of safety tests

- Mechanical
- Radiation
- Electrical
The life cycle of X-ray imaging systems

- Replacement
- Disposal
- Maintenance and routine QA
- Critical examination/commissioning
- Clinical use
- Commissioning
- Equipment specification
- Tender
- Purchase contract
- Installation
- Critical examination (on behalf of installer)
- Acceptance (on behalf of purchaser)
Mobile replacement

Next generation of trailers:

- Hybrid battery / generator technology
- 56% reduction in carbon footprint per mobile
- Silent running
- Improved sustainability
Training of staff

- Mammography staff lectures
- Radiation protection training
Summary

- All aspects of equipment lifecycle
- Scotland-wide approach
- Close working
  - Screening centres
  - Manufacturers
Thank you

Kath Schofield & Anne McCurrach
NSS Medical Physics