

Oxford Radcliffe Hospitals NHS Trust
DEPARTMENT OF MEDICAL PHYSICS
AND CLINICAL ENGINEERING

ANNUAL REPORT

APRIL 2010 - MARCH 2011

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DEPARTMENTAL OVERVIEW – Dr Chris Gibson

Introduction

The change of government and the overall financial position of the public sector have been the background to another challenging year. The department, along with the rest of the NHS, has been faced with savings targets on a scale not seen for many years. Although all parts of the NHS have been challenged, it can be particularly difficult for clinical support departments still dealing with the consequences of previous growth and investment. That is particularly the case for Oxford, where several major capital schemes with associated growth in the amount and complexity of equipment and facilities are still having an impact on the workload of the department. In response there is an understandable, if undesirable, requirement to prioritise the maintenance of safe clinical services at the expense of service development. Nevertheless, the department can point to a number of innovations and achievements during the past year:

- Introduction of Intensity Modulated Radiotherapy (IMRT) as part of routine clinical practice.
- Commissioning of a web-based system for recording staff training on medical equipment, together with loans from the growing number of equipment libraries in the Trust.
- Significant reduction in finger doses for interventional radiologists using flexible shielding materials.
- Trialling of medical equipment tagging using radiofrequency tags (RFID) and the existing hospital wireless network, to simplify location of key items and reduce losses.
- Specification and procurement of a replacement medical equipment management database for the Trust.

As a result of Trust re-organisation, the department is now part of an expanded Directorate of Oncology, which has facilitated links between staff groups working in radiotherapy. Looking further afield, the proposed merger with the Nuffield Orthopaedic Centre provides an opportunity for closer working with colleagues in Rehabilitation Engineering.

The department is also looking forward to welcoming our first trainees under the Modernising Scientific Careers framework. In common with all healthcare science disciplines, training schemes for medical physics and clinical engineering staff have been completely revised, and we are actively involved in that process. As part of this, and of the wider development of healthcare science, I have accepted a part-time secondment to NHS South Central to take up the newly established role of Lead Scientist for the SHA.

I would like to thank all members of the department for their continuing commitment to service quality and to patient care. In particular, I would like to thank Gordon Brindle (Head of Clinical Engineering) and Geoff Lewis (Head of the Non-Ionising Radiation Section) who retired after many years of service to the NHS. We will not find it easy to replace them.

CLINICAL ENGINEERING – Richard Osman

Introduction

The primary role of the Clinical Engineering Group is to provide medical equipment management services to the Oxford Radcliffe Hospitals NHS Trust, and to other healthcare organisations in Oxfordshire and neighbouring counties. The services provided cover the complete lifecycle of a medical device and include Specification; Purchase; Inventory management; Loan acceptance and evaluation; Acceptance testing and commissioning; Maintenance and repair; External maintenance contract management; DoH Central Alerting System administration; and Disposal.

In providing these services Clinical Engineering follows guidance from the Medicines and Healthcare products Regulatory Agency (MHRA) on “Managing Medical Devices DB2006(05)”. To ensure that our services are consistent, and of the intended quality, Clinical Engineering operates a quality management system based on the standard BS EN ISO 9001:2008, which includes twice yearly audits by our external accreditation body (currently Lloyd’s Register Quality Assurance Limited) and also includes the implementation of an internal audit programme. Our management system is applicable to the management and evaluation of medical equipment including in-house and field maintenance and repair of electronic, electromechanical and anaesthetic equipment. The Quality Management System has undergone significant changes this year, with the introduction of themed audits; the introduction of an on-line system for recording internal audits; and an on-line version of the quality management system documentation.

Staff, Resources and Facilities

Clinical Engineering staff are registered healthcare scientists and administrative colleagues whose role is to implement the equipment management services offered by the Group. Clinical Engineering continues to work in collaboration with ORH Procurement on the evaluation, procurement and acquisition of medical equipment and devices. The Medical Devices Strategy and Project Manager works in close liaison with an embedded representative of Procurement to achieve a significant volume of equipment purchasing.

Maintenance and repair activities are performed in four well equipped technical workshops spread across the three sites of the Trust, and to provide services to external customers in the community Clinical Engineering staff make use of two lease cars. To support our technical activities we have a comprehensive range of test and measurement equipment, with an associated periodic calibration programme. To support urgent repair and maintenance activities Clinical Engineering holds a range of spare parts and consumables in a number of dedicated stores.

The acceptance testing of newly delivered medical equipment and devices is now carried out in a dedicated workshop in the Industrial Block, closer to the point of delivery. This workshop is staffed from the other main workshops as the needs arise. The three Assistant Clinical Technologists continue to develop their roles continuing to support the logistical requirements of the Group as well as developing their skills on a selected group of medical devices under the supervision of a suitably qualified clinical technologist. Work is on-going to achieve a Central Stores facility in the Industrial Block.

The Group provides accredited training for Clinical Technologists, within the overall IPEM accreditation scheme for Medical Physics and Clinical Engineering. The candidate who remained in ORH employment achieved a creditable 'Distinction' grade for his Diploma.

Work Place Organisation

The in-house maintenance and repair activities are now organised under two multi-disciplinary teams rather than a two-workshop model. The teams rotate periodically to allow individual members to gain experience in the full range of medical devices and equipment. Training support is available in-house as well as from particular suppliers and manufacturers.

ORH Restructuring

The ORH carried out a re-alignment and restructuring of its services, culminating in a revised managerial structure in November 2010. In relation to inventory, budgetary analysis and contract management the transition from a 3 Division / 15 Directorate model, to a 6 Division / 15 Directorate model requires a significant level of data manipulation and translation.

Administration Section

Over the year the Response Centre logged 15,008 new jobs relating to medical equipment delivery, repair and maintenance. In addition, this Section continues to provide a procurement hub for purchasing of medical devices across the ORH NHS Trust, as well as for neighbouring Trusts (NOC, Northants Community, Northants Healthcare, South Central Ambulance Service, and Oxford Health).

On behalf of the ORH Trust 352 orders for new medical devices were placed with a value of £7.2m. Orders placed for our external customers totalled 184 with a value of £545k. The Section continues to achieve significant savings by risk stratification of equipment, challenging invoices, and negotiating discounts on purchase of both equipment and maintenance contracts. The Section also administers indemnities to cover loans and donations of devices from external suppliers, and 180 loans were logged during the year.

Technical Sections

These Sections provide the technical services necessary for the acceptance, maintenance and repair of medical devices. The Section Heads, together with the Deputy Head of Group, vet all Pre-Purchase Questionnaires (PPQs) prior to the purchase of any medical device.

Tasks undertaken during 2010 included:

Task	Number
Corrective maintenance undertaken in-house	5221
Corrective maintenance by external contractors	1003
Planned maintenance undertaken in-house	3423
Planned maintenance by external contractors	81
Acceptance of new equipment	2701
Supply of consumables	560
Acceptance of loan equipment	2701
Incident investigations	12
Total	15702

Inventory Management

The following table summarises the number of Trust assets directly managed by the Clinical Engineering Group together with their current replacement value (excludes Radiology, Radiotherapy and Pathology equipment):

Hospital Site	Asset Count	Replacement Value
John Radcliffe Hospital	5185	£ 12,715,114
Women's Centre	1339	£ 3,196,779
Childrens Hospital	478	£ 1,016,255
West Wing	1931	£ 5,849,297
Churchill Hospital	12998	£ 5,797,494
Oxford Cancer Centre	1320	£ 3,405,581
Horton Hospital	1435	£ 2,668,640
Total	24686	£ 34,649,164

¹ Excludes work undertaken by embedded Cardinal Health Engineer.

CLINICAL MEASUREMENT – Dr Eileen Palayiwa

Blood Gas Service

Clinical Measurement has continued to provide routine maintenance, calibration and quality assurance for 28 blood gas analysers (one of which is at the Nuffield Orthopaedic Centre).

Equipment Library Service

A new software system for administering the Equipment Library service was acquired and put into operation during the year. This has simplified the processes used in recording equipment loans, tracing overdue equipment and producing statistics to inform purchasing decisions. We are grateful to the John Radcliffe League of Friends who provided funding for this project.

We have been working with the Nuffield Orthopaedic Centre to plan for the provision of an Equipment Library on that site when the Trusts merge. We have also prepared a business case for provision of an Equipment Library on the Horton site. If both of these come to fruition, there will be a total of five libraries covered by our service.

A number of items in the Equipment Library have been fitted with RFID tagging devices which communicate the wireless network to provide information on their location. This is part of a trial of these devices in the Trust and a full report with recommendations about their future use will be prepared during 2011/12.

Medical Device Training

The new Equipment Library software includes a module for recording staff training on medical devices. This has been used to record infusion device training and provide managers with lists of staff who have received training and those whose training is due for renewal. The system is linked to the Electronic Staff Record so that statistics produced from it are accurate, and timely. It is planned to use this system for recording of training on other devices and also to give managers access to their own area's records. Eventually it will be possible to link training records to equipment library requests, so that wards are alerted if their training levels are low on the item of equipment which they are requesting.

Evoked Potential Monitoring

Spinal cord monitoring was provided for 144 cases and, for 5 of these, Multimodal Monitoring was used. A business case is being prepared to increase the staffing to provide better cover for these cases and to include multimodal monitoring where appropriate.

New spinal cord monitors for both the Nuffield Orthopaedic Centre and the John Radcliffe have been purchased and these will be put into use during 2011/12.

Other Physiological Measurements

The Group provides support to the Lung Function Clinic at the Churchill and spent a total of 51 days on this. We also provided lung function testing for the paediatric respiratory clinic for 31 sessions.

A number of other specialist investigations were performed, including Sweat Tests for diagnosis of cystic fibrosis (31 patients) and Paediatric Sleep Studies (23 patients).

Equipment Calibration Checks

The group regularly checks the calibration of inspired and expired gas analysers and of tourniquets. A total of 47 checks of this type were performed.

Staff Changes

Susan Dunn (West Wing Equipment Library Coordinator) retired from the service after 13 years' service and was replaced by Chris Tierney. Oksana Khylenko (Equipment Library Assistant) also left the group and was replaced by James McDade.

RADIATION PHYSICS & PROTECTION – Therese Crawley



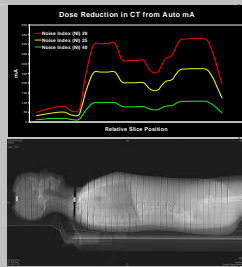
We are now in our second year in the Cancer and Haematology Centre and the Group has seen some re-structuring to streamline our support services. The main change has been the incorporation of Non-ionising radiation support services, for lasers, ultraviolet and ultrasound, into the Imaging section. The inventory of equipment now supported by the group includes:

- 6 CT scanners
- 9 MRI scanners
- 5 double-headed (SPECT) gamma cameras
- PET /CT imaging centre
- GMP radiopharmacy, serving nuclear medicine, oncology and cardiology
- 3 full-field digital mammography units
- 5 digital interventional rooms
- 5 cardiac catheterisation laboratories
- Acute Vascular Imaging Centre (stroke) with bi-plane angiography and 3T MRI
- A wide range of ultrasound equipment
- Cone beam dental equipment
- Ultraviolet therapies (PUVA and TL-01 narrow band)
- A range of surgical lasers
- On Board Imaging facilities on Linear Accelerators

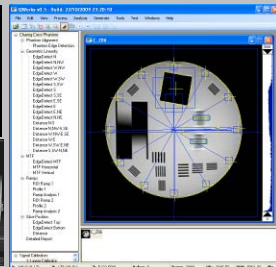
We are also involved in the development of a service using High Intensity Focussed Ultrasound (HIFU) – one of only a few systems in Europe, and with the Oxford Hyperpolarised xenon project. This last year has seen a keen emphasis on image optimisation work across several imaging modalities within the Trust and community. We have also successfully introduced Yttrium dotate as a new radionuclide therapy, and built on previous success with Yttrium microspheres, with many more patients now having this treatment. Our PET centre is in its second year and we now support many new PET trials. The radiopharmacy has been successful in achieving re-accreditation from the MHRA, and we are considering introducing an in-house QA service to reduce our running costs.

The Group plays an active part in the Oxford Medical Physics Research Group along with the University of Oxford Physics Department, with several collaborative projects on-going.

Much of our work involves optimisation and quantification of diagnostic images, across all modalities



CT Auto mA
RANDO
phantom



iQWorks: Analysis
of MR images



Acute Vascular
Imaging Centre



Chest optimisation



Anatomical
phantom

Teaching and training

In February we provided an Open Day for potential applicants for healthcare scientist training posts under the new Modernising Scientific Careers framework. The new Scientist Training Programme is now 3 years long instead of 4, and will require some changes in the department to accommodate the new training format.

In the last year we have also provided:

- Courses in radiation and laser safety for all staff groups
- Teaching programmes for doctors undertaking FRCR
- Radiation physics and imaging teaching to two MSc degree courses
- Radiation Protection Supervisor Update
- IRMER courses and IRMER Roadshows for staff using radiation on patients
- MSc student projects (for Masters students at Oxford University and UCL)

RADIOTHERAPY PHYSICS – Liz Macaulay

This has been a challenging year in many ways, and I would like to thank the staff in the Radiotherapy Physics Group for their commitment, dedication and perseverance.

Staff:

We congratulate Dr Andrew Reilly on the achievement of his PhD and wish him all the best in his new post in the Clatterbridge Centre for Oncology. Joining the Group this year are James Connolly, Dr Charlotte Hector, Maxwell Robinson and Anthony Walsh. IPEM Part 2 training in Radiotherapy Physics is underway for Roger Francis, Maxwell Robinson, Anthony Walsh and Tracy Underwood.

An informal review by the National Cancer Action Team (NCAT) in November 2010 and the Radiotherapy Peer Review at the end of the year both identified the need for increased staffing in Radiotherapy Physics. An external review of Radiotherapy Physics planned for early next year will look at staffing numbers and skill mix, in the light of the demands on the service in Oxford.

Workload

The workload has been generally high, with no sign of lessening. It has been a challenge to progress developments, whilst continuing to deliver the routine service to clinical radiotherapy. However some key developments were achieved: the bringing into routine clinical use of the kilovoltage planar and cone beam imaging on the two linear accelerators equipped with this facility, the replacement and rapid commissioning of a CT scanner for radiotherapy, and the introduction of Intensity Modulated Radiotherapy treatments for low risk prostate patients.

Looking ahead

An ambitious strategy to progress radiotherapy treatments rapidly in Oxford has been published, to include the provision of IMRT treatments for 30% of patients by the end of 2012, development of 4D treatment planning, introduction of PET-CT scanning for radiotherapy treatments, expansion of the the PDR Brachytherapy service, and shortening the waiting time for radiotherapy treatment to two weeks from the date of agreement.

EXTERNAL ROLES AND ACTIVITIES

Name	Roles
Rosemary Belton	Joint Chair of Staff side for the ORH NHS Trust Member of National Professional Committee of the Hospital Physicists Association (part of trade union Unite).
Gordon Brindle	Member of the Southern EBME Benchmarking Club
Mary Cocker	External Training Adviser for East Anglian Training Consortium Member of BIR Radiation Protection Committee
Therese Crawley	ETA representative on the IPEM Accreditation Sub-Panel
Samantha Gardner	Member of IPEM Radiotherapy Special Interest Group
Chris Gibson	President of IPEM Member of IPEM Fellowship Panel Member of the National Imaging Board Member of the Cancer Diagnostics Advisory Board External Examiner for the University of Aberdeen
David Hurdley	Member of the Southern EBME Benchmarking Club
Daniel McGowan	Secretary, BIR Trainee Committee Member of BIR Radiation Physics & Dosimetry Committee
Elizabeth Macaulay	Member of IPEM Professional Development Panel
Eileen Palayiwa	Treasurer of Neuromonitoring UK External Moderator for IPEM Clinical Technologists' training Scheme
Andrew J Reilly	Chair of BIR Radiation Physics and Dosimetry Committee Secretary of IPEM Informatics and Computing Special Interest Group Member of RCR Clinical Research Sub-Committee Secretary of Radiotherapy Imaging User Group Member of IET Healthcare Technologies Executive
Ian Robinson	Member of IPEM Physiological Measurement Special Interest Group
Stuart Slade-Carter	Member of IET Healthcare Executive, Technical & Professional Network Member of IPEM Working Party on Physics Services to Radiotherapy Member of VRCT Council
Rosie Steele	Meetings Secretary, Neuromonitoring UK Clinical Technologists' Training Scheme Coordinator for the Oxford/Northampton/Reading Consortium

PUBLICATIONS AND PRESENTATIONS

Published Papers and Reports

Winter H, Natarajan T, Belton RR
"Characterization of the MapCHECK2 for pre-treatment IMRT QA"
Radiotherapy and Oncology p508, Vol 99, May 2011.

Tromans CE, Diffey J, Cocker M, Brady M
"Optimising Beam Quality Selection in Mammographic Acquisition using Standard Attenuation Rate"
Lecture Notes in Computer Science p197-204, Vol 6136, 2010.

Presentations at National and International Conferences

Amarnath J, Mutch S J, Chakraborty S, Platt K, Park K
"A review of local dose-area product levels for paediatric fluoroscopy in a tertiary referral centre. Are National Reference Doses falsely reassuring?"
British Society for Paediatric Radiology Annual Conference, Nottingham, Sep 2010

Gibson CJ
"Physics and Engineering – IPEM and the future", NHS Education for Scotland, University of Aberdeen, Jan 2011.

Jonnada J, Costelloe M, Trent S
"Moving Towards GEC-ESTRO guidelines in Cervical Cancer brachytherapy. The Oxford Cancer Centre experience", GEC-ESTRO, London, May 2011

McGowan DR, Crawley MT
"River Water Monitoring", Annual meeting of the British Nuclear Medicine Society, Harrogate, April 2010

McGowan DR, Francis R, Roberts RW, Dvorak P
"Simulated clinical effect of in-vivo diode perturbation in megavoltage photon beam radiotherapy", International Symposium on Standards, Applications and Quality Assurance in Medical Radiation Dosimetry, IAEA Vienna, November 2010

McGowan DR
"Training in the 21st Century: a scientist's perspective", Multi disciplinary Collaboration: Training and Beyond, BIR London, December 2010

Mutch S J
"Modelling Of CBCT Patient Doses", BIR Meeting on Radiotherapy Imaging: Goals, Challenges and the Diagnostic Basics, London, Nov 2010

Robinson M
"An Assessment of Forward Planned IMRT and Electronic Compensation as Alternatives to Conventional Breast Planning". Annual Regional Scientific Meeting of the IPEM South East Group, Institute of Cancer Research, Sutton, May 2010

Tse D, Das N, Allington A, Cocker M

“Hand dose reduction using sterile, disposable scatter protection drape: a prospective randomized study”, British Society of Interventional Radiology Annual Meeting. Interventional Radiology Meeting, Nov 2010.

Other Conference Presentations

Belton R

“The Hospital Physicists’ Association and what can the HPA do for you”, IPEM Medical Technologists Study Day, July 2010

Cocker M

“Standard Attenuation Rate Algorithm for Digital Mammography”. Medical Physics Research Group, Oxford, July 2010

Cocker M

“Radiotherapy Imaging Doses”, Medical Physics Research Meeting, Oxford July 2010

Gibson CJ

“Training as a clinical scientist”

IPEM Induction Day for Part 1 Clinical Scientist Trainees, York, Dec 2010

McGowan DR, Nomerostski A, Mikhailik V

“Existing Collaborations: SiPMS for TOF PET and IVD Modelling”, Medical Physics Research Group, Oxford, July 2010

McGowan DR

“British Institute of Radiology”, Induction Day for Part II Clinical Scientist Trainees, York, February 2011

Robinson M

“An Assessment of Dose in Clinical PET-CT when Standardising Image Quality using Auto mA Scanning”, Oxford Biomedical Imaging Festival, Oxford, October 2010

STAFF**Departmental Management**

GIBSON, Chris
BAILEY, Jill

Director of Medical Physics & Clinical Engineering
Departmental Administrator

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Brindle, Christine	Document Scanning Clerk
Buck, Stephen	Section Mgr
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Catherall, Richard	Business Manager
Curtis, Robert	Clinical Technologist
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Ferguson, Alex	Clinical Technologist
Goth, Reg	Clinical Technologist
Gudeti, Madhavi	Clinical Technologist
Hastings, Pennie	Clinical Technologist
Hurdley, David	Clinical Technologist
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Walton, Kevyn	Clinical Technologist
Watson, Andrew	Clinical Technologist
Watts, Clare	Buyer
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Wood, Christopher	Deputy Section Head

Clinical Measurement Group

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DEVINE, Paul	Equipment Library Coordinator
HOWELL, Mark	Equipment Library Coordinator
JODEIRI-LAKPOUR, Morteza	Senior Clinical Technologist
McDADE, James	Equipment Library Assistant
McPEAK, Hanne	Senior Clinical Technologist
RADCLIFFE, Jo	Equipment Libraries and Training Manager
ROBINSON, Ian	Senior Clinical Technologist
STEELE, Rosie	Principal Clinical Technologist
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Radiotherapy Physics Group

MACAULAY, Elizabeth	Head of Radiotherapy Physics
BELTON, Rosemary	Head of Machines and QA
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COSTELLOE, Mary	Principal Clinical Scientist
DUTTON, Diana	Senior Clinical Technologist
DVORAK, Pavel	Radiotherapy Physicist
FOGEL, Gregory	Clinical Scientist
FRANCIS, Roger	Trainee Scientist
GARDNER, Samantha	Clinical Technologist
HECTOR, Charlotte	Principal Clinical Scientist
KOZYRA, Damian	Clinical Scientist
NATARAJAN, Thirumavalavan	Principal Clinical Scientist
PATMORE, Peter	Principal Clinical Scientist
REILLY, Andrew	Principal Clinical Scientist
ROBERTS, Ralph	Head of Treatment Planning
SLADE-CARTER, Stuart	Principal Clinical Technologist
WOLF, Terence	Principal Clinical Technologist
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BARNARD, Mike	Clinical Technologist
BRADLEY, Jill	Senior Clinical Technologist
CATTLE Brian	Senior Clinical Technologist
COCKER, Mary	Head of Imaging Physics
DIXSON, Steve	Radiopharmacy QA Manager
FARUK, Sanjeev	Senior Clinical Technologist
FERRIS, Connor	Trainee Scientist
GOUGH, Grace	Radiopharmacy Production Manager
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MUTCH, Steve	Principal Clinical Scientist
POMEROY, Kay	Clinical Scientist