NHS England

North of England Cancer Network

Radiotherapy NCCG

Annual Report

2013

Document Information					
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Circulation List:	Radiotherapy NCCG				
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Version History:					
Date:	14.06.13	Version:	v2.4	Review Date:	May 2014

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Mrs F Milnes	South Tees Hospitals NHS FT
Mrs M McGuckin	North Cumbria University Hospital NHS Trust
Date Agreed:	03.10.13

NCCG members agreed the Annual Report on:	
Date Agreed:	14.06.13
Review Date:	May 2014

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INTRODUCTION

This report relates to the operational period January - December 2012.

The Radiotherapy Cross Cutting Group met four times during 2012.

Key Achievements

- IMRT delivery has become routine and progressing steadily towards NRAG recommendations
- Joint training events, including the stereotactic radiotherapy event
- Sharing of planning images and data
- User and carer representation achieved and retained consistently
- Regular and well attended group meetings with good engagement across the Network
- Funding and Strategy for OnQ atlas based auto-segmentation to facilitate increased IMRT delivery agreed
- Roll out of Dosimetry Check for In vivo dosimetry
- Completion of 5 senses patient survey

Key Challenges

- Maintaining Equipment Replacement programme
- Staffing levels at Carlisle
- Continuing to promote radiotherapy in a changing commissioning environment
- Development of the satellite centre
- Equity of access to radiotherapy services across the Network

11-1E-101t/11-1E-127t, NSSG Meeting Schedule/Attendance

The Network Cross Cutting Group has met on five occasions over the previous year. A full breakdown of NSSG attendance for the year is included in Appendix 1.

The NRG will meet as a minimum three times per annum – see table 1 below. The group will agree and operate under the Terms of Reference. All members will be informed of meeting dates and be included in distribution of the Agenda and Minutes. Records of attendance will be maintained and shared with the Cancer Unit Managers in order to inform them of their trust representation at network level.

Date	Time	Location
24.02.12	3.00 pm	Evolve Business Centre
04.05.12	3.00 pm	Evolve Business Centre
25.05.12	3.00 pm	Evolve Business Centre
27.07.12	3.00pm	Evolve Business Centre
26.10.12	3.00 pm	Evolve Business Centre

11-1E-132t, Fractions per Million Population (EBRT/IMRT)

The Network Board has reviewed the annual number of radiotherapy fractions delivered by the departments in the network, see Appendix 2. The Network Board has reviewed the current service provision, cancer incidence, referral rates, patient flow, case mix, fractionation regimens and the role of radiotherapy within the Network. As a consequence of this review, the Network has produced a development plan, see Appendix 1 in Work Programme

SAFETY

11-1E-106t, In Vivo Dosimetry Risk Assessment (EBRT)

Detail of the network-wide risk assessment of introducing IVD into the practice of the departments can be found at Appendix 3.

11-1E-118t, External Quality Control Programme (EBRT)

The External Quality Control Programme (EQC) agreed programme for the departments in the Radiotherapy Network can be found at Appendix 4.

CLINICAL PATHWAYS

11-1E-108t, Treatment Protocols (Generic)

The clinical treatment protocols were reviewed by the Radiotherapy NCCG at the meeting on 17 September 2010 and at regular intervals following this with a review taking place on the 24th February 2012.

11-1E-109t, Consistency with National Dose/Fractionation Recommendation (EBRT)

Any review/changes in the treatment protocols will take into account the National Dose/Fractionation Recommendation (EBRT).

11-1E-117t, Out of Hours Treatment Service Specification (EBRT)

Out of hours radiotherapy provision in the network is provided at NCCC and JCUH. Under normal circumstances patients who would receive radiotherapy during normal hours at CIC will be treated out of hours at NCCC. See Appendix 5, Out of Hours Service Specification.

TRAINING AND ASSESSMENT

11-1E-111t, Training and Assessment Policy including
11-1E-112t, Assessors of Competence (EBRT)

The Network policy covers the following professional groups for their activities in the Radiotherapy Departments of the Network:

Clinical Oncology, Therapeutic Radiographers, Clinical Scientists in Radiotherapy Physics, Clinical Technologists in Radiotherapy.

See Appendix 6, Training and Assessment Policy.

11-1E-113t, Assessors of Competence for Prescribing Radiotherapy, Outside the Specialty of Clinical Oncology (EBRT)

Not applicable – There is no prescribing outside the specialty of clinical oncology within the NECN.

11-1E-114t, Renewal of Competency (EBRT)

Any individual who has previously been assessed as competent, but whose area of work or practice does not require this competency for a significant period of time, will be assessed for renewal of competency prior to returning to an area of work or practice, where the competency is required. See Appendix 6, Training and Assessment Policy.

11-1E-115t, Network List of Assessors (EBRT)

The list of authorised assessors of competence for radiotherapy practice in the Network, together with the competencies they are authorised to assess can be found at Appendix 7.

11-1E-121t, Brachytherapy - Assessors of Competence

The Network Radiotherapy Group adopts the following Brachytherapy criteria for the following groups:

- Clinicians
- Physics
- Radiographers/Mould Room Technicians

Clinicians must be competent to: assess suitability for brachytherapy, take consent, have knowledge of applicators, applicator insertion, prescribing and assess response and toxicity.

Physicist must be competant to: plan brachytherapy, outlining OAR's, maintainance of applicators and HDR machine (commissioning, QA etc).

Radiographers/Mould Room Techniciansmust be competent to: explain procedure to patient, have knowledge of applicators, knowledge of Imaging requirements and operation of HDR machine. Insertion of CVC applicators and oesophageal inner tubes.

11-1E-122t, Brachytherapy - Renewal of Competency

For clinicians competency should be reviewed where the individual is involved in less than 10 cases per year.

Physicists and Radiographer – reviewed every 3 years (every year in Carlisle).

11-1E-123t, Brachytherapy - Network List of Assessors

The list of authorised assessors of competence for brachytherapy practice in the Network, together with the competencies they are authorised to assess can be found at Appendix 8.

PATIENT & CARER INVOLVEMENT

The user representative is Margaret Warner who is currently a member of the Radiotherapy NCCG group. She is invited to and actively participates in meetings. Relevant issues are reported back to the NECN Patient and Carer Group for comments and feedback. User involvement is actively encouraged and promoted throughout the NECN.

PROCESS

11-1E-116t, Change Management

The NRG has, at their regular meetings, discussed the most recent changes or proposed changes in the practice, including operational procedures, clinical practice or staff or equipment or facilities.

See NRG minutes 24 February 2012, Appendix 9, for discussion regarding the development of the network wide in-vivo dosimetry implementation strategy which included a risk assessment and proposed timescales. Regular updates have been given at all subsequent meetings.

The agenda for the radiotherapy NSSG meeting has been changed to include a specific section on change management to ensure compliance with this measure.

11-1E-125t, Equipment Replacement Programme

The Radiotherapy NCCG has provided evidence to support the equipment replacement programme. However, this remains challenging for the host trusts - see Appendix 10.

Appendix 1 - Radiotherapy NCCG Attendance Sheet

Radiotherapy Group

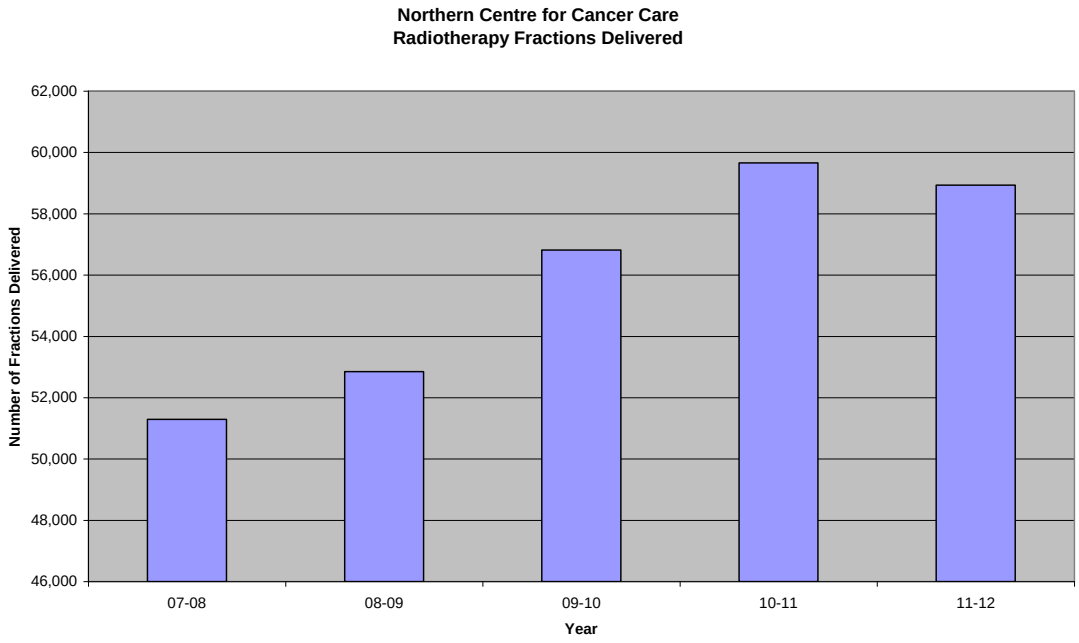
ATTENDANCE RECORD 2012

Total meetings: 5

First Name	Surname	Role	Organisation	Attendance	24/02/2012	04/05/2012	25/05/2012	27/07/2012	26/10/2012
Gwen	Barker	Radiotherapy Manager,	N Cumbria		1		1		
Ann	Bassom	Network Co-ordinator	NECN		1				1
Debbie	Bennett	Dept Radiotherapy Services Manager	NCCC		1	1	1		1
Tony	Branson	Clinical Oncologist	Newcastle		1		1	1	1
John	Byrne	Deputy Head of Radiotherapy Physics	NCCC			1			
Peter	Dunlop	Clinical Oncologist	South Tees		1	1			
Mandy	Headland	Divisional Manager	South Tees		1				
Susan	Lamb	Radiotherapy Service Manager	Newcastle		1	1	1	1	1
Gill	Lawrence	Head of Radiotherapy Physics	RMPD		1	1	1		
Roy	McLachlan	Network Director	NECN		1		1	1	1
Jim	Mathven	Head of Medical Physics	N Cumbria		1	1			
Steve	Mattock	Head of Radiotherapy Physics	N Cumbria		1			1	
Fiona	Milne	Radiotherapy Manager	South Tees		1	1	1		1
Adrienne	Moffatt	Radiotherapy Project Manager	NECN		1	1		1	1
Ian	Pedley	Consultant Clinical Oncologist	Newcastle		1	1	1	1	
Adrian	Rathmell	Consultant Clinical Oncologist	South Tees		1	1			1
Bill	Richardson	Cancer Modernisation Manager	NECN		1	1	1		1
Ken	Roxburgh	IT Project Manager	S Tees		1	1			
Louise	Shutt	Cancer Services Manager	S Tees					1	
Sandeel	Singhal	Consultant Oncologist Clinical Lead	N Cumbria		1	1		1	1
Dawn	Stephenson	Deputy Divisional Manager	S Tees					1	
Emma	Thompson	Research Radiographer	S Tees		1	1			1
Chris	Walker	Head of Radiotherapy Physics	S Tees		1		1	1	1
Margaret	Warner	User Representative	NECN		1	1	1		1
Andrew	Welch	Lead Cancer Clinician	Newcastle		1	1		1	1
					21	16	10	11	14

Appendix 2 - Fractions per Million Population (EBRT/IMRT), 11-1E-132t

Northern Centre for Cancer Care, Newcastle

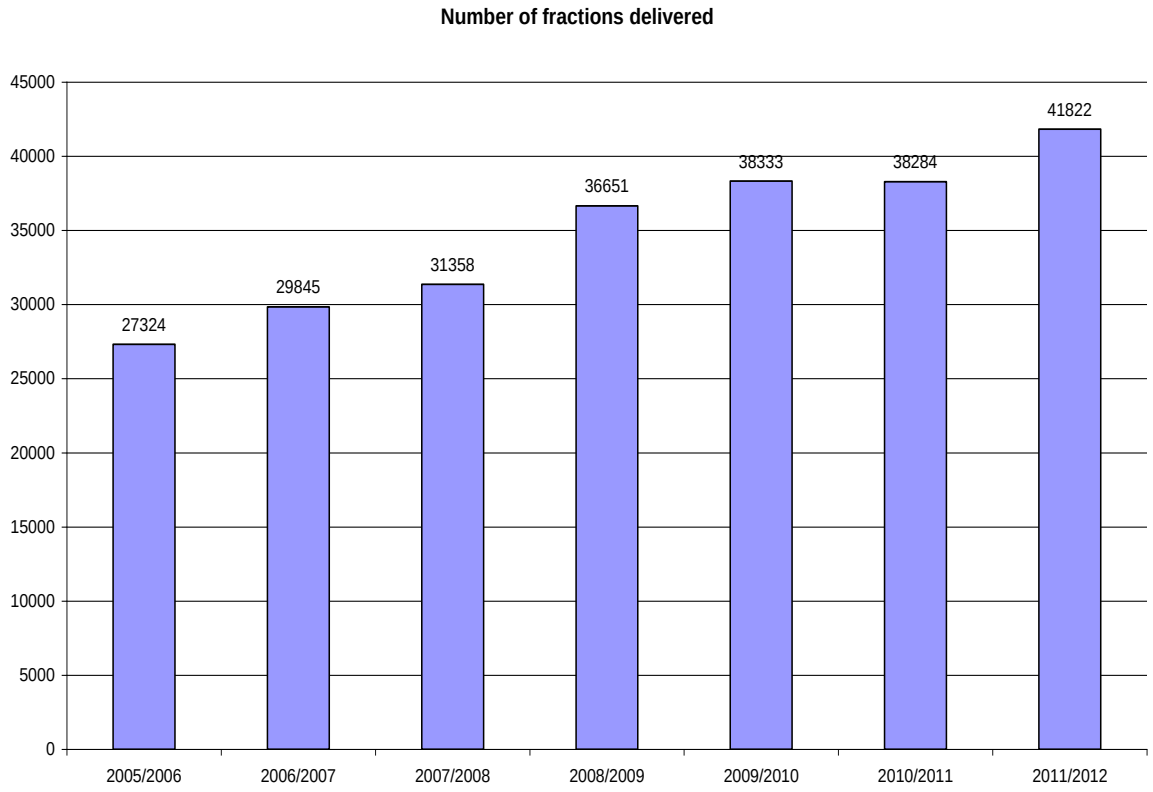


Year	Population served (millions)	Fractions delivered	Fractions/mill popn
11-12	**1.72**	**58,933**	**34,263**

2012 / 2013 Data please note RTDS move to attendance count

Population served	1,755,837	(RTDS 2011 population data)
Linear accelerator attendances	58,366	(RTDS)
Attendances per million population	33,241	

S Tees

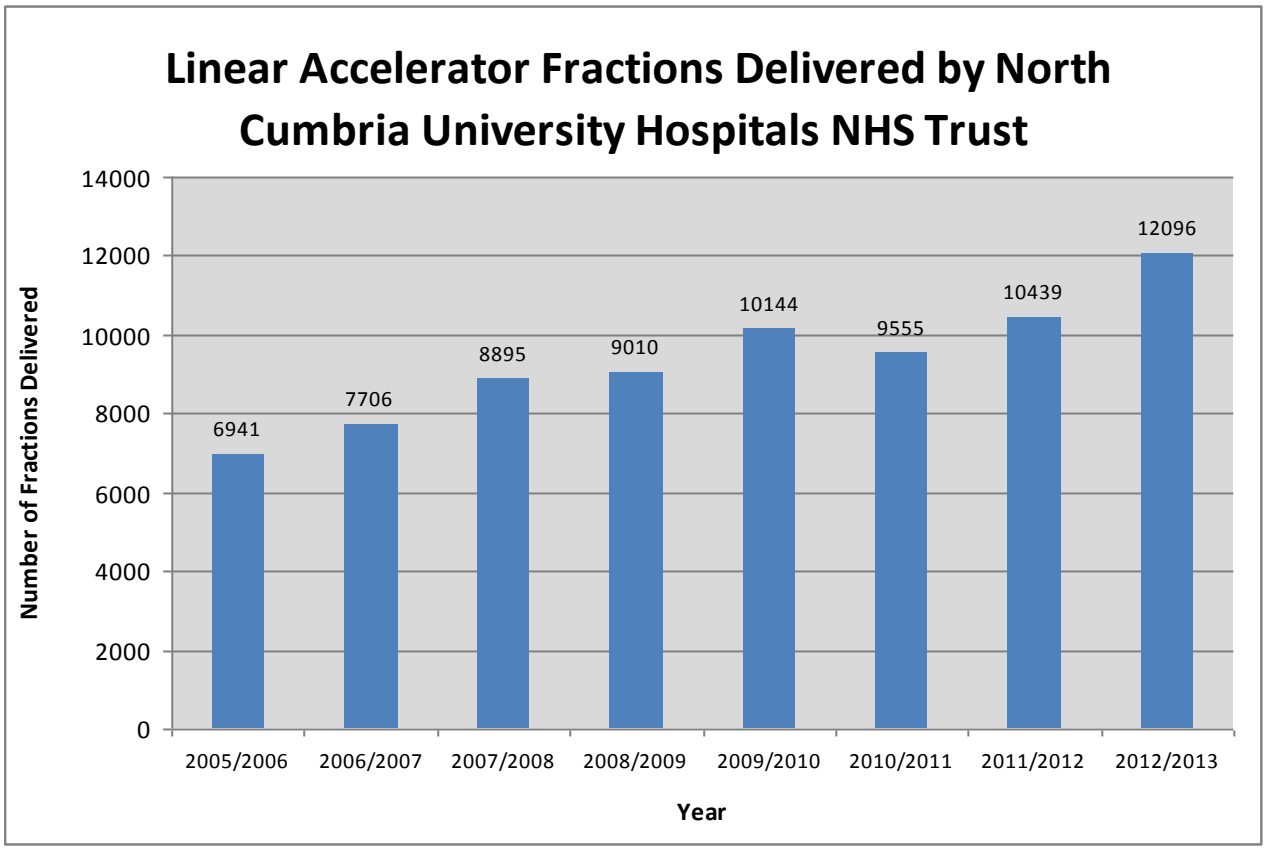


Population (RTDS)	1.013314 million
Actual fractions delivered 2011/12	41,822
Fractions per million population	41272

2012 / 2013 Data please note RTDS move to attendance count

Population served	1,011,710	(RTDS 2011 population data)
Linear accelerator attendances	35,803	(RTDS)
Attendances per million population	35,389	

Cumbria



Population of North Cumbria = 279,941 (NatCanSAT RTDS)

No of fractions delivered in 2011/12 = 10,531
No of fractions delivered/million population = 37,618

2012 / 2013 Data please note RTDS move to attendance count

Population served	300,549	(RTDS 2011 population data)
Linear accelerator attendances	12,285	(RTDS)
Attendances per million population	40,875	

Appendix 3 - IVD Risk Assessment

Document Title:	**Risk assessment of introduction of Dosimetry Check and OnQ into departments**	**Version No**	**2.00**
Project Title:	***Implementation of in vivo dosimetry***	**Date Initiated**	**29.07.2010**

** Likelihood = H (High) M (Medium) L (Low)
*** Impact H = (High) M (Medium) L (Low)
**** Severity = Impact X Likelihood (Using the adjacent grid).
***** Status = Happened (H), Worsening (W), Constant (C), Reducing, (R) Disappeared (D),

Sort Risks in descending order of severity and display those that have disappeared in light grey text

LIKELIHOOD			
H	3	6	9
M	2	5	8
L	1	4	7
	L	M	H
	IMPACT		

Risk No	Author	Date identified	Date of last update	Description	Likelihood	Impact	Severity	Countermeasures	Owner	Status
1	Gill Lawrence	20.07.11	15.09.12	PCTs agree to fund the strategy, no indication on how funds are to be accessed.	L	H	7	Discuss issues with individual Trusts, decision made in the context of other capital projects		R
2	Gill Lawrence	20.07.11	15.09.12	PCTs fund only part of the strategy or for a limited period of time	L	H	7	Proceed with implementation but limit clinical implemention to certain anatomical sites or types of treatment.		R
7	Gill Lawrence	02.08.13	02.08.13	No funding identified after March 2015 for the maintenance costs and the staffing required to maintain Dosimetry Check	H	M	6	Develop an NECN strategy, discuss the risk with individual Trusts		C
8	Gill Lawrence	02.08.13	02.08.13	Clinical use of Dosimetry Check is restricted due to limitations of EPID panel size.	H	L	3	Develop a strategy to use another type of IVD for patients where the EPID size and position makes use difficult. The impact is low whilst IVD is not mandatory for all radical patients.		H
3	Gill Lawrence	20.07.11	02.08.132	Software development and release is delayed	M	H	8	Continue with very limited use of TLDs or diodes		D

4	Gill Lawrence	20.07.11	02.08.13	Failure to recruit appropriate clinical scientist staff to commission IVDs	L	H	7	Consider recruitment at another band to release an appropriate person from current duties.		R
5	Gill Lawrence	20.07.11	02.08.13	Failure to recruit additional therapy radiographers to undertake additional work	L	H	7	Consider recruitment at another band to release an appropriate person from current duties		R
6	Gill Lawrence	20.07.11	02.08.13	Availability of transit dosimetry option ceases	L	L	1	Implement use of TLD, diodes or alternative transit dosimetry. Significant personnel resource issues		R

Appendix 4 - External Quality Control Programme

North of England Cancer Network
Radiotherapy NCCG
External Quality Control Programme – April 2013

The purpose of the external quality control programme is to ensure the integrity of the dosimetry chain and the application of the dosimetry chain within the local clinical environment.

The table below indicates the range of individual audits and possible frequency. Nationally each radiotherapy centre belongs to an audit group organised by the Institute of Physics and Engineering in Medicine (IPEM). However the activity within any audit group is dependent on the members and the frequency and range of audit varies.

Name of audit	Frequency of audit	Comments
NECN Dosimetry Audits		
Local audits	After installation of new equipment or introduction of a new procedure	Arranged between the three radiotherapy centres as required
National Dosimetry Audits		
IPEM interdepartmental audits	When arranged within IPEM groups	JCUH belongs to the M62 group. FH and CIC belong to the Scottish + group
National specialist audit	When organised	Specialist areas include - brachytherapy, IMRT, TSEI
NPL audits	Approx every 3 years	Specialist areas include - brachytherapy, Tomo, SXT, photons and electrons
Clinical Trial audits	As required by individual trial protocols	
International Dosimetry Audits		
MD Anderson TLD	Annually	All radiation beams apart from 50kVp
ESTRO TLD audit	Annually	

Appendix 1 lists the audits undertaken within each centre since 2010. The results are reported within the local centre at management review meetings / resource management meetings and at the NECN Radiotherapy Cross Cutting Group as the results become available.

Appendix 1- Report of Audits Undertaken Since 2010

Cumberland Infirmary, Carlisle

	Date	Brief description	Summary of results
Local audits			
IPEM Interdepartmental audit	28/05/10	Scottish plus photon audit Scottish plus electron audit	Outputs within 0.1% at 6X and 10X All electron outputs in the range +0.5% to +1.2% Non std ssd, non std insert, bolus, dose at 90% output measured at -3.2% tolerance ~ 5%
IPEM Interdepartmental audit	01/11/12	Scottish plus photon audit	6MV agreed to 0.9% and 10MV to 0.8%

James Cook University Hospital, Middlesbrough

	Date	Brief description	Summary of results
Local audits	24/05/10	NCCC and JCUH TomoTherapy audit	NCCC and JCUH measured output of Rm9T1 using independent kit. Average of standard plan output was +0.7%, agreement of 0.6% between centres.
IPEM Interdepartmental audit	27/04/10 06/05/10	M62 group Preston audit of JCUH electron dosimetry M62 group JCUH audit of Leeds electron dosimetry	6 MeV energy agreement -1.5%, output agreement +1.65%. 10 MeV energy agreement +2.2%, output agreement +0.31%. 15 MeV energy agreement+1.1%, output agreement +0.88%. 6 MeV energy agreement -4.5%, output agreement -0.5%. 10 MeV energy agreement -3.9%, output agreement +0.24%. 15 MeV energy agreement-0.1%, output agreement -1.18%.
National specialist audit	24/07/11	National rotational IMRT audit.	Comprehensive audit to be carried out 24/07/11 on TomoTherapy with Octavius plus linear array, chambers, film and alanine. Results to be provided.
MD Anderson TLD	07/06/10	MDA TLD audit for TomoTherapy	Ratio of dose from MDACC/JCUH = 1.02
MD Anderson TLD	2010/11 (yearly)	MDA for MV photon beams (all linacs)	Ratio of dose from MDACC/JCUH = 0.98 to 1.01
MD Anderson TLD	2010/11 (yearly)	MDA for MV electron beams (all linacs)	Ratio of dose from MDACC/JCUH = 0.96 to 1.01. Depth of 50% from JCUH stated depth from -0.1cm to 0.1cm
Local audits	16/02/12	NCCC at JCUH	NCCC and JCUH measured photon outputs and TPR 20/10 ratios measured for 6 and 15 MV beams on Linac C (152402).
Local audits	18/12/12	NCCC at JCUH	NCCC and JCUH measured electron outputs and RD,50 ratios measured for 6, 8, 10, 12, 15 and 18 MeV beams on Linac B (152401).
National specialist audit	14/11/12	National rotational IMRT audit.	Comprehensive audit carried out on 14/11/12 using treatment plans from both Masterplan and Monaco TPSs delivered by VMAT on linac B (152401).
MD Anderson TLD	May 2013	TLD audit for TomoTherapy	Ratio of dose from MDACC/JCUH = 0.97 (MDACC tolerance = 0.95 to 1.05)
MD Anderson TLD	May 2013	TLD for MV photon beams (all linacs)	Ratio of dose from MDACC/JCUH = 0.96 to 0.99(MDACC tolerance = 0.95 to 1.05)
MD Anderson TLD	May 2013	TLD for MV electron beams (all linacs)	Ratio of dose from MDACC/JCUH = 0.95 to 1.01. (MDACC tolerance = 0.95 to 1.05 Depth of 50% from JCUH stated depth from -0.1cm to 0.1cm (MDACC tolerance = +/- 0.5cm)

Freeman Hospital, Newcastle upon Tyne

	Date	Brief description	Summary of results
Local audits	24/05/2010	NCCC and JCUH TomoTherapy audit	NCCC and JCUH measured output of Rm9T1 using independent kit. Average of standard plan output was +0.7%, agreement of 0.6% between centres.
IPEM Interdepartmental audit	13/6/2010	Photon (6 and 15MV) and electron (6, 9 and 18MeV) inter-regional audit ring.	Electron Depth of 50% from NCCC stated from -0.3 to +0.6mm. Electron outputs within 1.3% Electron plan agreements within 0.9%. Photon Quality index within 0.1% Photon output within 0.6%
IPEM Interdepartmental audit	Autumn 2012	Photon (6 and 15MV) inter-regional audit ring. Output and quality index.	6MV Quality Index: Ratio (Local/Audit): 1.007 Output at 5cm: Ratio (Local/Audit): 0.997 15MV Quality Index: Ratio (Local/Audit): 1.002 Output at 5cm: Ratio (Local/Audit): 0.986 Output at 7cm: Ratio (Local/Audit): 0.986
National audit	23/07/2011	Pilot Rotational Radiotherapy (PRRA) audit for TomoTherapy	Measurements of a geometric test case and a clinical head&neck case from the ArtDECO trial made using ion chambers, 2D array, gafchromic film and alanine. Average ion chamber result was -0.2% (range -1.0 to 1.3%), agreement with alanine 0.9% and all dose distributions well within tolerance.
Clinical Trial audit	02/08/2012	Dosimetry audit for the PIVOTAL Trial	Dose points in the PTVs (combined IMRT fields +0.3% and -0.7) OARs (+4.4% and +3.9%) where there were higher dose gradients. Gamma analysis of dose distribution showed 99.7% of pixels within 3%/3mm.
Clinical Trial audit	28/10/10	Chhip QA audit	6MV photon energy total measured dose difference for combined IMRT fields 0.65% in target and 0.5% in rectum. Gamma analysis of dose distribution showed 100% of pixels in high dose region and 99.5% of pixels in full distribution within 3%/3mm.

	Date	Brief description	Summary of results
MD Anderson TLD	February 2012	MDA for MV photon beams (all linacs)	ratio of dose from MDACC/NCCC = 0.98 to 1.01(MDACC tolerance = 0.95 to 1.05)
MD Anderson TLD	February 2012	MDA for MV electron beams (rooms 1,4,6)	ratio of dose from MDACC/NCCC = 0.99 to 1.01. (MDACC tolerance = 0.95 to 1.05 Depth of 50% from NCCC stated depth from -0.1cm to 0.1cm (MDACC tolerance = +/- 0.5cm)
MD Anderson TLD	February 2012	MDA for SXT beams	ratio of dose from MDACC/NCCC = 0.97 to 0.98 (MDACC tolerance = 0.90 to 1.10)
MD Anderson TLD	February 2012	MDA for TomoTherapy	ratio of dose from MDACC/NCCC = 1.03 (MDACC tolerance = 0.95 to 1.05)

Appendix 5 - Out of Hours Treatment Service Specification (EBRT)

Procedure for the Provision of Out of Hours Emergency Radiotherapy (On-Call)

Newcastle upon Tyne Hospitals NHS FT

Scope and Objective

To ensure an effective and consistent out of hour's emergency radiotherapy system is provided at NCCC at weekends and Bank holidays (excluding Christmas day).

Responsibilities

The Clinician is responsible for:

- Accurately identifying patient's who require emergency on call radiotherapy (as outlined below)
- Obtaining informed consent from the patient in accordance with *Newcastle Upon Tyne Hospitals NHS foundation Trust Policy for Consent to Examination or Treatment.*
- Contacting the designated lead on -call radiographer and arranging the time of treatment.
- Organising the timely arrival of the patient at NCCC.
- Informing security that the department will be in use
- Defining treatment field parameters
- Providing an approved treatment prescription.

The On- call radiographers are responsible for:

- Liaising with the clinician to organise the call out.
- Switching on the CT scanner and linear accelerator and performing quality assurance and calibration checks.
- Performing and checking monitor unit calculations.
- Scanning and treating the patient.
- Ensuring the patient has left the department and informing security when the on call session has finished.

Documentation

Newcastle Upon Tyne Hospitals NHS foundation Trust Policy for Consent to Examination or Treatment.

Electronic Treatment Prescription	CL01
Patient Identification	CL01
Pregnancy Procedure	CL01
Emergency on Call Radiotherapy	IS01
Record of Concomitant Doses	IS01
Procedure for Scanning a Patient	IS02
Reference Permanent Skin marks Procedure	IS02
Pregnancy Status Procedure	IS02
CT Protocols	IS02
Radiotherapy Virtual Simulations	IS03
On Call Checking of Prosoma	IS03
Out of Hours Treatment Delivery	RA05
Treatment Techniques	RA05
Patient Identification	RA06

Monitor Unit Calculation Procedure for Unplanned Treatments	RP01
Run Up Procedures	RT01
Errors and Inaccuracies in Radiotherapy	RP11

Method

The radiotherapy service available out of hours is limited to specified clinical needs and treatments. The following guidelines have been established with consideration to safety and level of support services.

Emergency on-call treatment is provided for:

- Spinal cord compression where there is a potential clinical benefit to the patient. Radiotherapy treatment is not appropriate when the patient's condition has resulted in paralysis.
- Superior Vena Cava Obstruction where the option of stenting is not available.
- Severe haemorrhage/haemoptysis which is not controlled by other methods.
- Stridor where tracheotomy/intubation is not appropriate.

Radiotherapy Treatment Options

- Treatment is available for 1 fraction only over a standard weekend period.
- Treatment is available for 2 fractions over a four day Bank Holiday weekend.
- Emergency patients who have received treatment on a Friday are not eligible for emergency on-call treatment.
- Virtual simulation and Prosoma planning will be provided when these functionalities are clinically available.
- Treatment will be delivered using a 6MV photon beam only.
- Single applied fields prescribed at Dmax or parallel opposed pairs will be available.
- There is no provision for beam shaping.

Radiation errors/inaccuracies during on-call treatment

In the event of a radiation error/inaccuracy the lead radiographer must inform the prescribing clinician immediately. The lead radiographer may contact the radiotherapy service manager/deputy should they require any additional advice. The clinician will advise the radiographers of any immediate clinical corrective action required and annotate this instruction on the patient prescription sheet. The clinician may seek advice from the consultant oncologist on-call in making this decision. Where immediate clinical corrective action is requested the radiographers will action this and annotate the details on the radiotherapy record sheet. For fractionated courses of radiotherapy, it may be possible to delay corrective action until the next working day to allow consultation with the appropriate consultant clinical oncologist and head of radiotherapy physics. The incident must be reported to the radiotherapy service manager/deputy on the next working day by the lead radiographer.

Emergency Call Out Process

Notes for clinician

Radiographers are available between 9am and 5pm. Call outs should be made before 3.30pm. The patient must be at NCCC by 3.30pm for treatment to be delivered that day

The clinician requesting the call out is responsible for obtaining informed consent from the patient according to NUTHT policy

The clinician must contact the portering service via the FRH switchboard to arrange transport of the patient from the ward where necessary

The clinician must remain in the radiotherapy department until the patient has left the department to provide medical support

Clinician contacts designated lead on-call radiographer via FRH switchboard

↓

The lead radiographer responds within 15minutes

↓

Organisational arrangements are agreed between the clinician and lead radiographer

↓

The lead radiographer contacts the second radiographer within 15mins to confirm arrangements

↓

The clinician is responsible for ensuring the patient arrives at level 1 NCCC at the agreed time

↓

The clinician is responsible for informing the security service via the FRH switchboard that the department will be in use

↓

The radiographers switch on and run up the CT scanner and linear accelerator and undertake quality assurance and calibration checks

↓

The radiographers will scan and treat the patient

↓

The lead radiographer ensures the patient has safely left the department and advises security that treatment is complete

↓

The lead radiographer is responsible for ensuring that all radiotherapy equipment is switched off where appropriate

Notes for radiographers

The on-call rota is posted in the radiographer rest room and designates an imaging and treatment radiographer. One radiographer is designated organisational lead

The radiographers will report for duty 30 minutes prior to the arranged treatment time

Quality checks are carried out in accordance with departmental procedures. Advice and support may be sought from the radiotherapy technology group prior to the call-out

The imaging radiographer will assume radiographic lead responsibility in the scanning and prosoma planning process. The treatment radiographer will assume lead radiographic responsibility for the treatment process

Additional treatments are scheduled by the lead radiographer in collaboration with the scheduling department

South Tees Hospitals NHS FT

1.0 PURPOSE

To detail the treatment criteria, marking up and treatment of patients referred for emergency radiotherapy.

2.0 INSTRUCTION

Use this Operational Instruction in conjunction with:

- Trust Procedure G38 - Policy & procedure for the positive identification of patients
- EB-XRT-01 Delivery of Radiation Treatment
- EB-XRT-02 Responsibilities of radiographers and assistant practitioners on a treatment unit
- EB-IM-7 Routine field placement on Prosoma for patients NOT requiring dosimetry calculation
- GEN-04 Patient Care
- GEN-06 Positive identification of patient
- GEN-24 Responsibilities of radiographers in the imaging section
- Mosaiq-4 Entering unplanned patients into Mosaiq

2.1 The following categories of patients will be accepted for treatment outside the agreed opening hours of the Department.

* Spinal cord compression
* Superior Vena Cava Obstruction

2.2 Patients are accepted for emergency treatment from 8.30 – 17.00 at weekends and bank holidays and from 17.00 -- 19.00 on weekdays. On Christmas day, boxing day and New Years day on call hours are 8.30 – 14.00

2.3 Patients who are already in the Department before 17.00 will be treated as usual with staff staying late on the allocated Linear accelerator.
Patients arriving in the department after 17.00 will be treated by the on-call staff

2.4 Marking up, planning and treatment of on-call patients is ONLY carried out in the radiotherapy department on the main hospital site.

2.5 The Consultant Clinical Oncologist (CCO) requesting the treatment will contact the on-call staff by telephone to arrange to treat the patient

2.6 The radiographers switch on the appropriate linear accelerator and perform the daily checks. If the accelerator fails on any check the process is repeated on the alternative linear accelerator. The machine can only be used to treat a patient if all the checks are within the accepted tolerances.

2.7 CT should also be switched on and checks performed.

2.8 The patient is marked up in accordance with EB-IM-7. Approval of Prosoma work by the CCO MUST be completed before treatment is given. A set up sheet is also completed.

2.9 The calculation to determine dose/monitor units/treatment time is carried out by one radiographer using Radcalc and then it is independently checked manually by the second radiographer.

2.10 Treatment parameters MUST be entered into Mosaiq and the data entry checked in accordance with the Mosaiq user guides before treatment commences.

2.11 The patient's details MUST be entered onto the Mosaiq scheduler before treatment commences.

3.0 KEY POINTS

3.1 All treatment calculations are checked independently using primary data sources.

3.2 On-call patients **Are Not Treated** in the Endeavour Unit

RADIOTHERAPY NCCG

TRAINING AND ASSESSMENT POLICY

Document Information

Title:	Radiotherapy NCCG Training and Assessment Policy
Author:	NCCG Group
Circulation List:	Radiotherapy NCCG
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Version History:

Date:	20.02.12	v.0.3	Review Date:	May 2013

The NCCG Training and Assessment policy covers the following professional groups for their activities in the radiotherapy departments of the network:

- clinical oncology
- therapeutic radiographers
- clinical scientists in radiotherapy physics
- clinical technologists in radiotherapy
- diagnostic radiographers (where appropriate).

As part of the policy the following criteria must be met to ensure that the service is delivered by professionals who are competent in their own area and have relevant documentation as evidence:

1 To be considered independently capable of delivering their profession's input into a given part of the process, or be the person who should be present in a team of people inputting into that part of the process who, otherwise, individually may be at various levels of training; then they should have their competence for that part of the process, assessed and documented in a training record

2 In addition to the possession of documented competencies, the final responsibility for certain key activities should be restricted to certain of the professional groups, as follows:

i) overall clinical responsibility for a named patient at any one point in that patient's care pathway should lie with a named consultant in clinical oncology

ii) the decision to treat with a course of radiotherapy, obtaining informed consent to a course of radiotherapy and prescription of a course of radiotherapy should be by a medically qualified person working in clinical oncology at ST3 level or above, and therapeutic radiographers and non consultant career grades (NCCGs) who are trained and assessed as competent according to the provisions set out below

This competence is an approved Skills for Health competence
Ref: https://tools.skillsforhealth.org.uk/competence/show?code=R9 and is achieved through studying a relevant M level module and gaining approved competence locally in conjunction with a clinical oncologist in line with the Skills for Health occupational Standard.

iii) the method for finally checking the accuracy of the dose to be delivered by a course of radiotherapy should be determined by a medical physics expert

iv) the final responsibility for delivering an exposure of therapeutic external beam radiotherapy lies with a registered therapeutic radiographer

v) the final responsibility for the 'absolute' calibration (i.e. Against a secondary standard) of a treatment machine should lie with a clinical scientist (radiotherapy physics)

vi) the final responsibility for QA/QC of computer planning systems and imaging equipment in the department should lie with a clinical scientist (radiotherapy physics)

vii) the final responsibility for exposing a patient to radiation for diagnostic or investigatory purposes (including imaging for localisation and verification) should lie with either a registered therapeutic radiographer or a registered diagnostic radiographer.

3 The criteria for a staff member to be considered as an assessor of competence are:

Each staff member, recognised as being an assessor of competence within a certain area, may nominate another appropriately trained person within their own profession to be an assessor if they can demonstrate that the nominated staff member has reached an acceptable level to act as an assessor. For example, the staff member and nominated staff member must be from a recognised profession that works in Radiotherapy, i.e. Radiographers, Physicist, Technicians etc.

- The staff member and nominated staff member must be from a recognised profession that works in radiotherapy e.g Radiographers, Physicist, Technicians etc.
- The nominated staff member should be considered as experienced and expert in the appropriate field and able to assess the competencies in that area which they themselves are competent in.
- The nominated staff member must ensure that any uncertainties are addressed by a more experienced assessor of the same profession

Scope

The 4 main professions involved in the safe delivery of radiotherapy are:

Clinical Oncologists
Therapeutic Radiographers
Radiotherapy Physicists
Radiotherapy Technologists

Each department within the Network should have policies in place for each of the professions. The policies will be governed by the department's own Quality System procedures and will identify the practices undertaken, what training is required and how competency is assessed and maintained. Where key responsibilities are restricted to specific professions this will be indicated in the documentation.

Assessors of Competence

Competency requirements have been agreed within each department and the Network holds a list of the assessors. This list is reviewed and updated annually by each department.

Renewal of Competency (11-1E-114t)

Once a member of staff has been declared as competent in a specific area, this competency will continue for as long as the person practices within the area of the assessment with the exception being that significant work changes warrant new training and competencies to be identified.

Continued competency is confirmed at annual appraisal and if a staff member has not undertaken duties in a specific area over an agreed length of time then renewal of competence assessment will be required.

The authorisation to act as an assessor will continue for as long as the staff member maintains competency in the relevant area of work.

Medical staff are subject to annual appraisal which includes assessment of the RCR Continuing Medical Education requirement to maintain competence as per a five year cycle.

Appendix 7 - Network List of Assessors (EBRT)

Newcastle upon Tyne Hosptials NHS FT

Radiotherapy – List of Assessors

The Northern Centre for Cancer Care at Freeman Hospital, Newcastle upon Tyne has a list of authorised assessors of competence for Radiotherapy practice. The list is as follows:

Area of Competence	Named Assessor	Area of Competence	Named Assessor
Primus RTT 2.1 / Oncor RTT4.2	Superintendent Radiographers	MOSAIQ-ProSoma Transfer	Mrs A Ogilvie
	Senior Radiographers		Mrs S Driver
Optivue	Superintendent Radiographers		Mrs R Pickles
	Senior Radiographers		Mrs J Small
MOSAIQ	Mrs J Johnson	Tomotherapy	Mrs S Dickson
	Superintendent radiographers		Mrs A Brewis
	Senior Radiographers		Mr P Addison
Daily Linac QA	Mr R Small		Miss D Jones
	Miss S Kirby	Clinical Mark up	Mrs E Murphy
	Mrs C McFetrich		Mrs C Irving
Breast Verification Prep	Mrs A Ogilvie		Mrs S Driver
	Mrs S Driver	WBRT	Mrs S Dickson
	Mrs R Pickles		Mrs A Ogilvie
	Mrs J Small		Mrs S Driver
	Mrs C McFetrich		Mrs R Pickles
Breast Verification on Linac	Mrs A Ogilvie		Mrs E Murphy
	Mrs S Driver		Mrs J Small
2D Image Analysis	Mrs S Dickson	CT Scanning/ProSoma (Imaging Section)	Mrs A Ogilvie
	Mrs A Ogilvie		Mrs J Heywood
	Mrs S Driver		Miss N Smith
	Mrs R Pickles		Mrs A Jackson
	Mrs J Small		Mrs J Kotre

Area of Competence	Named Assessor	Area of Competence	Named Assessor
	Mrs C McFetrich	Fast Track	Dr A Branson
M Vision Cone Beam	Mrs S Driver	Consent to Radiotherapy	Dr AN Branson
	Mrs J Small		Dr UK Mallick
CT Vision level 1	Mrs A Ogilvie		Dr HH Lucraft
CT Vision level 2 (Soft Tissue)	Mr P Addison		Dr CG Kelly
CT Vision level 3 (Head and Neck)	Mr P Addison		Dr WB Taylor
	Mrs A Ogilvie		Dr W Dobrowsky
SXT	Mrs J Johnson		Dr P Mulvenna
	Mrs R Foster		Dr R McMenemin
File Prep	Miss V Matthews		Dr F McDonald
	Mrs J Plummeridge		Dr J Lewis
SlimOMP	Mrs M Wilkinson		Dr D Lee
Scheduling	Miss V Matthews		Dr K Wright
	Mrs J Plummeridge		Dr J Frew
MRI	Mrs Jill McKenna		Dr I Pedley
On call –Treatment Radiographers	Mrs A Ogilvie		Dr P Atherton
	Imaging Team leaders		Dr H Turner
On Call – Imaging Radiographers	Senior Treatment Radiographers		Dr E Lethbridge
			Dr G Shaikh
			Dr J Kovarik
		External Beam Radiotherapy Planning	Dr AN Branson
			Dr UK Mallick
			Dr CG Kelly
Radiation prescription	Dr AN Branson		Dr WB Taylor
	Dr UK Mallick		Dr W Dobrowsky
	Dr CG Kelly		Dr P Mulvenna
	Dr WB Taylor		Dr R McMenemin

Area of Competence	Named Assessor	Area of Competence	Named Assessor
	Dr W Dobrowsky		Dr F McDonald
	Dr P Mulvenna		Dr K Wright
	Dr R McMenemin		Dr J Frew
	Dr F McDonald		Dr I Pedley
	Dr J Lewis		Dr P Atherton
	Dr D Lee		Dr H Turner
	Dr K Wright		Dr E Lethbridge
	Dr J Frew		Dr G Shaikh
	Dr I Pedley		Dr J Kovarik
	Dr P Atherton		
	Dr H Turner		
	Dr E Lethbridge	Gynaecological Brachytherapy	Dr A N Branson
	Dr G Shaikh		Dr W B Taylor
	Dr J Kovarik		
		Patient Dosimetry	Mr S Locks
			Dr J Byrne
			Dr H McCallum
Ext Bm equipment QC	Dr V Allen		Dr J Mott
	Mr R Dacey	Radiobiology	Mr S Locks
	Ms K Hawthorn	Reference Dosimetry	Mr S Locks
RT Data Archiving	Dr H McCallum		Mr R Dacey
CT-MRI Fusion	Dr H McCallum	Dosimetry Check	Dr V Allen
(Prostate/Gynae/Brain)	Mrs M Wilkinson	OnQ	Dr H McCallum
ProSoma/Masterplan/Use of MU check software (Overview of planning functionality/QA Procedures)	Mrs M Wilkinson		
Basic External Bm Planning/checks (Category 3 plans)	Mrs K Wilkes	Imaging Eq't QC	Dr V Allen
	Mrs T Wintle		Mr R Dacey
	Mrs L Huthart		Ms K Hawthorn
	Mr A Steele		

Area of Competence	Named Assessor	Area of Competence	Named Assessor
Conformal Ext Bm Planning/checks (Category 4 plans)	Mrs M Wilkinson	TomoTherapy QC	Ms K Hawthorn
	Mrs K Wilkes	Complex Electron Planning	Dr H McCallum
	Mrs T Wintle		Ms N Kent
	Mrs L Huthart		
	Mrs M Wilkinson		
Complex Ext Bm Planning (Cranio-spinal technique)	Mrs K Wilkes	TomoTherapy	Dr J Mott
	Mrs T Wintle	IMRT – prostate	Dr J Mott
	Mrs L Huthart	IMRT – H&N	Dr J Mott
	Mrs M Wilkinson	MOSAIQ	Mr N West
Complex Ext Bm Planning	Mrs K Wilkes		
	Mrs T Wintle		
	Dr H McCallum		

South Tees Hospitals NHS FT

Radiotherapy – List of Assessors

The Clinical Oncology Department at the James Cook University hospital, Middlesbrough has a list of authorised assessors of competence for Radiotherapy practice. The list is as follows:

Area of competence	**Named Assessor**	**Area of Competence**	**Named Assessor**
Radiotherapy Prescriptions	Dr PRC Dunlop	Use of Siemens CT scanner	Joanna Reynolds
	Dr AJ Rathmell		Emma Thompson
	Dr J Hardman		Michelle Watson
	Dr N Storey		Marie Turnbull
	Dr N Wadd		Emma Banham
	Dr DC Wilson		Claire Butterfield
	Dr D Shakespeare	Use of Mosaiq	Paul Bartley
	Dr C Peedell		Catherine Wilson
	Dr E Aynsley		
	Dr J McBride (pall only)	Mosaiq Scheduling	Joanna Reynolds
	Dr M Adusumalli		Marie Turnbull
	Dr J Van Der Voet		Emma Banham
	Dr S Lawless	Defib.	Claire Butterfield
		Use of Therapax	Catherine Wilson
			Gita Bhanvra
			Marie Turnbull
Management Issues	Fiona Milnes	Use of CR	Paul Bartley
			Catherine Wilson
Use of Ximatron Simulator	Joanna Reynolds		
	Emma Thompson		
Ximatron (cont)	Michelle Watson	Use of Tomotherapy	Helen Bayles
	Marie Turnbull		Karen Pilling
	Emma Banham	Plan checking	Pauline Summers

Area of competence	Named Assessor	Area of Competence	Named Assessor
Use of Toshiba CT scanner	Claire Butterfield		James Green
	Claire Reeve		Leanne Land
	Joanna Reynolds		Chris Walker
			Neil Richmond
Use of Elekta Synergy (Agility) (LAA, LAB, LAC, LA4 and LA5)	Karen Pilling	IMRT	Karen Pilling
	Claire Huntley		Claire Huntley
	Helen Bayles		Helen Bayles
	Catherine Wilson		Chris Walker
			Neil Richmond
		XVI	Karen Pilling
			Claire Huntley
			Helen Bayles
			Catherine Wilson
		Dosimetry check	Helen Bayles
Use of Varian EX	Claire Powlesland		Robert Brackenridge
Prosoma	Joanna Reynolds	On call imaging	Joanna Reynolds
	Emma Thompson		Michelle Watson
	Michelle Watson		
	Marie Turnbull	Portal vision	Claire Powlesland
	Emma Banham		Catherine Wilson
	Claire Butterfield		
	Pauline Summers		
	Leanne Land		
	James Green		
	Niry Kara		

Area of competence	Named Assessor	Area of Competence	Named Assessor
I View	Catherine Wilson		
	Karen Pilling		
	Claire Huntley		
	Paul Bartley		

The above list is representative of the competencies for:

- Clinical Oncologists relating to medical staff in the protocols indicative of the sites they sub specialise in.
- Radiographers at a band 6 or 7 who are deemed as the main assessors for the listed areas.
- Radiotherapy Physicists for the area in Radiotherapy planning that they assess.

North Cumbria University Hospitals NHS Trust

Radiotherapy – List of Assessors

The Clinical Oncology Department at the Cumberland Infirmary, Carlisle has a list of authorised assessors of competence for Radiotherapy practice. The list is as follows:

Area of Competence	Named Assessor	Area of Competence	Named Assessor
Radiotherapy Prescriptions	Dr Sandeep Singhal	**Use of Eclipse**	Mrs Maureen McGuckin
	Dr Jonathon Nicoll		Mrs Bobby Crosbie
	Dr Paul Dyson		Mrs Gill McQuade
	Dr Anil Kumar		Mrs Jane Lamont
Management Issues	Mrs Maureen McGuckin		Mrs Jane Fallon
Use of Simulator	Mrs Maureen McGuckin		Ms Sally Frankish
	Mrs Bobby Crosbie		Ms Louise Morrison
	Mrs Gill McQuade	**Plan Checks**	Mrs Maureen McGuckin
	Mrs Jane Lamont		Mrs Bobby Crosbie
	Mrs Jane Fallon		Mrs Gill McQuade
	Ms Sally Frankish		Mrs Jane Lamont
	Ms Louise Morrison		Mrs Jane Fallon
Use of CT	Mrs Maureen McGuckin		Ms Sally Frankish
	Mrs Bobby Crosbie		Ms Louise Morrison
	Mrs Gill McQuade	**Physics Plan Checks**	Mr Stephen Mattock
	Mrs Jane Lamont		Mrs Teresa Heath
	Mrs Jane Fallon		Mrs Teresa Clark
	Ms Sally Frankish		
	Ms Louise Morrison		

Area of Competence	Named Assessor	Area of Competence	Named Assessor
Use of Linear Accelerators	Mrs Helen Taylor	**VARIs data entry**	
	Mrs Gill McQuade		Mrs Maureen McGuckin
	Mrs Jane Lamont		Mrs Helen Taylor
	Mrs Jane Fallon		Mrs Bobby Crosbie
	Ms Sally Frankish		Mrs Gill McQuade
	Mrs Louise Morrison		Mrs Jane Lamont
Use of Gammamed	Mrs Helen Taylor		Mrs Jane Fallon
	Mrs Gill McQuade		Ms Sally Frankish
	Mrs Jane Lamont		Ms Louise Morrison
	Mrs Jane Fallon		
	Ms Sally Frankish		
	Mrs Louise Morrison		

The above list is representative of the competencies for:

- Clinical Oncologists relating to medical staff in the protocols indicative of the sites they sub specialise in.
- Radiographers at a Band 7 or above who are deemed as the main assessors for the listed areas.
- Radiotherapy Physicists for the area in Radiotherapy planning that they assess.

There are other staff who are capable of being assessors and this is shown in the ‘Competencies Matrix’.

Appendix 8 - Brachytherapy - Network List of Assessors

Newcastle upon Tyne Hospitals NHS FT

Radiotherapy – List of Brachytherapy Assessors

The Northern Centre for Cancer Care at Freeman Hospital, Newcastle upon Tyne has a list of authorised assessors of competence for Brachytherapy practice. The list is as follows:

Area of Competence	Named Assessor	Area of Competence	Named Assessor
Brachytherapy Dosimetry	Mr S Locks	Daily QA - HDR	Mr N Scott
Gynaecological Brachytherapy	Dr AN Branson	Treatment delivery - HDR	Mr N Scott
	Dr WB Taylor	Safe working practices - HDR	Mr N Scott
	Dr G Shaikh	Radiation protection supervisor	Mr N Scott
Prostate I-125 implant	Dr J Frew	Iodine -125 QA	Mr N Scott
	Dr R McMenemin	Iodine -125 seed preparation	Mr N Scott
Consent for brachytherapy	Dr AN Branson	Brachytherapy prescription	Dr AN Branson
	Dr WB Taylor		Dr WB Taylor
	Dr G Shaikh		Dr J Frew
	Dr J Frew		Dr R McMenemin
	Dr R McMenemin		Dr P Atherton
	Dr P Atherton		Dr P Mulvenna
	Dr P Mulvenna		Dr C Kelly
	Dr C Kelly		

South Tees Hospitals NHS FT

Radiotherapy – List of Brachytherapy Assessors

The Clinical Oncology Department at the James Cook University Hospital has a list of authorised assessors of competence for Brachytherapy practice. The list is as follows:

Area of Competence	Named Assessor	Area of Competence	Named Assessor
Brachytherapy Prescriptions	Dr AJ Rathmell (gynae)	Management Issues	Chris Walker
	Dr M Adusumalli (cervix)		
	Dr DC Wilson (Upper GI)	Removal of Upper GI applicators	Dr N Wadd
	Dr N Wadd (Upper GI)		Dr DC Wilson
			David Wilson (Mould room)
Use of HDR unit	Joanna Reynolds	Removal of Vaginal applicators	Joanna Reynolds
	Marie Turnbull		Marie Turnbull
	David Wilson (Mould room)		Michelle Watson
Physics use of HDR unit	Chris Walker	Removal of Cervix Applicators	Dr AJ Rathmell
	Neil Richmond		Dr M Adusumalli
	Andy Lecomber	Insertion of Applicators	Dr AJ Rathmell (gynae)
	Onuora Awunor		Dr M Adusumalli (Cervix)
	Rob Brackenridge		Mr YKS Viswanath (upper GI)
	Jim Daniels		Mr S Dresner (Upper GI)
			Dr H Dallal

The above list is representative of the competencies for:

- Clinical Oncologists competent as being assessors for prescribing Brachytherapy.
- Radiographers at a Band 7 who are deemed as the assessors for the listed areas.
- Senior Medical Physics Tech. Band 7 deemed as assessor for Brachytherapy
- Radiotherapy Physicists for Brachytherapy planning.

North Cumbria University Hospitals NHS Trust

Radiotherapy – List of Brachytherapy Assessors

The Clinical Oncology Department at the Cumberland Infirmary, Carlisle has a list of authorised assessors of competence for Brachytherapy practice. The list is as follows:

Area of Competence	Named Assessor	Area of Competence	Named Assessor
Brachytherapy Prescriptions	Dr Sandeep Singhal		Mrs Jane Fallon
	Dr Jonathon Nicoll	**Removal of Upper GI & CVC applicators**	Mrs Helen Taylor
	Dr Paul Dyson		Ms Anne O'Sullivan
	Dr Anil Kumar		Mrs Gill McQuade
Management Issues	Mrs Jane Lamont		Mrs Jane Lamont
	Mrs Helen Taylor		Mrs Jane Fallon
Use of HDR Unit	Mrs Helen Taylor		Ms Louise Morrison
	Ms Anne O'Sullivan		Ms Sally Frankish
	Mrs Gill McQuade	**Insertion of CVC applicators**	Dr Sandeep Singhal
	Mrs Jane Lamont		Mrs Helen Taylor
	Mrs Jane Fallon		Ms Sally Frankish
	Mrs Lesley Green		Ms Anne O'Sullivan
	Ms Louise Morrison		Ms Jane Fallon
	Ms Sally Frankish		Mrs Jane Lamont
Physics use of HDR Unit	Mr Stephen Mattock		Ms Louise Morrison
	Mrs Teresa Heath		
	Mrs Teresa Clark	**Verification of Upper GI applicator**	Mrs Helen Taylor
			Ms Anne O'Sullivan
Removal of 'Fletcher' Applicators	Dr Sandeep Singhal		Ms Louise Morrison
	Ms Sally Frankish		
	Ms Anne O'Sullivan		

Area of Competence	Named Assessor	Area of Competence	Named Assessor
	Mrs Jane Lamont		
Brachytherapy Physics Plan Checks	Mr Stephen Mattock		
	Mrs Teresa Heath		
Care of Brachytherapy Applicators	Ms Sharon Austin		
Physics Management Issues	Mr Steve Mattock		

The above list is representative of the competencies for:

- Clinical Oncologists competent as being assessors for prescribing Brachytherapy.
- Radiographers at a Band 6, 7 or above who are deemed as the main assessors for the listed areas.
- Radiotherapy Physicists for Brachytherapy planning.

NHS
North of England Cancer Network

RADIOTHERAPY NCCG

Friday 24th February 2012, 3:00pm
Evolve Business Centre, Houghton-le-Spring

M I N U T E S

Present:	Debbie Bennett, Dept of Radiotherapy Services Manager, NCCC	**DB**
	Chris Hartley, Cancer Lead Clinician, Sunderland	**CH**
	Gill Lawrence, Head of Radiotherapy Physics, RMPD	**GL**
	Jim Methven, Head of Medical Physics, North Cumbria	**JM**
	Fiona Milne, Radiotherapy Manager, South Tees	**FM**
	Adrienne Moffet, Radiotherapy Project Manager, NECN	**AM**
	Ian Pedley, Consultant Clinical Oncologist, Newcastle	**IP**
	Adrian Rathmell, Consultant Clinical Oncologist, South Tees	**PP**
	Debra Redding, Research & Development Radiographer, Newcastle	**DR**
	Bill Richardson, Cancer Modernisation Manager, NECN	**BR**
	Sandeep Singhal, Consultant Oncologist Clinical Lead, North Cumbria	**SS**
	Emma Thompson, Research Radiographer, South Tees	**ET**
	Chris Walker, **Chair,** Head of Radiotherapy Physics, South Tees	**CW**
	Margaret Warner, User Representative, NECN	**MWa**
	Andrew Welch, Lead Cancer Clinician, Newcastle	**AW**
In Attendance:	Ann Bassom, Network Co-ordinator, NECN	**AB**
Apologies:	Gwen Barker, Radiotherapy Manager, North Cumbria	**GB**
	Tony Branson, Clinical Oncologist**,** Newcastle Hospitals	**ANB**
	Peter Dunlop, Clinical Oncologist, South Tees	**PD**
	Mandy Headland, Divisional Manager, South Tees	**MH**
	Susan Lamb, Radiotherapy Service Manager, Newcastle Hospitals	**SL**
	Steve Mattock, Head of Radiotherapy Physics, North Cumbria	**SM**
	Roy McLachlan, Network Director, NECN	**RMcL**
	Ken Roxborough, IT Project Manager, South Tees	**KR**

1. INTRODUCTION

a. Welcome & Apologies

CW welcomed everyone to the meeting. Apologies were noted as above and introductions were made.

b. Previous Minutes – 04/11/11

The previous minutes were confirmed as a correct record of the meeting.

c. Action Points from Previous Meeting

- **Working Group Update**

BR reported on recent discussions held with commissioners and the following comments were noted:

- There is a tariff arrangement which will be developed by commissioners.
- Commissioners recognise the need for flexibility.
- Commissioners have asked what the drivers for change are and do they now need to be an agenda item for the commissioning meetings and whether radiotherapy managers are talking to their contract teams.

The group discussed the national position regarding tariffs and agreed to benchmark current activity from the 3 centres against national tariffs and bring results back to the next meeting. It was noted that this will need executive level clearance. **DB/MH/GB**

- **Commissioning Representative**

To be progressed.

- **Invivo-dosimetry for the Centre and the Network**

GL reported on various discussions and confirmed that Clatterbridge Oncology will support the process and an initial timetable has been agreed. Clatterbridge have offered the opportunity of a visit to the service. Ongoing support over a period of time (to be agreed) will be included in the package. The timeframe will be Carlisle – April – May; Newcastle – June – July; James Cook – September – October.

To be kept on the agenda for progress updates and to be included in the work programme. **GL/BR**

GL confirmed that OnQ will be part of the set up. A working group will be established to progress a network approach possibly starting with Head & Neck cancers. GL raised concerns on behalf of Newcastle Hospitals Trust regarding financial arrangements and agreed to share a proposed financial arrangement for each of the 3 centres. **GL**

- **Tomotherapy Masterclass - update**

IP updated on the current position. Training is still available and IP agreed to follow up. GL highlighted that OSL are visiting Newcastle on 23 March. **IP**

2. SPECIFIC ISSUES ARISING

a. Radiotherapy Project Update

AM updated on progress to date. A market engagement event is being planned at the end of May to determine interest following which a procurement specification will be developed.

Radiotherapy Service in Carlisle – Sustainability of Provision

CW noted that implications for radiotherapy in Carlisle would fit with the radiotherapy project. JM highlighted difficulties in recruiting suitable

candidates to radiotherapy physics in Carlisle. The service is looking at skill mix to support service delivery however there is a limit to the impact this can have. There is some limited support offered from Newcastle. The group noted experienced clinical scientists are a limited resource across the whole network. GL offered support for the set up of invivo-dosimetry in Carlisle. JM noted that the Trust is currently out to advert again. The group acknowledged a need for a network wide approach. AW highlighted the difficulties around North Cumbria's reconfiguration and suggested that the Network group can offer support and ask the Network Director to raise this issue with Northumbria Healthcare Trust as they progress the Trust merger. This was supported by the group and BR agreed to discuss with RMcL. The group also acknowledged that the offer of support for patient care from Newcastle is only a holding measure. CH suggested that this group documents what the service in Carlisle should be able to offer in line with NCAT recommendations. **BR**

b. Radiotherapy Modelling

CW referred to the letter from Mike Richards requesting local intelligence and local demand analysis regarding radiotherapy modelling in the future. DB and FM to update the group following a national meeting early next month. **DB/FM**

c. Key Documents

- **Annual Report**
- **Constitution**
  - **Configuration of Services**
- **Work Programme**

The key documents were endorsed by the group. Members were asked to forward any additional updates / comments to carol.mayes@necn.nhs.uk. It was noted that a training and education policy has been developed which will be appended to the annual report.

d. Clinical Guidelines

- **Standardised Radiotherapy Protocols – update on progress**

AR reported on progress with the gynae protocols which are almost complete. Standardisation of the urology guidelines are also progressing. The group recommended that this is kept on the NSSG agendas and a progress report brought back to this meeting. The use of Webex to be encouraged.

The group agreed that it was the individual consultant's responsibility that appropriate numbers of brachytherapy patients are recorded and joint sessions are discussed / arranged as appropriate.

The group discussed the possible use of shared surgical sessions within the Network and agreed to further discussions at Trust level.

- **Guidelines for Benign Conditions**

The group discussed various benign conditions. IP/DB agreed to share a list of protocols for further discussions. **IP/DB**

e. QPulse

BR reported that the Network is considering QPulse as a method of version control for the website. Financial implications in Carlisle were noted. BR agreed to discuss further with RMcL. **BR**

f. Activity / Cancer Waiting Times

	Radicals	Palliative	Fractions (April to January)
Newcastle	19 days	10 days	52,000
Carlisle	20 days	6 days	8, 311
South Tees	16 days	9 days	34,520

3. AUDIT PROGRAMME

a. Off Protocol Procedures

FM reported that South Tees had 5 off protocol procedures in January of which 2 were the same. Newcastle figures to be obtained. Carlisle had 1 off-protocol procedure. The group agreed to ask ANB to liaise with radiotherapy managers to continue with this audit. **ANB**

b. Consent for Radiotherapy

IP updated on the review of consent forms in Newcastle. A trial in colorectal and breast cancers is being planned for standardised consent forms. The group agreed that some elements of the forms such as side effects could be standardised across the network.

c. Any Other Audits

ET referred to radiotherapy for breast conservation and chemoradiotherapy for cervix which are Royal College audits.

4. RESEARCH

a. Clinical Trials Recruitment Report

The group noted the portfolio and recruitment report. The group discussed ways of working more collaboratively across the network.

b. Programme of Improvement

The Research networks will provide recruitment data in February to all MDTs in order that the MDT's submit there own proformas to the NSSG for review in line with Peer review Programmes for Improvement.

5. CLINICAL GOVERNANCE ISSUES

CW reported there had been IRMER incident in the Trust and any learning

will be shared with the group at a future meeting.

6. SERVICE USER INVOLVEMENT PROGRAMME

a. Radiotherapy Patient Survey

To update at the next meeting.

b. Network Service User Partnership Group (NSUPG)

MW reported on the current position of the NSUPG in relation to new attendees and developing the constitution of the group. MW noted the group was still keen to do the 5 senses survey.

The group noted the following update from the Network Patient and Carer Manager:

- Cancer Peer Review Measures launched for service users summer 2011
- North of England Cancer Network has recruited over 600 service users who wish to be involved with the network. Level of involvement varies from attending meetings to being involved in document consultations and questionnaires
- Peer Review measures specific in membership of the NSUPG
- Interim group meetings Jan and March 2012 - service users from each locality are represented
- Meetings planned for Feb and March to meet service users who have signed up to be involved with the Network
- Currently mapping what groups exist in each locality
- 2 representatives from each locality will feed into the NSUPG
- Chair and Vice chair will be appointed for the NSUPG which will meet 4 times a year
- Recent peer review visit highlighted need as Network to ensure that we have correct representation of service users on each NSSG
- NSUPG at last meeting agreed that best practice is for all service users who sit on NSSG's to have signed up to the Networks database

7. ANY OTHER BUSINESS

Skin Care – it was noted that national guidelines are being developed. It was agreed to place this on the next agenda. **AB**

National Physics Laboratory – GL referred to the service level agreement with the laboratory which is due to be paid by the end of May. The suggestion was that Newcastle continues to host the SLA and the other centres contribute their share.

8. CLOSE OF MEETING

a. Date of Next Meeting

The group agreed to an additional meeting at the end of April.

b. Review of Minutes and Sign Off

The group reviewed the minutes and agreed them as a correct record of the meeting.

Post Script –the next meeting is now confirmed as 04 May 2012, 3:00pm, Evolve Business Centre. Future dates to be discussed at this meeting but currently stand as:

- Friday 25 May 2012, 3:00pm, Evolve Business Centre
- Friday 26 October 2012, 3:00pm, Evolve Business Centre

Contact: ann.bassom@necn.nhs.uk

Appendix 10 – Equipment Replacement Strategy

NEWCASTLE UPON TYNE HOSPITALS NHS TRUST

Northern Centre for Cancer Care
Long Term Radiotherapy Equipment Replacement Strategy

1. Executive summary

The Northern Centre for Cancer Care (NCCC) provides radiotherapy to the geographical area around Newcastle upon Tyne and specialist services to a larger population.

This paper aims to provide the Capital Management Group (CMG) with a proposed timetable for equipment replacement from 2013 onwards for planning purposes.

National drivers for changes in the radiotherapy service include.
The 'National Radiotherapy Advisory Group Report to Ministers - Radiotherapy: developing a world class service for England', (NRAG) report published in 2007'.
The 'Draft Radiotherapy Service Specification' published by the National Clinical Reference Group in May 2012. This document based on the NRAG report outlines the required standards for a radiotherapy service and impacts on the equipment portfolio.

The financial position of the service will be significantly improved by the introduction of a mandatory national radiotherapy tariff in 2013/14. The increase in complex activity which attracts premium tariff will further improve this position.

The present equipment at NCCC delivers a range of radiotherapy treatments including image guided radiotherapy (IGRT) and intensity modulated radiotherapy (IMRT).

In August 2012 an order for two stereotactic enabled linear accelerators was placed. This will enable NCCC to deliver stereotactic ablative body radiotherapy (SABR) and stereotactic radio surgery (SRS).

In the short term support is sought for the purchase of two CT scanners to replace end of life equipment in 2013/14. These will provide the on-going capacity for localisation for treatment planning and IGRT.

For 2014/15 it is requested that the Trust gives consideration to the offer of a significantly reduced price from Accuray to purchase a TomoTherapy HD and an upgrade to the current TomoTherapy unit. This strategy would provide additional IGRT/IMRT capacity and ensure on-going resilience in this service.

Beyond 2-3 years, with the rapid changes in technology and national requirements for radiotherapy, the paper should only be considered as an indication of likely costs. To this end the paper would need to be reviewed and re-considered on an annual basis to inform the capital programme.

A summary of the capital costs is below:

	Estimated capital cost (inc VAT) (£)	Estimated 7*/10 year lifetime cost (£)
2012-14	4,468,022	6,534,902
and		
2013/14	974,580	1,771,292
2014/15	1,977,600	2,059,500
2015/16	2,178,000	4,405,860
2016/17	540,000	1,080,000
2017/18	3,156,000	4,250,496
2018/19	3,316,000	4,845,429
2019/20	1,080,000	1,980,000
TOTAL	**17,690,202**	**26,927,479**

It is acknowledged that there are areas of uncertainty, in particular:

- The impact of the provision of a satellite centre south of the Tyne
- Choice of manufacturer for standard linear accelerators
- Technological developments in imaging and radiotherapy

This strategy is formulated in consideration of these and would ensure NCCC continues to thrive and be a radiotherapy leader in this changing environment.

Recommendations of the paper

It is acknowledged that NCCC should have an outline replacement strategy for the radiotherapy equipment and software. This is required to comply with the 'Draft Service Specification for External Beam Radiotherapy'.

CMG are asked to:

- Approve the replacement of two end of life CT scanners to enable sufficient imaging capacity to implement a 4DCT localisation service for SABR, take account of the year on year increasing demand for radiotherapy and increasing IGRT on the linacs.

- Approve the purchase of a new TomoTherapy HD unit and upgrade the current TomoTherapy unit to an 'HD' within eighteen months. This increases IMRT capacity and provides resilience in the IGRT/IMRT service.

- Mandate the management team of NCCC to explore a funding and procurement strategy to enable the long term equipment replacement strategy outlined in this document.

2. Introduction

The Northern Centre for Cancer Care is a large regional centre serving a population of 1.72 million from Northumberland, Tyne & Wear and Durham. The centre provides a comprehensive range of cancer treatments which include complex 3D conformal radiotherapy, intensity modulated radiotherapy, and image guided radiotherapy, superficial treatment, brachytherapy and continuous hyper-fractionated accelerated radiotherapy (CHART). Some specialist treatments such as total body irradiation, total skin electron irradiation, and paediatric radiotherapy are delivered to the population of 3.1 million within the area covered by the North of England Cancer Network (NECN).

Radiotherapy has proven to be a cost effective treatment for cancer. Whilst the initial capital cost of the equipment is high the on going operating costs and cost of courses of treatment for individual patients is low compared to both surgery and chemotherapy. (Towards Evidence based Guidelines for radiotherapy Infrastructure and staffing needs in Europe: the ESTRO QUARTS project. Rad. Onc. 2005 75(3)).

3. National context including drivers for change

The document 'The Provision and Replacement of Radiotherapy Equipment' published in 2000 by the Royal College of Radiologists specifies the acceptable lifetime for major items of radiotherapy equipment. These time scales were referenced within the National Radiotherapy Advisory Group Report to Ministers - Radiotherapy: developing a world class service for England', (NRAG) report published in May 2007.

This report highlighted a number of issues for the government to address which directly affect the service provided by all radiotherapy centres. This included:

- Improved access rates for radiotherapy
- Improved standards of technology for imaging and treatment in radiotherapy centres.
- Increased access to radiotherapy equipment on bank holidays and at the weekend
- Limited servicing and QA during the clinical working day
- Plans to expand and up date radiotherapy services in the long term were initiated

Nationally it was estimated that a 91% increase in 2008 radiotherapy activity was required by 2016 to achieve optimal treatment levels.

The Cancer Reform Strategy published in October 2007 emphasises;

- The need to deliver treatment close to where the patient resides
- The under investment in and consequent limited availability of both equipment and workforce for the delivery of radiotherapy.

In 2012/13 the funding route for radiotherapy transfers from the Primary Care Trusts (PCTs) to specialist commissioners. In the near future national commissioning of radiotherapy is expected to be implemented. The National Clinical Reference Group for radiotherapy has published a draft national service specification to be used by the specialist commissioners for 'Radiotherapy – External Beam'. Within that document the expected standards for a radiotherapy service are outlined. These standards impact on the equipment portfolio and range of treatment techniques delivered at a radiotherapy centre. In particular the following are pertinent to this document:

- At least 33% of all radical attendances for radiotherapy should be delivered using IMRT.

- Accurate treatment is delivered in the context of a safety conscious culture (i.e. quality systems to define/control process, image guidance and IVD)
- There is access to modern radiotherapy techniques e.g. IMRT and IGRT
- A service development strategy should exist and be regularly reviewed and should include an equipment replacement programme, a planned refresh of software, the introduction of new treatment techniques and services. The service development strategy should be informed by the heads of the 3 professional disciplines (Oncologist, Physicist, Radiographer) working in close partnership.
- Equipment replacement:
    - Radiotherapy equipment should be replaced regularly and trusts must ensure that all machines are listed as part of a capital replacement programme. NRAG recommends that all Linear Accelerators are replaced every 10 years and computer hardware is updated every 3 years. Replacement CT scanners and associated planning equipment should be within a 7 year period.
    - The provider should ensure that each linear accelerator is in operation for a maximum of 10 years and that replacements are planned in a timely manner. Commissioners may divert activity where this is breached without agreement.

In 2012/13 non-mandatory tariffs were published by the Department of Health for radiotherapy activity. The tariffs, detailed in table 1, reflect the difference in resources required to plan and deliver IMRT/adaptive radiotherapy compared to complex conformal and other more simple types of radiotherapy. It is anticipated that these tariffs will become mandatory from 1 April 2013 with 50% of the difference between current local tariffs being applied.

Table 1: Draft national tariff 2012/13.

HRG code	HRG name	Tariff (£)
SC21Z	Deliver a fraction of treatment on a superficial or orthovoltage machine	80
SC22Z	Deliver a fraction of treatment on a megavoltage machine	97
SC23Z	Deliver a fraction of complex treatment on a megavoltage machine	115
SC24Z	Deliver a fraction of Radiotherapy on a megavoltage machine using General Anaesthetic	239
SC25Z	Deliver a fraction of Total Body Irradiation	423
SC29Z	Other Radiotherapy Treatment	-
SC31Z	Deliver a fraction of adaptive Radiotherapy on a megavoltage machine	197
SC40Z	Preparation for intensity modulated radiation therapy	1,258
SC41Z	Preparation for intensity modulated radiation therapy-With Technical Support	1,677
SC42Z	Preparation for Total Body Irradiation	943
SC43Z	Preparation for Total Body Irradiation-With Technical Support	943
SC44Z	Preparation for hemi body irradiation	464
SC45Z	Preparation for simple radiotherapy with imaging and dosimetry	419
SC46Z	Preparation for simple radiotherapy with imaging and dosimetry-With Technical Support	703
SC47Z	Preparation for simple radiotherapy with imaging and simple calculation	291
SC48Z	Preparation for simple radiotherapy with imaging and simple calculation-With Technical Support	481
SC49Z	Preparation for superficial radiotherapy with simple calculation	177
SC50Z	Preparation for superficial radiotherapy with simple calculation-With Technical Support	237
SC51Z	Preparation for complex conformal radiotherapy	629
SC52Z	Preparation for complex conformal radiotherapy-With Technical Support	838
SC56Z	Other external beam radiotherapy preparation	-

4. Current local position/facilities/resources

4.1 Equipment

In 2008 the Northern Centre for Cancer Care moved to the Freeman Hospital (FH) site. The current equipment portfolio is itemised in Appendix 1. In summary the imaging equipment comprises two planning CT scanners and one MR scanner. The therapy

equipment comprises of four new linear accelerators which were installed and commissioned at the FH site and four linear accelerators transferred from the Newcastle General Hospital (NGH). Of the eight linear accelerators, five are capable of delivering IMRT. A range of on-treatment imaging devices includes eight electronic portal imaging devices, two in-room CT scanners and three MV cone beam facilities. Additionally a TomoTherapy unit provides an integrated IMRT/IGRT facility, a superficial unit is available and a High Dose rate (HDR) microSelectron is used for brachytherapy.

This equipment portfolio resulted in a centre capable of delivering IMRT and IGRT. IMRT has been commissioned and implemented extensively in the past year. Prostate IMRT is now routine and in the first quarter of 2012/13 19% of radical attendances were delivered with inverse planned IMRT. There is an active commissioning programme for the more complex head and neck IMRT planning and delivery on the Siemens linacs and the first patients were treated in the third quarter of 2012/13. At least 20% of all radical fractions will be delivered as IMRT in 2012/13.

IGRT is also routine; 20.8% of treatment episodes are delivered with image guidance before treatment delivery.

4.2 Agreed equipment replacement – October 2012

Stereotactic radiotherapy techniques are now the standard of care for certain anatomical sites. Stereotactic Ablative radiotherapy (SABR) requires the most modern IGRT techniques and very accurate patient positioning. Stereotactic Radio Surgery (SRS) requires specialist equipment and software to enable delivery of this technique.

Currently patients are being referred outside the network to receive both SABR and SRS as NCCC does not have the equipment required to deliver these techniques. However following charitable fundraising and an extensive evaluation over the summer of 2012, two stereotactic enabled linear accelerators have been ordered.

These two linacs will be capable of maintaining the current workload whilst delivering both SABR and SRS. Additional functionality that will also be available includes:

- Volumetric arc radiotherapy (VMAT): a rotational treatment technique which is reported to reduce the treatment delivery time and is similar to the treatment delivery technique on the TomoTherapy unit.
- An advanced IMRT technique called ‘sliding window IMRT’, instead of ‘step and shoot IMRT’ which is the only option on Siemens linacs.
- Flattening free radiation beams, which deliver radiation beams at very high dose rates compared to conventional flattened radiation beams. A reduction in the radiation times has been reported with these beams.
- Gated therapy to treat chest and abdominal tumours with delivery synchronised to the breathing pattern. This is reported to increase the time for treatment delivery.

It is anticipated that:

- 20 – 30 SABR patients would be treated in the first year after commissioning. This would increase to 50 per annum.
- 30 – 40 SRS patients would be treated in the first year after commissioning. This would increase to 60 – 70 per annum.

These techniques will accrue the higher radiotherapy tariffs.

Time savings are likely once sliding window IMRT, VMAT and flattening free beams are in routine use. The throughput of conformal treatments should be maintained and hence an increase in income could be anticipated.

Implementing gated therapy is likely to impact negatively on treatment times and hence activity.

Matched linacs provide resilience in a downtime situation.

Cost savings have been achieved over the estimated cost of purchasing two linacs separately.

4.3. Specialist software applications

Radiotherapy is heavily dependent on IT. It is recommended in the draft service specification document that as improved functionality becomes available software should be up dated and an up grade should be planned every three years as a minimum. As the full capability in software releases is usually dependent on having the highest specification hardware available this also requires replacement within the same time frame. It is anticipated that the NCCC hardware replacement would be in conjunction with the Trust hardware replacement programme and as costs are not known they have not been included in this paper.

All radiotherapy scheduling, data transfer and treatment records are managed within the MOSAIQ Oncology Information System (OIS).

The treatment planning system used to routinely plan conformal and linac based IMRT patients is the Oncentra Masterplan (OMP) treatment planning system (TPS). A specialist TPS is used for planning prostate iodine 125 implants and a dedicated TPS is integrated into the TomoTherapy system.

ProSoma is an imaging and virtual simulation software package used extensively throughout NCCC for imaging requirements both during the localisation and on treatment verification of treatment plans.

RadCalc is monitor unit check software used to perform the independent monitor unit check calculation required by legislation.

NCCC has a rolling programme of software upgrades to ensure that all the applications have the current safety fixes and releases and have been upgraded within the last 18 months.

4.4 Recent developments

Since 2008 there has been no requirement for significant replacement of radiotherapy hardware equipment.

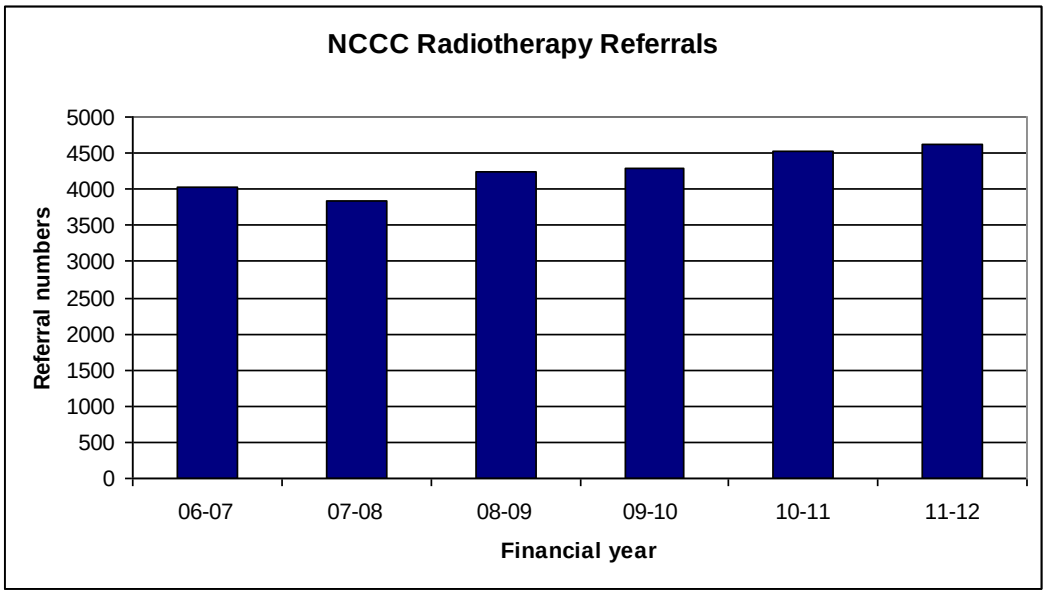
In 2012 two major software applications have been installed and commissioned:

- MOSAIQ OIS
- Dosimetry Check: An In vivo dosimetry (IVD) system based on transit dosimetry with EPIDs. The capital funding was provided by the NECN. Commissioning is largely

completed and clinical implementation will commence after training late in 2012. NCCC will then be compliant with the draft national service specification.

4.5 Radiotherapy Demand

The average increase in referrals over the previous 3 years has been 2.75% per annum.



5. Other issues to consider

5.1 Choice of Manufacturer

In 2004 when the equipment for FH was selected a decision was made to purchase and install additional Siemens linear accelerators. This was made for a number of logistical reasons:

- Staff were familiar with Siemens equipment and the preference was to maintain familiarity during the transfer of the centre.
- A shorter commissioning time for the older linacs as they were transferred with beam matching.
- Patients could be transferred between two compatible 'rings' of equipment either the 58 leaf MLC or the 160 leaf MLC ring without requiring additional machine specific treatment plans. Thus in times of breakdown the patients could be transferred between machines, minimising delays and cancellations. This policy has proved successful and in 2011/12 only 72 patient appointments were cancelled because of equipment failure.

For ten years there have been only three major manufacturers of linear accelerators Siemens, Elekta and Varian. Specialist equipment had been developed by TomoTherapy and Accuray (Cyberknife).

Varian had operated a system whereby sites were encouraged to have an all Varian solution with Eclipse, the Varian TPS, and ARIA, the Varian OIS. Eclipse and ARIA did not interface to other manufacturer's equipment.

The manufacturer Nucletron BV had a portfolio of brachytherapy equipment and the OMP treatment planning system.

IMPAC developed and sold an OIS, initially known as 'IMPAC' then rebranded as 'MOSAIQ'. In the past 'IMPAC' had been made bespoke by Siemens as 'LANTIS' for their linacs. This resulted in a very good linac interface which optimised the automatic delivery of radiotherapy fractions. 'MOSAIQ' interfaced to the other linac manufacturers.

In 2010 Elekta purchased IMPAC so MOSAIQ became an Elekta product to parallel Varian's ARIA. In September 2011 Elekta purchased Nucletron thus acquiring a portfolio of brachytherapy products and OMP.

At the end of 2011 Siemens announced their withdrawal from the radiotherapy market. Subsequently Siemens have made a commitment to maintain their therapy hardware until 2022. Siemens have also entered into a collaborative agreement with Varian.

As a consequence of these changes the radiotherapy infrastructure, i.e. the treatment planning and OIS, at NCCC are provided by Elekta. Maintenance charges for OMP are paid to Elekta. However the MOSAIQ software was purchased through Siemens at a competitive price. In the longer term it is anticipated that the TPSs currently supported by Elekta will be merged into one 'MOSAIQ TPS' and integrated into MOSAIQ towards the end of 2014.
Accuray purchased TomoTherapy Inc. in 2011.

5.2 Stand alone facilities

Delays in either the start of a course of radiotherapy or during a course of radiotherapy can adversely affect the probable outcome of the course of treatment for a patient. For the Trust, delays in the start of a course of treatment impacts on cancer waiting time targets and breaches, with possible financial consequences.

Compatible linac technology means that patients can be treated on the matched equipment without compromising their treatment or requiring treatment plans to be generated for a number of machines. Operating two rings of compatible therapy equipment at NCCC has resulted in very low rates of patient appointment cancellations.

A single standalone treatment facility, such as the TomoTherapy unit at NCCC, can result in major operational difficulties during times of unplanned maintenance. Patients either have their treatment delayed or catch-up sessions are provided once the TomoTherapy unit is operational or they are transferred to conventional linacs with sub-optimal conformal plans (non IMRT).

Single stand alone therapy facilities are not considered to be optimal in a radiotherapy centre.

5.3 Infrastructure modifications

NCCC operates within the portion of the Freeman Hospital that was procured under a PFI arrangement and as such is currently operated under this agreement. The Project Company currently managing the building and the PFI arrangement on behalf of the funders and the Trust is Healthcare Support (Newcastle) Limited (HSNL).'

All modifications to the infrastructure have to be costed and delivered by HSNL via the NUTH TNH project team. In certain cases HSNL may agree to the use of a manufacturer turnkey solution, provided the basic infrastructure is managed by them.

All the therapy equipment at NCCC require base frames to be concreted in to the floor and ducting to be positioned appropriately for the equipment. The services required in each bunker are equipment specific. As it is not possible to replace the current equipment with Siemens linacs all the rooms will require major modifications to install equipment from an alternative manufacturer.

5.4 Commissioning times

Once an item of therapy equipment has been installed it is necessary to complete an acceptance procedure, specified by the manufacturer, and a critical examination of radiation safety. This takes between two and four weeks, depending on the machine complexity and room design. After acceptance a period of time is required to commission the equipment for the local clinical service. The overall time required is dependent on a number of factors:

- The number of radiation beams options available on the linac
- The range of imaging options on the linac
- Commissioning the TPSs and other associated software applications
- Validating interfaces between the equipment and infrastructure
- Establishing baseline parameters for quality assurance
- Validating established clinical techniques and procedures

- Developing and validating new clinical techniques and procedures
- Training and familiarisation with the equipment
- The staff resource available to participate in the commissioning process

A piece of equipment which is new to a department can take up to 6 months to fully commission. If a matched piece of equipment is purchased then the commissioning process can be reduced to a validation exercise against previously acquired data and the time can be reduced to as little as six weeks.

5.5 Maintenance

5.5.1 Range of maintenance delivered

Three types of maintenance are required to ensure the equipment is clinically available:

- Planned maintenance

This follows pre-specified schedules to ensure the equipment is maintained in a good operating condition. This is based on manufacturer recommendations and local experience. It includes a scheduled pro-active replacement of parts etc. Typically this is four episodes per annum.

- Planned Corrective maintenance

This is necessary when a linac develops a non-critical fault which does not significantly affect the safe delivery of radiotherapy but may restrict the extent of the clinical use of the linac. Corrective maintenance has to be undertaken to return the linac to full range of clinical services

- Emergency maintenance.

This occurs when the linac develops a fault which prevents the clinical use of the linac. This requires immediate repair before the clinical service can be resumed.

Following all maintenance episodes a period of quality assurance is required prior to returning the equipment to clinical use.

Clinical downtime can be minimised by undertaking all the planned and planned corrective maintenance outside the hours of the planned clinical service. This requires engineering and physics staff to be available outside the clinical hours.

5.5.2 Maintenance contracts

Maintenance can be fully provided by the manufacturer or there can be varying amounts of locally provided maintenance by a radiotherapy technology/engineering group (RT/EG).

A fully comprehensive maintenance contract would provide the resources to cover planned, corrective and emergency maintenance. Manufacturers may locate staff permanently within a radiotherapy centre. Other fully comprehensive maintenance contracts specify a manufacturer response time, usually of four hours between the time of call out and engineer on site.

Radiotherapy centres with large and experienced RT/EG may opt for no maintenance contract and purchase spare parts and specialist knowledge as required. This requires the local technologists/engineers to be trained or have at least the same breadth of experience and training as the manufacturer engineers.

5.5.3 Local Maintenance Arrangements

The preferred option for NCCC is a 'shared partnership contract' whereby the Radiotherapy Engineering group (REG) provides all first and second line maintenance for the linear accelerators. The service contract includes access to manufacturer specialist knowledge, spare parts, upgrades, bug fixes and telephone support. If a manufacturer engineer is required on site this will be paid for as required. The contract includes manufacturer training for a specified number of local engineers.

The REG is currently recruiting five additional members of staff. The group of 10 members will be full trained to deliver all the first and second line maintenance locally. Both the planned and planned corrective maintenance will be delivered outside the hours of planned clinical service delivery.

For the next few years all the imaging equipment not integrated with a linac will be on full maintenance contracts.

5.6 Satellite centre

In January 2009 a joint Vision paper was written by the clinical directors of NCCC and JCUH, Tony Branson and Peter Dunlop, titled 'MODERN RADIOTHERAPY IN THE NORTH OF ENGLAND CANCER NETWORK. A VISION FOR THE FUTURE'. This identified a shortfall of four in the number of linear accelerators required at NCCC to deliver the fractions of radiotherapy identified in the NRAG report by 2016. The need to improve access to radiotherapy by providing satellite radiotherapy centres close to centres of dense population was also identified.

The shortfall in resources identified in the Vision paper would be partially addressed by developing a satellite unit south of the Tyne comprising two linacs with imaging facilities. The NECN is working with Commissioners to develop a satellite centre and the process will be launched at a meeting in November 2012 with the tendering process anticipated to last for six months.

Provision of a South of Tyne satellite could impact in the short term on the activity at NCCC and therefore on the scheduling of the equipment replacement programme. There is however currently uncertainty associated with the provision of a satellite centre. If NCCC

were to be one of the partners engaged in the provision of a satellite service then the equipment in the replacement programme could be installed in the satellite centre instead of on the FH site. If a satellite centre independent of NCCC was established then the re-provision of out of date equipment on the FH could be stalled and any excess capacity de-commissioned.

5.7 Commissioning of radiotherapy activity

Since 2009, a local tariff for radiotherapy has been agreed by the PCTs. This had a limited range of payments for treatment fractions of differing complexity. There was no separate tariff for the treatment preparation. The complexity and hence treatment preparation time varies significantly between different treatment techniques. This is reflected in the proposed mandated national tariff.

Based on activity figures from 2011/12 the activity for 2012/13 has been modelled using both the local tariff and the proposed mandated national tariff. The detailed modelling is to be found in Appendix 5. The increase in income from radiotherapy activity is calculated to be significant.

6. Capital Equipment Replacement

The current equipment at NCCC is itemised in Appendix 1, this includes a projected replacement date for each item in accordance with the RCR document and the draft national service specification.

The current capacity and equipment replacement programme is determined by:

- The requirement for :
    - Planned maintenance;
    - Planned corrective maintenance;
    - Routine quality assurance;
- The number of patient referrals.
- Treatment fractionation
- On-treatment imaging protocols.
- The complexity of radiotherapy delivered
- Patient expectations of standard of care
- The design of the infrastructure of NCCC
- National requirements for standards in radiotherapy e.g. in-vivo dosimetry, delivery of radiotherapy close to patient home.

The Trust Vision statement is *'To be "the health service for Newcastle" and a leading national healthcare provider'*. It is considered that adopting a replacement strategy which includes some items of specialist radiotherapy equipment would best achieve this vision for NCCC.

6.1 Replacement imaging equipment 2013/14

6.1.1 Treatment Planning CT scanner - room 32.1.206 (CT1)

Background

- The planning Emotion Duo CT scanner in room 32.1.206 is over 10 years old. It was transferred from the NGH site in 2009 and in 2013 will be obsolete.

- The Sensation Open CT scanner installed in 2008 in room 32.1.210 (CT2) is a wide bore model. It is used as the primary source of CT data for radiotherapy planning as it allows clinical versatility, high speed and efficient use of staff. It is used to 100% capacity.
- The Emotion Duo CT scanner is not utilised 100% for radiotherapy treatment planning. It provides the capacity to meet the shortfall in imaging capacity required for the clinical demand at NCCC. It is further utilised to avoid cancer waiting time target breaches as it is used to accommodate fluctuations in demand. It also provides the capacity for quality assurance (QA) and maintenance of the Sensation Open CT scanner. The current activity equates to four sessions per week.
- Two sessions of clinical trials work per week is undertaken on the Emotion Duo CT scanner which generates £88K per annum for NUTH.

Opportunities and benefits

- It is acknowledged that currently a direct replacement of the Emotion Duo CT scanner would not be fully utilised with NCCC activity. However the activity is significant and could not be accommodated solely on the Sensation Open CT scanner.
- It is envisaged that over the medium term additional CT capacity will be required for:
  - The likely on-going increase in demand at NCCC of 2.75% per annum.
  - Introduction into clinical use of 4DCT. This requires longer CT scanning and appointment times.
    - For SABR 4DCT planning is required to accurately assess tumour motion (NRIG Report 'Stereotactic Body Radiotherapy Guidelines for Commissioners, Providers and Clinicians in England 2011)
    - 4DCT is recommended for lung tumours with significant motion. (NRIG Report 'Image guided radiotherapy (IGRT) Guidance for implementation and use' (2012)).
    - Once 4DCT is established for planning in the thorax region it is envisaged that it should be extended to tumours in the abdomen which could also be treated with SABR.
  - Additional capacity required to accommodate the SRS patients.
- Avoid a loss in income from the clinical trials activity for the Trust by retaining the CT activity within the Trust on this CT scanner.

Action required

- A business case to replace the Emotion Duo CT scanner before the end of 2013. This should take account of possible alternative solutions in the short to medium term to the installation of a high specification CT scanner.
- NCCC to seek possible sources of additional activity to utilise the short term excess capacity on the replacement CT scanner. This would be in addition to the clinical trials activity.

NCCC explored the possibility of purchasing a SPECT CT scanner jointly with Radiology which would have incorporated two imaging modalities; however the Directorate of Radiology have recently advised that they intend to pursue the purchase of a SPECT CT scanner independent of NCCC.

6.1.2 In-room CT scanner - room 32.1.107

Background

The in-room CT scanner in linac bunker 32.1.107 is also an Emotion Duo CT scanner and is end of life in 2013.

The 160leaf MLC linac in this room is used to treat pelvic tumours and in particular prostate IMRT patients. The CT scanner is required for IGRT as it facilitates on-treatment verification of soft tissue tumours. There is insufficient capacity on the other linac with in-room CT scanner to absorb this activity.

An increase in IMRT/IGRT activity is planned from the fourth quarter of 2012/13 when an IMRT service for head and neck patients is implemented on the Siemens linacs. This is required to comply with the CQUIN target which has financial penalties for the Trust associated with it. Following an extensive local evaluation of the imaging options, the optimum imaging modality is 3D imaging using the in-room CT scanner. This increase in activity has to be accommodated.

Opportunities and benefits

CT scanners offer a number of advantages over 2 dimensional imaging or MVCB imaging. The length of the scan is not limited by the size of the imaging device and the image quality is superior with a larger field of view.

Re-planning of patients during their course of treatment is facilitated by use of the in-room CT scanner. The CT scan acquired in the treatment position during a treatment appointment can be used to re-plan the treatment. This eliminates the requirement for an additional patient appointment on the imaging CT scanner and minimises any delay in the course of treatment.

The radiation dose received by the patient from an imaging episode is less for a CT scan than for an MVCB scan.

An as yet unproven imaging modality for NCCC is KVCB imaging which will be available on the new Varian linacs. It is anticipated that the image quality will be an improvement on the MVCB imaging on the Siemens linacs, however there will be limitations on the scan length and the reconstructed field of view and the images could not be used for re-planning patient’s treatments.

NCCC has been invited to participate in a number of clinical trials because of the superior image quality achieved on the in-room CT scanner.

As the linac in room 32.1.107 will be ten years old in 2014 it is proposed that the replacement CT scanner is installed in room 32.1.085, where one of the newer Siemens linacs is located.

A wide bore CT scanner is required to facilitate imaging of bariatric patients and patients in the treatment position.

Action required

- Identify the preferred supplier for a wide bore in-room CT scanner.
- Complete a business case for the proposed purchase.
- Once the preferred supplier is identified it is proposed to enter into negotiations to ascertain whether a turnkey solution is the preferred and cost effective option for the required building modifications.

6.2 Replacement therapy equipment programme 2014/15 – 2015/16

Background

NCCC has been the regional centre for specialist radiotherapy techniques for many years. In order to maintain that status it is important to have high quality radiotherapy technology available. This position will be reinforced by the purchase of the two stereotactic linear accelerators in 2012/14. However to ensure on-going maintenance of these standards it is essential to continue to purchase modern state of the art equipment.

The replacement programme proposed in Appendix 2 would provide the capacity to deliver high quality specialist treatments whilst maintaining adequate capacity for routine conformal radiotherapy and IMRT.

It is proposed that a TomoTherapy HD unit is purchased to replace the linac in Room 8 and the current TomoTherapy unit is upgraded to a TomoTherapy HD. This would provide two matched TomoTherapy units. The TomoTherapy HD units should be more stable with:

- Fixed Target Linac
- DCS – Dose Control System
- OIS connectivity
- Noise Eliminating intercom

Additionally the treatment planning is improved with:

- Network Data Storage
- VoLO Technology
- Dicom Export
- Remote planning

Opportunities and benefits

The original TomoTherapy unit was only the second NHS one in the UK and it is acknowledged that at times it has experienced significant downtime issues. However over the last year the radiotherapy physics group have achieved downtime figures commensurate with those of the other manufacturer maintained linear accelerators. This has been achieved with an improved understanding of the technology, with attendance at specialist courses and visits to other TomoTherapy centres. Pro-active management of the equipment is undertaken.

There is now a cohort of staff experienced in planning TomoTherapy treatments and it requires less resource to plan complex IMRT on the TomoTherapy planning system than on OMP for a Siemens linac.

The treatment plans delivered on TomoTherapy are of a higher technical standard than can be delivered on Siemens linacs and for certain categories of patients' treatment on TomoTherapy this is the only option.

In a breakdown situation patients can be transferred between the two TomoTherapy units without requiring cancelled appointments or a treatment of compromised quality on a conventional linac.

The TomoTherapy unit would cease to operate as a single unit with a reduction in the on-going service delivery issues associated with a single therapy facility.

Currently 40% of all patients referred for consideration for treatment on the TomoTherapy unit cannot receive treatment there due to capacity issues. A second TomoTherapy unit would ensure those patients would be able to receive the most appropriate treatment for their condition.

If an independent satellite centre was established certain patients would still need to be referred for treatment at NCCC as the TomoTherapy unit would be the treatment machine of choice and NUTH would continue to accrue the income from the activity.

It is anticipated that following the major up grade to the current TomoTherapy unit the lifetime of the equipment would be extended beyond 2018.

Action required

The price conditions and offer detailed in the appendices are only available until December 2012. Accuray have stated that they are willing to receive an order without a down payment or deposit. The configuration and pricing would be honoured for up to eighteen months.

The NUTH Supplies manager has indicated that the offer appears to be very attractive provided a number of points were clarified: Accuray would be required to put the offer via the NHS Supply Chain (NHSSC) National Framework Agreement for Digital Imaging and Radiotherapy Equipment and in doing so agree to NHSSC terms and conditions of contract and Clinical Radiology and Clinical Oncology Equipment (CRACOE) payments terms (95% payment upon delivery and 5 % upon installation of equipment).

Support for this is sought.

6.3 Replacement imaging equipment 2015/16

Background

For the majority of patients CT scans are an essential element of the pre-treatment process. NCCC could not operate without sufficient CT capacity for all the patients referred for radiotherapy.

The draft service specification states that CT scanners are considered to have a 7 year lifecycle.

Opportunities and benefits

A direct replacement of the planning Sensation CT scanner in 32.1.210 (CT2) is likely to result in a CT scanner delivering a lower dose of radiation with improved image quality for

each CT scan. In particular a reduction in inherent noise could be anticipated with better image resolution.

There may also be a timesaving in the scan time. However the time required for the associated radiotherapy set up activity would not be impacted by a shorter scan time.

The ability during a CT scan to monitor movement e.g. breathing is likely to be routine on a replacement CT scanner and would enhance the data acquired for radiotherapy planning and facilitate improved treatment for lung and abdominal patients. It is anticipated that there is likely to be a more extensive use of this facility as the technology develops and becomes more integrated.

Action required

Monitor the development and clinical use of CT for radiotherapy treatment planning to enable an informed decision on a replacement option.

6.4 Therapy replacement programme 2015/16 – 2018/19

6.4.1 – Linac replacement

Background - Choice of equipment manufacturer

In 2012 a standard linac would be considered to have 5mm MLCs, on board imaging and be capable of delivering conformal radiotherapy and IMRT. These linacs can be purchased from Elekta or Varian. As previously stated the NCCC radiotherapy infrastructure is based on Elekta technologies, MOSAIQ for the OIS and OMP for the TPS. To maximise transferability between linacs it would be advantageous to purchase all the standard linacs from the same manufacturer. A single manufacturer usually results in an optimised treatment and delivery system. Mixing manufacturers can result in sub optimal treatment workflows and may result in restrictions on access to the most complex treatment or imaging options.

The costing for the linear accelerator replacement programme has been based on a Varian option. This does not imply that this is the preferred option for future purchases.

Opportunities, risks and benefits

By 2015/16 NCCC will have gained experience of operating Varian equipment and working with this manufacturer, in addition to on-going experience of working with Elekta as the manufacturer of the OIS and supplier of OMP.

Varian purchase

If Varian linacs were selected for the cohort of standard linacs to be replaced from 2015/16 onwards then it would be advantageous to optimise the infrastructure for Varian. In parallel with replacing the Primus H3 with the first of the standard linacs it would be proposed to replace the Elekta infrastructure i.e. replace MOSAIQ with ARIA and OMP with Eclipse to ensure optimisation of workflow and seamless working practices.

Varian/Siemens have informed NCCC that as MOSAIQ has recently been installed a change to ARIA would be at no cost to the Trust. However replacing OMP would require the purchase of ECLIPSE.

Replacing the current infrastructure will require a series of major projects requiring significant resources and changes in working practices across the whole of the Trust.

Elekta purchase

If the decision is made to purchase Elekta linacs for the cohort of standard linacs then there would be no requirement to change the OIS or make significant changes in working practices.

Elekta have indicated that they have long term plans to integrate a TPS into MOSAIQ, which would have the same structure as OMP i.e. modular in design. It is likely that a migration pathway from OMP to MOSAIQ-TPS would have some revenue consequences, but this is unclear to date.

At the end of the current replacement cycle in 2020 there would be three circuits of therapy equipment:

- Two stereotactic linacs
- Two TomoTherapy units
- Five standard linacs.

This equipment portfolio would provide adequate capacity to meet the requirements for conformal radiotherapy and IMRT, as well as provide specialist SABR and SRS techniques and highly complex IMRT. With matched equipment it should be possible to manage capacity in the event of equipment breakdown.

Action required

A year before this phase of the replacement programme is scheduled the relative advantages of a Varian or Elekta solution for the delivery of standard radiotherapy should be extensively reviewed. This would require an assessment of each of the individual items of equipment and software, working practices and maintenance and local experience of working with the individual company.

6.4.2 High doserate microSelectron (HDR)

Background

Brachytherapy is the treatment of tumours with sealed radioactive sources. It is the treatment of choice in a range of sites where an applicator to contain the radioactive source can be implanted or inserted in a body cavity. It can be used in combination with external beam radiotherapy and other treatment modalities.

The majority of the brachytherapy treatments are planned on OMP and delivered on the high doserate microSelectron treatment delivery system. This minimises radiation protection issues for the staff delivering the treatment. The iridium-192 source is replaced every three months. The HDR equipment was last significantly up graded in 2008. Thus it would be due for replacement in 2018.

Opportunities, risks and benefits

The advantage of brachytherapy is the locally high dose that can be delivered whilst avoiding radiation dose being delivered to adjacent normal tissue.

The use of brachytherapy in specialist centres is increasing. At NCCC in the medium term there are plans to increase the activity on the HDR. In the long term there are plans to increase the range of treatments delivered to include superficial skin and interstitial treatments for head and neck cancers.

Failure to replace the microSelectron would result in a reduction in the range of specialist treatment facilities available at NCCC and patients would be required to travel to another radiotherapy centre for their brachytherapy.

Consideration should be given to increasing the treatment options by purchasing a replacement device capable of delivering treatments using a range of radioactive sources.

Actions

It is proposed that as a minimum the microSelectron should be replaced with updated equipment in 2018.

Monitor the clinical use of radioactive sources, in addition to iridium-192, to enable an informed decision on replacement options.

6.5 MR scanner replacement – 2019/20

Background

Compared to CT scan data MR provides much improved soft tissue definition which assists in the location of cancerous tissue and soft tissue organs at risk. This leads to improving identification of the region for treatment and avoidance of adjacent soft tissue organs. It is used extensively for tumours in the pelvic region, head and neck and for soft tissue tumours e.g. lymphomas. MR does not replace CT for treatment planning as there is no electron density information, image distortion may be a problem and MR sequences currently available do not image bone.

Opportunities and benefits

By 2019 a standard MR scanner is likely to be 3Tso a replacement of the Espree MR scanner is likely to have more sophisticated software with less image distortion and faster scan times.

With a 3T scanner a wider range of functional imaging (fMRI) options would be available which would impact on localisation and identification of tumour cells and regions of oedema, necrosis, scar tissue etc. Diffusion magnetic resonance (dMRI) would also be available on a 3T scanner and may provide information on the probable cellular response of cancer cells to radiotherapy. These options could lead to more sophisticated localisation and targeting of radiotherapy.

The MR room (32.1.210C) was designed for a 3T machine when it was constructed.

Actions

Monitor the development and clinical use of CT and MR for radiotherapy treatment planning until 2018 to enable an informed decision on replacement options.

7. Horizon scanning

7.1 Additional radiotherapy facilities within the NECN

The MALTHUS tool is a nationally developed modelling software tool intended to support radiotherapy needs assessment. It uses Monte Carlo modelling to simulate radiotherapy demands by generating virtual populations of cancer patients which match the demographics and tumour types of patients in the local population. It uses data feeds from the National Cancer and for the population served by NCCC it predicts the following:

Activity	2011/12	2017/18
Patients treated	3954	4469
Fraction delivered	72,664	82,706

At the time of writing it is likely that a satellite centre will be commissioned south of the Tyne. In the short term it is probable that the impact of a satellite centre would result in a reduction in the activity at NCCC. This would impact on the timeline for the equipment replacement strategy; Consideration would need to be given to delaying the equipment replacement programme and in the short term a possible de-commissioning of resources until the local activity returned to current levels.

Based on the Malthus prediction the radiotherapy activity will continue to increase due to changing population demographics and within the timeframe identified in this document all the equipment would require to be replaced.

The other unknown factor is the impact any strategic developments the Northumbria NHS Trust may have with respect to developing either the Carlisle radiotherapy centre or an additional radiotherapy centre.

7.2 Imaging in radiotherapy

7.2.1 PET CT

In many European centres extensive use is made of PET CT for radiotherapy planning of lung and lymphoma tumours. The PET CT scan is taken in the radiotherapy treatment position and the PET CT image informs the localisation of the active tumour and hence the volume for treatment.

With the current Alliance PET CT facility it is not possible to obtain PET CT scans in the radiotherapy position.

In Newcastle there is limited access to PET CT for radiotherapy planning on the university PET CT scanner which is now 5/6 years old. Whilst there have been two radiotherapy planning clinical trials for head and neck cancers utilising PET CT, there has been only limited clinical interest in the routine use of PET CT data for radiotherapy planning.

In the future new clinical staff may expect, in a large radiotherapy centre, access to PET CT for routine radiotherapy planning.

Actions

NCCC has to be aware of any agreed developments for a PET CT service within the Trust.

NCCC has to be aware of any potential changes in access to the PET CT scanner at the University.

If the use of PET CT scans for radiotherapy planning becomes more widespread consideration would need to be given to the installation of a PET CT scanner in the Trust / NCCC. This could impact on the replacement strategy for the planning CT scanners. It would require access to radio pharmacy facilities.

Despite the cost of the associated building works it would be possible to install a PET CT scanner either in the area bounded by the linear accelerators bunkers or in one of the planning CT bunkers. The cost of the former is in the region of £1.08M. If the latter is the preferred option then additional patient waiting areas and office accommodation would need to be provided on level 1 of NCCC.

7.2.2 SPECT CT

The possibility of utilising SPECT CT scans for radiotherapy planning has been identified. This is not such a widely accepted modality as PET CT for radiotherapy planning, but might enhance the localisation of neuro endocrine tumours and lymph nodes in other cancers e.g. breast and prostate. It is a modality in which developments over the next few years should be monitored. This could also influence any decision on a planning CT scanner replacement.

Actions

NCCC has to be aware of any installation and development of a SPECT CT service within the Trust. It would be advantageous for any installation to include orthogonal lasers and a flat couch top to facilitate radiotherapy planning scans.

Monitor the literature to be aware of national and international work in the use of SPECT CT for radiotherapy treatment planning.

If the use of SPECT CT scans for radiotherapy planning becomes more widespread consideration would need to be given to the installation of a dedicated SPECT CT scanner in NCCC. This could also provide a back up for the Sensation Open CT scanner. It would require access to radio pharmacy facilities.

7.3 New techniques

7.3.1 Adaptive radiotherapy

An anticipated development of IGRT is ‘four-dimensional adaptive radiotherapy’ (4D ART). 4D ART is currently used to describe two processes, namely:

- The use of 3D images acquired immediately before or during treatment to improve the daily delivery of radiotherapy by modifying the planned delivery to take account of the position and shape of the patient on a daily basis.
- The use of daily 3D images to calculate the treatment actually delivered over the course of radiotherapy and when necessary modifying the fractions at the end of the treatment to ensure the delivered treatment matches the prescribed treatment.

4D ART therefore requires integrated imaging on the linacs, which is available at NCCC, and appropriate software which includes deformable registration and treatment planning capability. Rapid recalculation on the highest specification hardware is essential for the process to be viable. Monitoring of the actual dose delivered on images acquired during treatment could be undertaken using the current treatment planning software but does require significant data storage facilities for all the data generated during the process.

It is important to monitor the development of and technology available for 4DART. It is probable that this will be the next major development once IMRT and IGRT are established as routine.

7.3.2 SABR for pancreas, liver metastases

SABR is already the recommended treatment of choice for certain lung tumours. There is increasing clinical interest in the use of the technique for other clinical sites which have not proved suitable for conformal radiotherapy. In particular recent reports in the literature have included reports on the treatment of the pancreas and liver metastases.

Action

Once the lung SABR service is clinical NCCC should establish a working party with the hepato-biliary surgeons to explore other anatomical sites appropriate for treatment with this technique.

NCCC staff should be aware of possible changes in the patient mix of cancers treated by radiotherapy, the potential increase in the range of sites treated and the consequent impact on activity.

7.4 New technology

7.4.1 MR linac

As stated previously IGRT is now the standard of care for radiotherapy patients. Imaging with radiation means that the patient receives a regular, albeit small, dose of radiation to the surrounding normal tissues, which may have implications for secondary cancer induction in patients being treated with curative intent.

One company has developed an integrated MR linac, which is now undergoing initial clinical validation in Europe. This would offer the opportunity for improved soft tissue localisation during treatment leading to tracking of tumour response and intra fraction movement. It could be anticipated that this would enhance the quality of the radiotherapy delivery without compromising the radiation dose to the surrounding normal tissue.

7.4.2 Protons

Proton treatments are now the standard of care for certain paediatric tumours and tumours adjacent to sensitive structures of the brain, base of skull or spinal column e.g. Chondrosarcomas, Chordomas and Meningiomas. There are no proton facilities in the UK and patients who would benefit from proton therapy are referred to proton centres in Europe and the USA.

Current technology requires a large area to accommodate a cyclotron and treatment bunkers and the cost is in the region of £20M. The UK government has agreed to two national proton facilities in the UK, in Manchester and London.

However new technologies are under development, such as laser-induced proton production and delivery of proton therapy on a 'dielectric' linear accelerator. In the medium term these would be much cheaper than the current proposed proton facilities and only require an installation space equivalent to two linear bunkers.

If this was to become a practical option, as a regional centre, NCCC should be at the forefront of installing one as it could enhance the current equipment portfolio. It is likely that increased access to proton therapy would result in an increase in clinical indications to use that modality.

Actions

For each of the new modalities it is important that each staff group at NCCC remain aware through conferences, user groups and literature, of the developments of the newer technologies.

Inform the Trust finance and infrastructure long term strategy of the developing new technologies and the probable timescales for local clinical implementation.

8. Resource requirements

Staffing

Staffing is not considered explicitly in this document. It is not anticipated that a significant number of additional staff would be required to resource the equipment replacement programme. However the situation will need to be kept under review.

It is probable that additional staff in particular specialties will be required to accommodate the commissioning, maintenance, planning and delivery of the more complex radiotherapy and imaging.

9. Costs, capital and revenue

The costs have been itemised as capital, revenue, maintenance and estates and are detailed in the following appendices:

- Appendix 2 Proposed Capital Budget Requirements
- Appendix 3 Maintenance costs analysis and cost of capital
- Appendix 4 Estimated Estate costs.

All the financial modelling has been based on current prices and should therefore only be considered indicative. The information provided by Accuray, Elekta, Siemens and Varian is acknowledged.

The estimate of income is based on previous year's activity and the local and draft national tariffs.

9.1. Capital – with reference to appendices 2 and 3

Over the last ten years radiotherapy equipment has been provided from a number of funding streams, namely central government, lottery money, charity, Trust or PCT funding.

Additionally there is now interest from private financial institutions providing radiotherapy services in private facilities or working in collaboration with NHS radiotherapy centres.

The draft service specification document requires that an equipment replacement and up grade programme is agreed in principle. Funding must be sought from appropriate sources in order to maintain the programme.

9.2 Estate costs – with reference to appendix 4

These are based on delivery within the PFI and the contract obligations placed upon the Trust within that environment. The budget cost estimates are provided for future budgetary planning purposes only. As no design has been performed or is available, each individual project will require further detail in order to be accurately priced if and when they are deemed as viable. The costs are based on the full breakdown of build cost that has been estimated by NUTH Estates through liaison with the project team.

The PFI mark-ups are based upon contract provisions and the applications made to variations made through the PFI arrangement. A verbal commitment was obtained by the project team on the 4 October 2012 that the lifecycle and FM elements should attract no additional annual costs where the replacement is on a similar basis. A number of assumptions, including possible alterations in the overall economic climate affecting the rate of RPI and inflation, have been made to estimate future uplifts to the Retail Price Index and application of inflation. There are obvious risks to these assumptions.

Services procured through the PFI do not require the addition of VAT. Direct delivery under a turnkey package may well attract VAT. Consideration could be given to delivery through a novated type of turnkey arrangement which could potentially have dual savings of not attracting VAT and some of the PFI mark ups applied to capitals works managed by their contractors. This is being looked for the initial replacement programme 2012/14 and could form a model for future delivery. There are also elements such as the Financial Management Fee that HSNL apply to capital works that require further negotiation to investigate whether it could be applied across a group of installations.

9.3 Revenue

A detailed comparison of the income from the local and draft national tariff can be found in Appendix 5. The income generated by clinical radiotherapy activity at NCCC based on the locally agreed tariff for 2012/13 is likely to be around £8,256,514. Based on current activity and the draft national tariff the increase in income for NCCC as the tariff transfers from a local to a national tariff is likely to be in the region of £3M.

10. Summary

The radiotherapy centre at NCCC provides radiotherapy to the geographical area around Newcastle upon Tyne and specialist services to a larger population.

This document outlines the national and local drivers impacting on the provision of a modern radiotherapy service at NCCC.

With the provision of two stereotactic enabled linacs NCCC will be able to develop a wider portfolio of high quality radiotherapy treatments. Thus patients will not have to be referred outside the region for treatment and the highest possible tariff will be accrued for activity.

The replacement strategy proposed in this document should enable NCCC to deliver a full spectrum of radiotherapy and imaging techniques.

It is acknowledged that there are areas of uncertainty, in particular:

- The impact of the provision of a satellite centre south of the Tyne

- Choice of manufacturer for the standard linear accelerators and potential impact on the radiotherapy infrastructure
- Technological developments in imaging and radiotherapy

The capital, revenue and income streams are indicative costs only and based on current prices provided by the manufacturers involved.

It is of primary importance that funding streams are identified so that equipment can continue to be replaced. Thus ensuring compliance with the draft national service specification and avoiding the risk of a reduction in income due to the on-going use of out of date radiotherapy equipment.

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November 2012

Appendix 1 - Capital items within NCCC

Asset Name	Model	Serial No	Asset ID	Location	Acceptance Date	Major up grade date	Replacement or major up grade scheduled date
Major Therapy Equipment items							
LINEAR ACCELERATOR	PRIMUS (H1)	M3238		Rm3H1 32.1.094	31/07/2000		2010
LINEAR ACCELERATOR	PRIMUS (M2)	M3445	126519	Rm2M2 32.1.090	21/01/2002		2012
LINEAR ACCELERATOR	PRIMUS (H2)	M3708	126453	Rm8H2 32.1.123	16/05/2003		May 2013
LINEAR ACCELERATOR	ONCOR (H3)	M3841	148306	Rm4H3 32.1.107	17/05/2004		2014
Linear Accelerator	Oncor (H4)	M5271	203218	Rm6H4 32.1.131	21/02/2008		2018
Linear Accelerator	Oncor (H5)	M5311	203217	Rm5H5 32.1.102	16/05/2008		2018
Linear Accelerator	Oncor (H6)	M5310	203216	Rm1H6 32.1.085	18/04/2008		2018
Linear Accelerator	Oncor (H7)	M5270	203219	Rm7H7 32.1.128	21/02/2008		2018
TomoTherapy unit		110228		Rm9T1 32.1.118	2008		2018
Minor Therapy Equipment items							
SXT unit	Darpac 2000			32.1.135/136	1984	18/04/1995	Not for replacement
HDR microSelectron		31058-32127	015612	32.1.137/136	1992	1998 & 2009	2018
Imaging Equipment							
MULTI SLICE CT SCANNER	EMOTION DUO	36077	107707	32.1.206	01/12/2001		2011. End of life 2013

Asset Name	Model	Serial No	Asset ID	Location	Acceptance Date	Major up grade date	Replacement or major up grade scheduled date
CT SCANNER	EMOTION (H3)	36686	148306	Rm4H3 32.1.107	12/03/2004		2014 End of life 2013
CT Scanner	Sensation Open	49481		CT2 32.1.210/208	2008		2015
CT Scanner	Sensation Open	CT4951 6	203217	Rm5 CT 32.1.102	2008		2015
MR Scanner	Espree		182848	32.1.210B/C	2009		2019
Specialist Software Applications							
ProSoma	Version 3.2			NCCC	2002	latest 2007	November 2012
Masterplan TPS (OMP)	Version 4.1			NCCC	2003	2008 and 2012	2019
Variseed	Version 8.0.1			NCCC	21/12/2010		2017
RadCalc	Version 6.2			NCCC	2011		2018
MOSAIQ	Version 2.3			NCCC	July 2012		2019
Legacy software – required for clinical data retrieval							
Helax TMS				NCCC	1992	several	Replaced with OMP
Plato				NCCC	1992	1998 & 2009	Replaced with OMP and Variseed
XiO TPS				NCCC	2003	2008	Replaced with OMP

Appendix 2 - Proposed Capital Budget Requirements

Replacement Date		Room	Current equipment	Proposed replacement	Estimated capital cost (inc VAT) (£)	Estimated 7*/10 year lifetime cost(£)
Due	Proposed					
2012	2012/13	32.1.090	Primus M2	Stereotactic linac	4,468,022	6,534,902
2010	2013/14	32.1.094	Primus H1	Stereotactic enabled linac		
2012/13 and 2013/14 combined therapy equipment. Replacement of Primus H1 and Primus M2 has been agreed by CMG					**4,468,022**	**6,534,902**
2013	2013/14	32.1.085	Emotion Duo CT scanner in 32.1.107	Definition AS64 Open Sliding Gantry CT scanner * in 32.1.085	519,516	917,872
2013	2013/14	32.1.106	Emotion Duo CT scanner	Definition Open Planning CT Simulator*	455,064	853,420
2013/14					**974,580**	**1,771,292**
2013	2014/15	32.1.123	Primus H2	TomoTherapy HD	1,977,600	2,059,500
2014/15					**1,977,600**	**2,059,500**
2018	2015/16	32.1.118	TomoTherapy	Upgrade to TomoTherapy HD	600,000	1,395,000
2014	2015/16	32.1.107	Primus H3	Standard linac	1,578,000	2,157,440
2015	2015/16	32.1.210/208	Sensation CT scanner	Definition Open Planning CT Simulator*	455,064	853,420
2015/16					**2,178,000**	**4,405,860**
2019	2016/17		MOSAIQ	ARIA	0	
2019	2016/17		OMP	ECLIPSE	540,000	1,080,000
2016/17					**540,000**	**1,080,000**
2018	2017/18	32.1.131	Oncor H4	Standard linac	1,578,000	2,125,248

Replacement Date		Room	Current equipment	Proposed replacement	Estimated capital cost (inc VAT) (£)	Estimated 7*/10 year lifetime cost(£)
Due	Proposed					
2018	2017/18	32.1.102	Oncor H5	Standard linac	1,578,000	2,125,248
2017/18					**3,156,000**	**4,250,496**
2018	2018/19	32.1.085	Oncor H6	Standard linac	1,578,000	2,105,936
2018	2018/19	32.1.128	Oncor H7	Standard linac	1,578,000	2,105,936
2018	2018/19	32.1.138	microSelectron HDR	Flexitron HDR	160,000	633,557
2018/19					**3,316,000**	**4,845,429**
2019	2019/20	32.1.210B/C	MR Espree	Replacement MR scanner	1,080,000	1,980,000
2019/20					**1,080,000**	**1,980,000**
TOTALS					**17,690,202**	**26,927,479**

Note: Budget has been allocated for 2012/13 and 2013/14 to replace two Linear accelerators.
£1.2m is to be funded from charitable funding.

Appendix 3 - Maintenance costs analysis and cost of capital (per annum)

					Fully Comprehensive maintenance package (£)	Proposed maintenance package (£)	Net saving (£)	Current maintenance budget (£)	Proposed maintenance costs (£)	Net increase/ decrease in annual maintenance charges (£)
					A	B	A-B	C	B	B-C
2012	2012/13	32.1.090	Primus M2	Stereotactic linac	233,840	136,110	-97,730	53,626	136,110	82,484
2010	2013/14	32.1.094	Primus H1	Stereotactic enabled linac	180,840	82,950	-97,890	64,902	82,950	18,048
2012/13 and 2013/14 combined.										100,532
2013	2012/13	32.1.085	Oncor H6	Definition AS64 Open Sliding Gantry CT scanner	58,992	58,992	0	32,584	58,992	26,408
2013	2012/13	32.1.106	Emotion Duo CT scanner	Definition Open Planning CT Simulator	58,992	58,992	0	32,584	58,992	26,408
2013/14										52,816
2013	2014/15	32.1.123	Primus H2	TomoTherapy HD	240,000	155,000	-85,000	71,930	155,000	83,070
2014/15										83,070
2018	2015/16	32.1.118	TomoTherapy	Upgrade to TomoTherapy HD	240,000	155,000	-85,000	172,000	155,000	-17,000
2014	2015/16	32.1.107	Primus H3	Standard linac	180,840	72,430	-108,410	59,878	72,430	12,552
2015	205/16	32.1.210/208	Sensation CT scanner	Definition Open Planning CT Simulator	58,992	58,992	0	55,253	58,992	3,739
2015/16							0			-709
2019	2016/17		MOSAIQ	ARIA	70,323	70,323	0	70,323	70,323	0
2019	2016/17		OMP	ECLIPSE	60,000	60,000	0	92,000	60,000	-32,000
2016/17							0			-32,000
2018	2017/18	32.1.131	Oncor H4	Standard linac	180,840	68,406	-112,434	112,243	68,406	-43,837
2018	2017/18	32.1.102	Oncor H5	Standard linac	180,840	68,406	-112,434	113,926	68,406	-45,520
2017/18							0			-89,357
2018	2018/19	32.1.085	Oncor H6	Standard linac	180,840	65,992	-114,848	128,184	65,992	-62,192
2018	2018/19	32.1.128	Oncor H7	Standard linac	180,840	65,992	-114,848	115,993	65,992	-50,001
2018	2018/19	32.1.138	microSelectron HDR	Flexitron HDR	52,618	52,618	0	52,618	52,618	0
2018/19										£112,193
2019	2019/20	32.1.210B/C	MR Espree	Replacement MR scanner	100,000	100,000	0	58,810	100,000	41,190
2019/20										41,190
TOTAL										**43,349**

Total Annual Capital Charges

Replacement Date		Room	Current equipment	Proposed replacement	Average annual capital charges (£)
Due	Proposed				
2012	2012/13	32.1.090	Primus M2	Stereotactic linac	383,993*
2010	2013/14	32.1.094	Primus H1	Stereotactic enabled linac	
2012/13 and 2013/14 combined therapy equipment. Replacement of Primus H1 and Primus M2 has been agreed by CMG					**383,993**
2013	2013/14	32.1.085	Emotion Duo CT scanner in 32.1.107	Definition AS64 Open Sliding Gantry CT scanner in 32.1.085	61,043
2013	2013/14	32.1.106	Emotion Duo CT scanner	Definition Open Planning CT Simulator	53,470
2013/14					**114,513**
2013	2014/15	32.1.123	Primus H2	TomoTherapy HD	232,368
2014/15					**232,368**
2018	2015/16	32.1.118	TomoTherapy	Upgrade to TomoTherapy HD	70,500
2014	2015/16	32.1.107	Primus H3	Standard linac	185,415
2015	2015/16	32.1.210/208	Sensation CT scanner	Definition Open Planning CT Simulator	53,470
2015/16					**309,385**
2019	2016/17		MOSAIQ	ARIA	0
2019	2016/17		OMP	ECLIPSE	63,450
2016/17					**63,450**
2018	2017/18	32.1.131	Oncor H4	Standard linac	185,415
2018	2017/18	32.1.102	Oncor H5	Standard linac	185,415
2017/18					**370,830**
2018	2018/19	32.1.085	Oncor H6	Standard linac	185,415

2018	2018/19	32.1.128	Oncor H7	Standard linac	185,415
2018	2018/19	32.1.138	microSelectron HDR	Flexitron HDR	18,800
2018/19					**389,630**
2019	2019/20	32.1.210B/C	MR Espree	Replacement MR scanner	126,900
2019/20					**126,900**
TOTAL ANNUAL CAPITAL CHARGES					**1,991,069**

*** Excludes donated element**

Appendix 4 - Estimated Estate costs

Replacement Date		Room	Replacement equipment	Estimated PFI costs (£)	
Due	Proposed			Capital Cost	Annual Cost
2012	2012/13	32.1.090	Stereotactic linac	283,886	0
2010	2013/14	32.1.094	Stereotactic enabled linac	293,558	0
2010	2013/14	32.1.106	CT scanner	120,384	0
2013	2013/14	32.1.085	Definition AS64 Open Sliding Gantry CT scanner to be installed	229,219	0
2013	2014/15	32.1.123	TomoTherapy HD	437,820	12,713
2018	2015/16	32.1.118	Upgrade to TomoTherapy HD	30,058	2,078
2014	2015/16	32.1.107	Standard linac	323,100	0
2015	2015/16	32.1.210/208	CT scanner	120,384	0
2018	2017/18	32.1.131	Standard linac	333,366	0
2018	2017/18	32.1.102	Standard linac	333,366	0
2018	2018/19	32.1.085	Standard linac	343,780	0
2018	2018/19	32.1.128	Standard linac	343,780	0
2019	2019/20	32.1.210B/C	Replacement MR scanner	TBA	TBA

The estimates for all future replacement of linacs were based on the same scope as for the first two stereotactic enabled linacs. It is estimated that for standard replacement linacs the installation costs would be significantly reduced.

It is assumed that:

- No additional chiller capacity is required to further cool any room / equipment.
- No further radiation protection is required.

Appendix 5 - Comparison of modelled predicted income from Local and National tariff – based on 2011/12 activity

						Income					
	National tariff (£)	Local Tariff (£)		Activity		Local Tariff (£)		National tariff (£)		Increase/Decrease (£)	
HRG code	2012/13	2011/12	2012/13	2011/12	2012/13	2011/12	2012/13	2011/12	2012/13	2011/12	2012/13
	N	A	B	C	D	A*C	B*D	N*C	N*D	(N-A)*C	(N-B)*D
SC21Z	80	53	52	308	372	16,324	19,344	24,640	29,760	8,316	10,416
SC22Z	97	84	82	14,059	8,513	1,180,956	698,066	1,363,723	825,761	182,767	127,695
SC23Z	115	119	117	42,396	44,398	5,045,124	5,194,566	4,875,540	5,105,770	-169,584	-88,796
SC24Z	239	206	203	43	101	8,858	20,503	10,277	24,139	1,419	3,636
SC25Z	423	164	161	84	104	13,776	16,744	35,532	43,992	21,756	27,248
SC29Z	0	286	281	4,520	8,211	1,292,720	2,307,291	0	0	-1,292,720	-2,307,291
SC31Z	197			4,520	8,211			890,440	1,617,567	890,440	1,617,567
SC40Z	1,258			65	121			81,770	152,218	81,770	152,218
SC41Z	1,677			136	244			228,072	409,188	228,072	409,188
SC42Z	943			0	0			0	0	0	0
SC43Z	943			15	19			14,145	17,917	14,145	17,917
SC44Z	464			0	0			0	0	0	0
SC45Z	419			100	100			41,900	41,900	41,900	41,900
SC46Z	703			50	50			35,150	35,150	35,150	35,150
SC47Z	291			857	750			249,387	218,250	249,387	218,250
SC48Z	481			300	175			144,300	84,175	144,300	84,175
SC49Z	177			67	81			11,859	14,337	11,859	14,337
SC50Z	237			20	24			4,740	5,688	4,740	5,688
SC51Z	629			2513	2634			1,580,677	1,656,786	1,580,677	1,656,786
SC52Z	838			387	406			324,306	340,228	324,306	340,228
						7,557,758	8,256,514	9,916,458	10,622,826	2,358,700	2,366,312

The HRG codes are described in detail in Table 1 on page 3 of this paper

Appendix 6 - Corollary of Acronyms

CHART	Continuous hyper-fractionated accelerated radiotherapy
CT	Computed Tomography
EPID	Electronic portal imaging device
FH	Freeman Hospital
HDR	High dose rate
HSNL	Healthcare services (Newcastle) Limited
IGRT	Image guided radiotherapy
IMRT	Intensity modulated radiotherapy
IVD	In vivo dosimetry
KVCB	Kilovoltage cone beam imaging
Linac	Linear accelerator
MLC	Multi-leaf Collimator
MVCB	Megavoltage cone beam imaging
NECN	North of England Cancer network
NRIG	National radiotherapy implementation group
OIS	Oncology information system
OMP	Oncentra Masterplan
PFI	Private finance initiative
QA	Quality Assurance
REG	Radiotherapy engineering group
RT/EG	Radiotherapy Technology/Engineering group
SABR	Stereotactic ablative radiotherapy
SRS	Stereotactic radiosurgery
TNH	Transforming Newcastle Hospitals
TPS	Treatment planning System
VMAT	Volumetric arc therapy

South Tees

REPLACEMENT PROGRAMME

Ref No	Lease	Division	Equipment	Location	2010/11	2011/12	2012/13	2013/14	2014/15	
RESM002		Speciality Medicine	CT/ Simulator	Radiotherapy				650,000		
RESM004		Speciality Medicine	DEXA bone density machine	Rheumatology				90,000		Moved 14/11/08
RESM005		Speciality Medicine	Deep Therapy	Radiotherapy				300,000		
RESM006	11	Speciality Medicine	Linac 2	Radiotherapy		1,500,000				
RESM007	9	Speciality Medicine	Linac 4	Radiotherapy		-				Not being replaced
RESM008	83	Speciality Medicine	Linac 1	Radiotherapy		1,500,000				
RESM009	30	Speciality Medicine	Simulator 1	Radiotherapy				750,000		Replace with CT. Inc enabling
					-	**3,000,000**	**-**	**1,790,000**	**-**	

Ref No	Lease	Division	Equipment	Location	2010/11	2011/12	2012/13	2013/14	2014/15	
RESM010		Speciality Medicine	Linac 5	Radiotherapy		1,500,000				
RESM011		Speciality Medicine	Brachytherapy	Radiotherapy				350,000		
RESM012		Speciality Medicine	Treatment Planner	Radiotherapy		350,000				Possibly part of Linacs
RESM013		Speciality Medicine	Record & Verify/ Storage	Radiotherapy		150,000				Possibly part of Linacs
					-	**2,000,000**	**-**	**350,000**	**-**	

Cumbria

Radiotherapy Equipment Replacement Programme
01/09/2010 Reviewed 12/09/12

Equipment	Supplier	Serial Number	Nominal Cost	Maintenance	Installation Date	Acceptance Date	Clinical Use Date	Replacement Date	Funded
Linear Accelerator (LA1)	Varian	140065	£1,500,000	RMPD	Oct-03	Mar-04	Oct-04	Oct-13	Replacement cost includes OBI
Linear Accelerator (LA2)	Varian	273002	£1,500,000	RMPD	Apr-05	May-05	Sep-05	Apr-15	Replacement cost includes OBI
Simulator with cone beam CT	Varian	770212	£700,000	RMPD	Aug-06	Sep-06	Sep-06	Aug-16	
CT-Simulator	Philips	7599	£450,000	RMPD / Contract	May-11	Jun-11	Jul-11	May-21	
Superficial X-Ray Set	Agfa	0302-7834	£115,000	RMPD	Feb-02	Mar-03	Apr-02	Apr-12	
GammaMed Plus HDR	Varian	H640296	£100,000	Contract	Aug-06	Aug-06	Feb-08	Aug-16	
Virtual Simulator	Varian		£110,000	Contract	Mar-03		Jun-03	Nov-12	Note replacement date for hardware only Software to be replaced on release of Aria11 early 2013
Treatment Planning System	Varian		£250,000	Contract	Mar-02		Aug-03	Nov-12	Note replacement date for hardware only Software to be replaced on release of Aria11 early 2013
Treatment Record and Verify System	Varian		£400,000	Contract	Sep-99	see data file	Sep-99	Oct-03	BUNDLED Hardware (2008 part) and software (2007) upgrade
Radiotherapy Office System	In House		£20,000	RMPD / CIC	Oct-97		Nov-97	Oct-04	Review of system replacement ongoing Sept 2012

Cumbria

Radiotherapy Equipment Replacement Programme

01/09/2010

Equipment	Supplier	Nominal Cost	Maintenance	Installation Date	Acceptance Date	Clinical Use Date	Replacement Date	Funded
Linear Accelerator (LA1)	Varian	£1,500,000	RMPD	Oct-03	Mar-04	Oct-04	Oct-13	
Linear Accelerator (LA2)	Varian	£1,500,000	RMPD	Apr-05	May-05	Sep-05	Apr-15	
Simulator with cone beam CT	Varian	£700,000	RMPD	Jul-06	Sep-06	Sep-06		
CT-Simulator	Philips	£450,000	RMPD / Contract	Mar-03	Mar-03	Jun-03	Mar-10	
Superficial X-Ray Set	Agfa	£150,000	RMPD	Feb-02	Mar-03	Apr-02	Apr-12	
High Dose Rate Brachytherapy	Nucletron	£150,000	Contract	Sep-92	Sep-92	Nov-92	Oct-04	NO
GammaMed Plus HDR	Varian	£150,000	Contract	Dec-06	Dec-06	-		
Virtual Simulator	Varian	£110,000	Contract	Mar-03		Jun-03	Mar-10	
Treatment Planning System	Varian	£250,000	Contract	Mar-02		Aug-03	Mar-09	
Radiotherapy Office System	In House	£20,000	RMPD / CIC	Oct-97		Nov-97	Oct-04	NO
Treatment Record and Verify System	Varian		Contract	Sep-99		Sep-99	Oct-03	BUNDLED
HDR planning system	Bespoke	£50,000	RMPD	Nov-92	Nov-92	Nov-92	Nov-04	NO

Withdrawn from clinical use

Cumbria - Medical Physics

Equipment	Supplier	Location	Serial Number	Nominal Cost	Maintenance	Installation Date	Acceptance Date	Clinical Use Date	Replacement Date	Funded
Dosimeter		LA1						1985		
Dosimeter		LA2						1995		
Dosimeter		SXT						1985		
Dosimeter		Backup						1985		
Dosimeter		Spare						1985		
Dosimeter		Kv Rad phys								
Dosimeter										
Dosimeter Well chamber	Varian							2006		
Survey Meter		Rad Phys						1984		
Survey Meter		Rad Phys						1985		
Survey Meter		Rad Phys						2002		
Water Tank	QADOS							2009		
Diode Array	QADOS							2009		
Diode Array Profiler	QADOS									
Isocentre tool	QADOS									
In-vivo diode system										
leeds test objects										
EPID test object										