**NHS GREATER GLASGOW & CLYDE**

**JOB DESCRIPTION**



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| 1. **JOB IDENTIFICATION**
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| **Job Title:****Responsible to:** | Radiotherapy Systems Engineer (Advanced Specialist Clinical Technologist) (Lead Technician)Technical Services Manager (Radiotherapy) |
| **Department:** | Radiotherapy Physics, Beatson West of Scotland Cancer Centre, Gartnavel & Monklands Hospitals, Diagnostic Directorate, Acute Services Division |
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| 1. **JOB PURPOSE**
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| The Advanced Specialist Clinical Technologist (Lead Technician) leads one of the teams of Clinical Technologists in the Technology Services of Radiotherapy Physics of the Department of Clinical Physics and Bio-Engineering (DCPB) and contributes to the comprehensive specialist clinical technology service provided to the Beatson West of Scotland Cancer Centre and Lanarkshire Beatson |
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| 1. **ROLE OF THE DEPARTMENT**
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| Radiotherapy Physics provides a comprehensive clinical physics service to the Beatson West of Scotland Cancer Centre, which is one of the largest UK cancer treatment centres providing radiotherapy treatment for more than 7,000 patients per annum in the west of Scotland. Its main base is at Gartnavel General Hospital, Glasgow with a Satellite Facility located at Monklands Hospital in Airdrie.  |
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| **4. ORGANISATIONAL POSITION** |
| Based at Beatson (Gartnavel), the Advanced Specialist Clinical Technologist (Lead Technician), whose organisational position is shown on the attached Organisation Chart, will rotate to work at the Beatson (Monklands) according to a published rota, and to provide cover on an adhoc basis, is: * 1. Accountable to the Chief Executive through the General Manager of Diagnostics Directorate, and responsible for the work and duties assigned through the Head of Radiotherapy Physics, the Equipment & Dosimetry Scientific Lead and Technical Services Manager (Radiotherapy).
	2. Responsible, as a Lead Technician, for the daily professional and technical management, supervision and specialised technical work of a team, normally comprising up to five Clinical Technologists (Specialists, Senior Practitioners and Practitioners) drawn from the Clinical Technologists’ Pool
	3. Responsible for assisting the Technical Services Manager to manage the technical support provided by Radiation Technology to the Beatson.
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| 1. **SCOPE AND RANGE**
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| Referrals for radiotherapy treatment across a wide range of malignant disease, originate from seven Health Boards (Ayrshire and Arran, Borders, Dumfries and Galloway, Forth Valley, Greater Glasgow & Clyde and Lanarkshire) and for non-routine specialised treatments from all the Scottish Health Boards.* 1. Radiotherapy Physics consists of Clinical Physicists, Dosimetrists and Clinical Technologists organised in distinct groups: Treatment Delivery, Clinical Planning & Imaging, Brachytherapy Physics, Teaching & Development and the Clinical Physicist Pool. Radiotherapy Physics has its own program of ongoing scientific research and development.
	2. External beam radiotherapy treatments are provided using eleven linear accelerators at the Beatson (Glasgow) and two accelerators based in Monklands, which together with CT simulators and treatment simulators, treatment verification systems and a low energy x-ray treatment unit have a capital value in excess of £30M.
	3. Radiotherapy Physics staff work closely with Multidisciplinary Teams of Clinical Oncologists, Radiographers and Nurses. Radiotherapy Physics staff support a wide range of specialist clinical services by carrying out radiotherapy treatment planning, brachytherapy physics, radiation dosimetry, equipment management, quality assurance, medical imaging and supporting networked radiotherapy patient information systems. Staff lead and support clinical developments and research, and provide education for multidisciplinary staff, trainees and students. This includes the delivery of post graduate teaching courses for the University of Glasgow.
	4. Within Treatment Delivery, Clinical Physicists work within three areas to provide a complete scientific support service for the Beatson radiotherapy treatment, quality systems and networked radiotherapy systems. These areas are Computing & Dosimetry, Quality Management and Clinical Radiotherapy Systems. Treatment Delivery incorporates the Technology Services management structure.
	5. Clinical Technologists in Technology Services, led by the Technical Services Manager, provide a complete in-house service for the calibration, quality control, maintenance and repair of all the radiotherapy treatment equipment described above. These Clinical Technologists are organised in flexible Teams led by Advanced Specialist Clinical Technologists (Lead Technicians), who allocate and supervise the technical work undertaken ensuring that it is carried out efficiently and to a high standard. These Clinical Technologist Teams operate a locally agreed flexible shift system.
	6. Technology Services staff participate in the day to day support and development of the networked radiotherapy treatment information system used to record and verify radiotherapy treatment data and manage a wide range of associated medical images.
	7. Work carried out within the Service complies with the Beatson’s ISO 9001 Quality Management System and with legislation, including the Ionising Radiation Regulations (2017) and the Ionising Radiation (Medical Exposures) Regulations (2017), and staff participate in the ongoing development of quality systems and procedures.
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| 1. **MAIN DUTIES/RESPONSIBILITIES**
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| 1. **Managerial**

The Advanced Specialist Clinical Technologist assists the Technical Services Manager to plan, design, prioritise and deliver specialist technical support to the Beatson. The postholder:* 1. Manages the work of his/her team of Clinical Technologists. The postholder leads, allocates and supervises complex technical work on radiotherapy equipment undertaken by the team on a daily basis, ensuring that it is carried out efficiently and to a high standard. The work undertaken includes the wide range of specialist electromedical, electronics, electrical and computing support required to support patients’ radiotherapy treatment. This includes the technical commissioning, calibration, quality control testing, planned preventative maintenance, repair & development of the highly complex, high capital value radiotherapy systems and equipment summarised in Section 6.
	2. Contributes to the technical support services provided, in accordance with local and national requirements, assists with the implementation of quality standards and prepares written protocols complying with the Beatson’s Quality System.
	3. Has responsibility as Lead Technician for developing one or more of the specialist areas of advanced work allocated to the Clinical Technologist Teams, as summarised in Section 5C.
	4. Contributes to the general professional and technical management of his/her team of Clinical Technologists, including absence control, flexible rostering, leave, overtime, working conditions, staff development, training, etc. Ensures that work undertaken by his/her team consistently meets high professional and technical standards and complies with extant legislation and national quality standards.
	5. Leads his/her team according to a locally agreed flexible working pattern, designed to cover extended day working, weekend working and emergency rotas to cover specialised out of hours patient treatments, including complex treatment regimes such as Continuous Hyperfractionated Radiation Treatment (CHART), as appropriate.
	6. Takes responsibility, when he/she is the most senior Clinical Technologist present, for the clinical status of the radiotherapy machines used to deliver radiation treatment and for infusion devices used to delivery chemotherapy treatment. Has responsibility for stock control and daily ordering of spare parts using computer-based ordering systems.
	7. Ensures high standards of communication particularly when dealing with highly complex information about radiotherapy equipment safety, fault diagnosis, repair and maintenance.
	8. Works with scientific, technical, radiography and other clinical staff to identify safety issues, diagnose faults, undertake preventative maintenance and equipment repair, including working in clinical areas and working with equipment manufacturers.

**B. Clinical Technical*** 1. Acts as an Operator, under the Ionising Radiation (Medical Exposures) Regulations (2017), with responsibility for complying with the employer’s procedures for work with ionising radiation.
	2. Prepares highly complex radiotherapy equipment (eg linear accelerators, kilovoltage x-ray unit and treatment simulators) for daily clinical use by checking safety features, ensuring correct technical operation, calibrating radiation beams, undertaking quality assurance, writing standard operating procedures and documenting work undertaken in appropriate records.
	3. Participates in the planning, scheduling and carrying out of detailed preventative maintenance programmes, servicing, fault finding and repair work on the highly complex radiotherapy equipment identified above, to help ensure its continuing safe operation, accurate radiation beam calibration, stringent quality control and operational performance within manufacturers’ published technical specifications.
	4. Helps ensure that maintenance, service and repair undertaken, by his/her team on complex medical equipment to component level, comply with extant European and Health Care Standards for patient and staff safety. This includes assisting with the management of health and safety procedures, adhering to relevant protocols and record keeping systems; and providing specialist technical advice on workshop electrical safety and the safety of radiotherapy systems.
	5. Has responsibility for ensuring that service and test equipment used by his/her team is properly calibrated and maintained in good condition and to supervise spares and stock control; including cost appraisal, ordering spare parts and other goods.
	6. Assists relevant Section Managers with the Beatson’s equipment management program and in the design and modification of electronic and mechanical systems, networked databases and other software systems.
	7. Authorises and supervises clinical engineering work undertaken by DCPB Mechanical Workshop staff on radiotherapy equipment in the Beatson’s clinical treatment areas.
	8. Carries out emergency preparation, calibration, quality control, maintenance or repair work on the radiotherapy treatment machines or simulators outwith normal hours as requested by the Technical Services Manager or Deputy or by the Head or Deputy Head of Radiotherapy Physics.
	9. Contributes to the design of new, replacement and modified mechanical systems and patient treatment aids for use with radiotherapy equipment.
	10. Contributes to non-routine design and construction of electromedical devices and systems for use with radiotherapy equipment systems and in clinical treatment.

**C. Specialist Areas of Advanced Work** Advanced Specialist Clinical Technologists are lead technical specialists for one or more of the systems described in Section 6. They also lead one or more advanced areas of technical/project work allocated to the Clinical Technologist Teams, requiring planning, investigative and organisational skills, at a standard equivalent to Master’s level.Current specialist areas include: Advanced Teaching & Training for RT Engineering, Quality System Documentation for Technology Services, Technical Support for Clinical Radiotherapy Systems, and Technology Services HelpDesk Coordinators. The postholder leads one or more such area and provides support for the others, including standing in for other Advanced Specialist Clinical Technologists in their absence. Associated responsibilities are:* 1. ***Advanced Teaching and Training*** ***for RT Engineering*** – The postholder takes the lead role for Clinical Technologist education in Radiation Technology. This includes collating suitable technical material, preparing and delivering lectures/PowerPoint presentations, and arranging practical demonstrations. The postholder leads staff from the Clinical Technologist Teams, who contribute to the preparation, organisation and delivery of appropriate teaching and training. He/she also keeps paper and electronic records of all such staff training and participates in the administration of the associated Quality Assurance Document Management Software (QPULSE) in Radiation Technology.
	2. ***Quality System Documentation for Technology Services*** – The postholder takes a lead role for implementing the Quality Management System in Radiation Technology (ISO9001:2000), ensuring its smooth operation including supervision of document preparation, revision, audit and assists with staff training records. Assisting the Technical Services Manager and Deputy in the operational management of the BOC Equipment Inventory, including recording of Equipment Calibration Certification and Hazard Notification.
	3. ***Technical Support for Clinical Radiotherapy Systems*** *-*The networked radiotherapy treatment management system used to record and verify radiotherapy treatment data and manage associated medical images. The postholder leads the CRIS Technical Support Team which is drawn from the Clinical Technologist Teams. The Team provides first line support for hardware and software systems including servers, network switches, backup devices, uninterruptible power supplies and associated computer equipment. Responsibilities include operational management of the Team, liaising with system managers/administrators; and communication with internal and external organisations (eg Hospital IT Department, Suppliers, etc). He/she also prepares associated system documentation and standard operating procedures.
	4. **Technology Services HelpDesk Coordinators –** The Coordinators takes responsibility for one of the two Technology Services HelpDesk (Beatson or Lanarkshire) including day to day delivery, management and organisation of staff and resources responding to requests for technical support to the HelpDesk, ensuring this is provided in a timely and effective manner across clinical operating hours, escalation of and closure of faults and jobs raised, prioritising and allocating work, organisation and completion of equipment servicing, including that undertaken by external organisations, preparation of operational reports and distribution of safety actions notices to nominated leads.

**D. Teaching and Training -** In addition to the duties described in Section 5C above, the postholder:* 1. Helps to ensure that Clinical Technologists in his/her team maintain and develop their experience by undertaking appropriate training, including rotating areas of work, and through the Knowledge and Skills Framework (KSF), Continuing Professional Development (CPD) and Personal Development Planning (PDP).

**E. Research and Development**Research and development are essential for continuous service improvement and to ensure that the potential of complex new equipment, facilities and treatment modalities is fully realised. The postholder:* 1. Supports appropriate research and development projects in radiotherapy, as requested through the line management structure and in accordance with corporate direction.
	2. Assists with the commissioning and acceptance testing of newly developed highly complex devices and systems for patient treatment including those designed and constructed in-house.

**F. Professional*** 1. Undertakes the personal development necessary to maintain the high quality of the service provided and takes a leading role in service developments. This includes attending suitable seminars and manufacturers’ specialist residential courses in order to keep up to date with the latest electronic and technical developments and their clinical applications in radiotherapy.

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| **F. Responsibility/Activity**  | **%** |
| a)  | Preparation of radiotherapy equipment for clinical use | 20 |
| b)  | Calibration, quality assurance and safety testing of radiotherapy equipment including maintaining appropriate records. | 15 |
| c)  | Preventative maintenance, servicing and repair of radiotherapy equipment including maintaining appropriate records. | 25 |
| d)  | Management of Clinical Technologists; direction and supervision of Lead Technicians’ **Specialist Areas of Advanced Work;** ensuring compliance with extant Legislation, Quality Systems, Standard Operating Procedures and NGD policies. | 30 |
| e)  | Design and production of accessories and clinical aids for radiotherapy treatment  | 10 |

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| 1. **SYSTEMS AND EQUIPMENT**
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| Advanced Specialist Clinical Technologists must have a practical knowledge and understanding of the function and broad operating principles of a wide range of radiotherapy systems and equipment. The postholder has lead technical responsibility for one or more of the following areas: * 1. All equipment related to high voltage radiation treatment delivery including linear accelerators with multileaf collimators, stereotaxy delivery systems, on-board x-ray imaging systems, portal imaging devices, calibration systems, radiation room safety systems, chiller systems and laser alignment systems for patient positioning.
	2. Patient radiotherapy treatment recording and verification systems, including associated networked systems used to manage patient treatment data and medical images.
	3. Other radiation treatment equipment including kilovoltage x-ray equipment, brachytherapy afterloading equipment, therapeutic radiation sources and associated handling equipment.
	4. Equipment used in the design of patients’ radiation treatments including x-ray treatment simulators, CT simulators, diagnostic x-ray equipment, electronic contouring systems and networked computerised treatment planning systems.
	5. Radiation treatment verification equipment including beam data acquisition systems, radiation beam profilers, ion chambers, solid state dosimetry equipment and in-vivo patient dosimetry.
	6. Resilient networked computer technologies, including the radiotherapy management system, patient critical server hardware, PC systems, critical data archiving systems, computer peripherals, interfaces, routers, switches, network infrastructure and wireless systems.
	7. Electrical, microwave, electronic, microprocessor based test equipment and electromedical equipment, some of which operates at high voltages. Heavy lifting equipment and precision equipment including jewellers’ screwdrivers, soldering irons, power tools and mechanical tools.
	8. System support, design assistance, construction and modification of networked databases, spreadsheets and a range of quality assurance and medical equipment management software and systems used extensively by Radiation Technology (eg. Equip, QPulse, Equipment Inventory, PECOs).
	9. Networked supplies ordering systems. Software systems include Microsoft (Word, Excel, Access and PowerPoint) and CAD packages and programming tools for project design.
	10. ISO9001: Quality Management System and associated documentation.
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| 1. **DECISIONS AND JUDGEMENTS**
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| The postholder, as a lead technician in clinical radiotherapy electronics is expected to use his/her own initiative to prioritise action and make the decisions and judgements required to:* 1. Contribute to the management of the daily activities of Clinical Technologists in his/her team, including formulating plans for its development and the service provided.
	2. Undertake analysis and advanced fault finding in highly complex situations on high capital value patient critical radiotherapy equipment within the Beatson’s ISO9001: Quality Management System and Local Rules for Ionising Radiation.
	3. Contribute to the analysis and interpretation of complex multifaceted data to predict radiotherapy equipment performance and assist with predictive maintenance planning and scheduling.
	4. Contribute to changes to written operating procedures relevant to Radiation Technology.
	5. Provide effective support to the Deputy Technical Services Manager and to stand-in for him/her when necessary and as required.
	6. Help make technical decisions on the best way to effect cost-effective safe repairs to complex medical equipment.
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| 1. **COMMUNICATIONS AND RELATIONSHIPS**
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| The postholder, who works closely with the Technical Services Manager, and other Lead Technicians, communicates internally and externally as follows: |
| **People/Organisation** | **Purpose** |
| Radiotherapy Physics Staff | 1. Communicates decisions often of a highly complex nature and justifies reasons
2. Communicates thoroughly reasons for decisions.
3. Involves team members in discussions on routine, strategic and service issues.
4. Helps sets standards when necessary and provides supporting documentation.
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| Radiotherapy Physics Staff | 1. Participates in Radiation Technology Meetings, leads his/her Clinical Technology Team meetings, and communicates with Section Managers, senior staff and Clinical Scientists on radiation technology matters.
2. Communicates with radiation dosimetry staff on the calibration of radiation treatment equipment, quality assurance and safety.
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| Therapy Radiographers | 1. Communicates to gain a clear understanding of complex equipment problems.
2. Advises on equipment problems with treatment (patient set-up, etc).
3. Assists with technical developments in clinical practice.
4. Arranges treatment equipment handover, discusses training issues etc.
5. Advises on new equipment and procedures. Provides training as appropriate.
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| Nursing Staff | 1. Communicates about equipment problems, faults and suppliers’ service visits
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| Clinical Oncologists | 1. May provide advice on complex technical matters including safety and use of equipment, treatment techniques, departmental procedures and developments.
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| Students and Trainees | 1. Gives lectures, tutorials and technical advice on radiation technology to trainee medical physics staff, students, student radiographers, nurses, etc.
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| Manufacturers’ Agents | 1. Discusses detailed and complex technical information about radiotherapy equipment, specialised software and computer systems.
2. Resolves problems and faults on radiotherapy equipment and associated safety systems.
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| Estates Staff | 1. Communicates and collaborates about aspects of hospital plant and equipment relevant to the operation of radiotherapy equipment.
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| 1. **PHYSICAL DEMANDS OF THE JOB**
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| * 1. Frequent requirement to maintain high levels of concentration when using computers and fault finding on highly complex treatment equipment in emergency situations and during intensive electrical/electronic work which can involve risks from associated high voltage electrical systems.
	2. Frequent requirement to exert moderate physical effort and for manual skills when working on treatment equipment (frequently at height), involving dismantling and manual handling of heavy equipment including treatment couches, x-ray shielding (>15kg) and linear accelerator collimator systems (> 0.5 tonne).
	3. Frequent requirement for high precision machine control checks, QA measurements and associated safety critical adjustments requiring fractional millimetre accuracy and manual dexterity.
	4. Requirement for the postholder to change tasks, often at short notice, that arises in a busy, demand led service in which he/she manages competing priorities, short timescales and associated clinical pressures.
	5. Regular exposure to potentially distressing or emotional circumstances in clinical areas where cancer patients receive radiation treatment, including occasional exposure to distressing or emotional circumstances.
	6. Regular requirement to respond to urgent treatment equipment problems, make rapid decisions, and implement essential actions which could affect patient treatment such as recommending withdrawal of equipment from clinical use.
	7. Regular requirement to work on highly complex high power microwave, high voltage and other live electrical systems, with responsibility for own safety and that of other staff.
	8. Regular requirement to work on radiation systems when safety controls are overridden or when parts of the equipment may be exhibiting induced radioactivity.
	9. Regular exposure to compressed gases, high vacuum, high temperature components, chemical products and microbiological hazards during equipment servicing and repair.
	10. Occasional requirement for fault diagnosis and safety decisions in emergency situations requiring stressful communications with medical staff, radiographers and patients.
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| 1. **MOST CHALLENGING/DIFFICULT PARTS OF THE JOB**
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| It is vital for the operation of the clinical service that all radiotherapy equipment managed and supported by Radiotherapy Physics is maintained in a safe working condition and available for clinical use for the maximum possible time during its lifecycle. The challenges are:* 1. Leading his/her team of Clinical Technologists in variety of demand led situations, in an assured and tactful way, to achieve an effective outcome, particularly when patient safety could be compromised, when no technical equipment fault can be found and/or when clinical pressures are applied by users to prioritise clinical urgencies.
	2. Diagnosing and helping to ensure the rapid, cost-effective repair of highly complex clinical linear accelerators and other equipment such that downtime is minimised and expenditure on costly components (some greater than £50K) is fully justified.
	3. Maintaining safety critical operation and reliability of radiotherapy equipment and systems in line with rapidly changing technologies, service developments and changing guidelines issued by government agencies, advisory bodies and manufacturers.
	4. Maintaining specialist knowledge continuously, across a broad range of highly technical areas in line with constantly changing technical developments in radiotherapy technology such that his/her team is capable of providing an effective and responsive service.
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| 1. **KNOWLEDGE, TRAINING AND EXPERIENCE REQUIRED TO DO THE JOB**
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| **ESSENTIAL****Qualifications**A Degree in Medical Technology, Electrical/Electronic Engineering or other relevant discipline is essential. An HNC/HND or equivalent qualifications in Applied Physics or Electrical and Electronic Engineering or equivalent degree will be accepted provided the knowledge, training and experience profile matches the requirements of the post.**DESIRABLE**Registration on the Register of Clinical Technologists (RCT) held by the Institute of Physics and Engineering in Medicine (IPEM) is desirable. Membership of IPEM at an appropriate level is desirable. **Knowledge and Training****ESSENTIAL**Staff at this level require advanced skills, knowledge and understanding gained by professional qualifications, training and practical experience. This will encompass:* 1. The operation, function and purpose of a significant proportion of the broad range of complex medical equipment listed in Section 6, including electromechanical systems, computer systems, electronic engineering, equipment design and construction, fault diagnosis and repair to component level using a wide range of test equipment.
	2. An advanced in-depth knowledge of radiation technology, including quality control and safety testing and a working knowledge of relevant legislation, national standards and quality systems.
	3. A high level of in-depth understanding of patient and staff risks arising from equipment failure or misuse and how these can be minimised.
	4. Policies and practices for managing highly complex medical equipment including planned preventive maintenance, inspection, testing, calibration and repair.

**DESIRABLE*** 1. Evidence of continuing commitment to Continuing Professional Development (CPD) by the ongoing attendance at relevant study days, short courses and presentations for generic and specific competency on a wide range of highly complex medical equipment and their impact on clinical management, fulfilling the requirements of the Health Professions Council (HPC) as appropriate.

**ESSENTIAL**ExperienceA minimum of **six years** relevant post-qualification experience is required for Degree and HNC/HND holders, including **two years** as a Specialist Practitioner Clinical Technologist or equivalent. Post-qualification experience in planning, investigating and undertaking technical projects is equivalent to the standard required for Master’s level qualifications. Relevant experience includes:* 1. In depth practical experience and training on a broad range of highly complex radiotherapy technology including linear accelerators, treatment simulators, treatment simulators, kilovoltage x-ray equipment and the advanced application of specialist fault finding techniques specific to computer/microprocessor control systems, high vacuum systems, high voltage and radiofrequency systems. This is evidenced through successful completion of extensive residential manufacturer training courses and on-going in-house training.
	2. Experience of service provision including leading teams, managing staff and resources, staff supervision, effective communication, writing standard operating procedures and knowledge of working policies and procedures.
	3. Experience of relevant legislation, national standards, professional and other guidelines, including workplace practice, quality management, health and safety legislation.

**DESIRABLE*** 1. A wide range of experience of modern radiotherapy technology and systems delivering advanced techniques eg. VMAT, gating
	2. Experience of the application of clinical technology to medical equipment in healthcare, including developing technical support systems, research and development techniques.
	3. Experience in organising helpdesk support.
	4. Experience in project management.
	5. Training of clinical, nursing or technical staff as individuals or in groups.
	6. Giving presentations on medical equipment technology to clinical, nursing or other technical staff.
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**Organisation Chart**

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