

The Voluntary Register of Clinical Technologists

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The Clinical Technologist: Scope of Practice

Clinical Technologists are Healthcare Scientists specialising in the practical application of physics, engineering and technology to clinical practice. They work in NHS hospitals, private health care, academic institutions, and, the medical device industry.

Clinical Technologists perform invasive procedures on patients, or, make clinical interventions, or, exercise judgement that can substantially impact on patient health or welfare. When acting autonomously within their area of expertise they have potential to cause harm to patients.

The practice of Clinical Technologists is divided into Clinical Physics and Clinical Engineering. They work in the following disciplines:

Clinical Physics Technologist

Nuclear Medicine:-	Practiced by Nuclear Medicine Technologists
Radiotherapy Physics:-	Practiced by Radiotherapy Physics Technologists
Radiation Physics :-	Practiced by Radiation Physics Technologists

Clinical Engineering Technologist

Medical Engineering:-	Practiced by Medical Engineering Technologists
Radiation Engineering:-	Practiced by Radiation Engineering Technologists
Rehabilitation Engineering:-	Practiced by Rehabilitation Engineering Technologists
Renal Technology:-	Practiced by Renal Technologists

The scope of practice of each of these disciplines is described overleaf. For each discipline there is an introduction, a broad overview, and, a description of the specialised tasks practiced. The scope of practice statements describes the attributes that would be expected from a newly qualified Clinical Technologist at the point of registration.

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Scope of Practice - Nuclear Medicine Technologist

Nuclear Medicine is the medical speciality that uses unsealed radioactive materials in the diagnosis and treatment of disease. The use of such radioactive materials is governed by statutory legislation. The practice involves the manufacture, administration, imaging and quantification of diagnostic radiopharmaceuticals to demonstrate organ and molecular function as well as the delivery of therapeutic radiopharmaceuticals to treat a number of pathologies. The Nuclear Medicine Technologist is an essential part of a multidisciplinary team who deliver these services to patients.

Broad overview

The primary responsibilities of the Nuclear Medicine Technologist are to ensure that nuclear medicine investigations are carried out safely, minimising patient radiation dose without compromising image quality. This includes authorising investigations against written guidelines, the safe manufacture of radioactive medicinal products, equipment quality assurance, the safe administration of radioactive medicinal products, undertaking imaging procedures using a gamma camera and processing the results, undertaking non-imaging nuclear medicine tests and administering radioactive medicinal products for radiotherapy.

Specialised tasks

The newly qualified Nuclear Medicine Technologist must be able to:

General

- Authorise referrals for nuclear medicine procedures received from other healthcare professionals using protocols agreed with authorised medical practitioners.
- Schedule procedures taking into account the needs of the patient, service availability and technical factors.
- Review patient status and suitability for diagnostic procedures.
- Administer radioactive and non-radioactive medicinal products to the patient by intravenous, intramuscular, and oral routes for diagnostic purposes.
- Work safely specifically with regard to radioactive, biological and chemical hazards in accordance with current legislation.

Radiopharmacy

- Verify prescription and/or order for radioactive and non-radioactive medicinal products.
- Plan for production of radioactive and non-radioactive medicinal products.
- Aseptically manufacture the radioactive and non-radioactive medicinal products including the accurate dispensing of patient doses in accordance with local diagnostic reference levels.
- Confirm that radiopharmaceutical products meet specification
- Release of radioactive and non-radioactive medicinal products suitable for clinical use.
- Dispatch of radioactive materials to intended user.
- Radiolabel blood components.

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Imaging procedures

- Perform quality assurance on the gamma camera before patient investigation is initiated.
- Prepare the patient and the environment for imaging procedures.
- Perform a wide range of imaging procedures using a gamma camera
- Acquire and record data during imaging procedures.
- Process the images using appropriate computer software and calculate quantitative results.

Non-Imaging procedures

- Perform quality assurance on sample counting equipment.
- Prepare the patient and the environment for non-imaging procedures.
- Perform a range of non-imaging diagnostic procedures.
- Collect, prepare and measure radioactive content of biological specimens.
- Calculate quantitative results.
- Prepare the patient and the environment for radionuclide therapy procedures in conjunction with senior staff.

Radiation protection

- Manage radioactive patients who have undergone diagnostic investigations.
- Provide information to patients, members of the public and other healthcare professionals regarding radiation protection controls after nuclear medicine procedures.
- Receive, store and dispose of radioactive and non-radioactive materials and products according to local protocols and environmental authorisations.

Other

- Assess risks associated with work activity.
- Participate in the development and maintenance of health, safety and security practices in the workplace.
- Report incidents associated with work activity.
- Manage personal effectiveness by reflection and review of practice and participating in continuing professional development.

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Scope of Practice - Radiotherapy Physics Technologist

A multi-disciplinary team of health care professionals delivers radiotherapy. The use of radiation and radioactive materials to deliver radiotherapy is governed by legislation. The practice involves the calibration and maintenance of radiotherapy equipment, treatment planning, patient immobilisation and verification that the treatment given matches the treatment plan. The Radiotherapy Physics Technologist provides scientific and technical services to ensure the delivery of high quality and appropriate radiotherapy to patients.

Broad overview

The Radiotherapy Physics Technologist is involved in a range of activities within radiotherapy physics. Including dose planning for external beam megavoltage therapy, mould room, brachytherapy, machine quality assurance (QA), in-vivo dosimetry, routine dosimetry and virtual simulation.

The scope describes the broad range of services provided and the activities described reflect current clinical practice within individual oncology departments.

Specialised tasks

The newly qualified Radiotherapy Physics Technologist must be able to:

Dose Planning

- Check the relevance of patient data and patient related data to ensure validity, consistency and completeness.
- Provide treatment parameters and dosimetric data for patients to undergo radiotherapy.
- Transfer of data from imaging equipment to computerized treatment planning systems.
- Outline anatomical structures for standard situations.
- Design an individual treatment plan for standard treatment techniques.
- Perform simple dose calculations for standard treatment techniques using data provided by a clinical scientist.
- Transfer data to and from the treatment planning system.

Virtual Simulation

- Transfer data from imaging equipment.
- Outline anatomical structures; for example, external patient contour.
- Define treatment field parameters for simple treatment techniques using virtual simulation software.
- Define appropriate isocentre.
- Conform treatment fields using multi-leaf collimators etc.
- Mark beam directional shell with relevant reference points.
- Transfer data to record and verify systems and/or treatment planning system.

Mould Room

- Take appropriate impressions of patients using a range of impression materials in order to manufacture treatment devices.

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- Manufacture individually custom made beam direction, modifying and shielding devices for radiotherapy treatment.
- Monitor and react to changing needs of the patient whilst in the Mould Room or undergoing brachytherapy procedures.
- Provide advice and point of contact for patients throughout the Mould Room process.
- Operate a broad range of mould room equipment including vacuum forming machines and computerised block cutting equipment.
- Manage and control stocks of materials used in the mould room.

Brachytherapy

- Calculation of standard treatment times for brachytherapy.
- Delivery of brachytherapy treatments using a range of applicators and treatment equipment.
- Provide safe care and custody for all sealed sources on site including record keeping, stock control and disposal.
- Manage the cleaning and sterilisation of brachytherapy sources and applicators.
- Provide brachytherapy technical support in theatre.

Quality Control of Radiotherapy Systems

- Undertake quality control, following specified procedures, for CT scanners, simulators, treatment planning systems, radiotherapy treatment units, and dosimetry equipment.
- Check equipment is operating within agreed tolerances.

Dose Measurements

- Perform dose measurements to support radiation treatment.
- Use a wide range of dosimeters for a variety of dose measurements types in accordance with established procedures which include TLD, semi-conductor diodes, electronic portal imaging devices, film and ionisation chambers. This involves in-vivo dosimetry measurements for patients, beam characterization and beam calibration.
- Know procedures to be followed for out of tolerance measurements.
- Correctly read and interpret measurements from the range of equipment used.

General

- Carry out QA processes on radiotherapy equipment following standard departmental protocols.
- Participate in audit and development activities.
- Assist with the provision of specialist training in radiotherapy physics techniques and practice.
- Record measurements and maintain appropriate records.
- Assess risks associated with work activity.
- Participate in the development and maintenance of health, safety and security practices in the workplace.
- Report incidents associated with work activity.
- Manage personal effectiveness by reflection and review of practice and participating in continuing professional development.

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Scope of Practice - Radiation Physics Technologist

The Radiation Physics services monitor the health and safety of workers, patients, the public, and, the environment from hazards arising from the medical use of ionising radiation (for example, from x-ray equipment and radioactive materials) and non-ionising radiation (for example, from ultrasound and phototherapy equipment).

The Radiation Physics discipline incorporates the sub-disciplines of Radiation Protection (ionising and non-ionising), Diagnostic Radiology Physics, and, Non-ionising Radiation Physics.

Broad overview

The primary responsibilities of the radiation physics technologist are:

Diagnostic Radiology and Non-ionising Physics

The Radiation Physics Technologist is involved in all stages of ionising and non-ionising imaging equipment lifetime. Their aim is to minimise patient dose without compromising image quality. They commission to obtain performance measurements on installation and acceptance testing for every part of the imaging chain and monitor its performance during its lifetime by undertaking quality assurance and radiation protection surveys.

Ionising and Non-ionising Radiation Protection

A radiation protection service is a specialised team, of which the Radiation Physics Technologist is an integral part. They ensure the protection of staff, patients, the public and the environment from all types of radiation, provide dosimetry services and calibrate monitoring equipment.

Radiation Physics Technologists must ensure that records and reports are accurately maintained for all equipment and activities. They must be able to provide technical support to all staff and patients associated with the Radiation Physics Service and participate in training other staff groups.

Specialised tasks

The newly qualified Radiation Physics Technologist must be able to:

- Participate in commissioning/acceptance testing/quality assurance testing of x-ray generating and imaging equipment, non-ionising imaging and therapy equipment and image production and storage devices.
- Audit darkroom facilities.
- Audit facilities using all forms of ionising and non-ionising radiation, for compliance with current legislation.
- Leak test sealed radioactive sources.
- Measure shielding and protection in new and existing radiation facilities.
- Assess staff and patient protection devices.
- Participate in scientific and statistical analysis, interpret results, diagnose faults, artefacts and anomalies.
- Maintain inventories and carry out audits of radioactive sources/substances
- Maintain records of radioactive waste. Analyse data, compile reports and compare against site licences

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- Calibrate ionising and non-ionising radiation measuring instruments.
- Participate in the provision of radiation monitoring services for staff, patients and the environment.
- Assist with the analysis and interpretation of patient dose data.
- Perform optimisation studies. Analyse and interpret dose and image quality data.
- Participate in the teaching and training of other staff groups in radiation and safety related topics.
- Carry out contamination monitoring of areas using unsealed sources and decontaminate as necessary.
- Keep relevant scientific and technical records of work performed.
- Assess risks associated with work activity.
- Participate in the development and maintenance of health, safety and security practices in the workplace.
- Report incidents associated with work activity.
- Manage personal effectiveness by reflection and review of practice and participating in continuing professional development.

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Scope of Practice - Medical Engineering Technologist

The Medical Engineering Technologist works independently, or as part of a multidisciplinary team, providing specialist engineering services and technical knowledge and skills to other healthcare staff and patients.

Broad overview

Medical Engineering is the application of engineering principles and technology in the specification, design, development, maintenance and repair of Electronic, Mechanical and Electro-Mechanical equipment used in healthcare.

Medical Engineering services cover general and specialised medical equipment used in wards, critical care areas, hospital laboratories, outpatient departments and the community.

The Medical Engineering Technologist optimises the availability and safe and effective use of medical equipment to support patient diagnosis and treatment.

The primary responsibilities of Medical Engineering services are:

Equipment Management

Medical Engineering Technologists working in Equipment Management operate over the full life cycle of medical devices. Starting from initial evaluation and specification through selection, procurement, acceptance, introduction to clinical use, user training, its safe and accurate use by planned maintenance, repair and calibration and safety testing, to the identification of the end of its life cycle and its eventual safe disposal and planned replacement.

Equipment Design and Development

Medical Engineering Technologists are involved in the design and development of new and novel medical devices leading to improved patient care.

Equipment Evaluation

Medical Engineering Technologists perform a vital role in the formal assessment of commercial medical devices providing valuable comparisons of medical device specifications, performance and function to other healthcare professionals.

Specialised tasks

The newly qualified Medical Engineering Technologist must be able to:

- Undertake the management of the complete lifecycle of the following medical devices to ensure they are safe and remain fit for purpose:
 - Suction devices, nebulisers, spirometers, infusion devices, temperature and blood pressure monitoring, ECG recorders and monitors, oxygen analysers, pulse oximeters, carbon dioxide monitors, electrosurgery equipment, defibrillators, neonatal care incubators, foetal heart monitors, endoscopic systems, and audiometry and physiotherapy equipment
- Perform planned preventative maintenance, faultfinding and repair, calibration and safety testing procedures on the above range of medical devices to reduce the risk and improve the quality of patient care.

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- Use computer based systems to ensure the effective management and service history of medical devices.
- Contribute to advice on the risks and benefits of existing, new and emerging technology.
- Participate in clinical trials and the evaluation of medical devices.
- Contribute to the provision of advice, support and training on the use of medical devices.
- Advise on the suitability and availability of medical devices.
- Participate in audit, and development, and report on the current use and effectiveness of medical devices.
- Decommission and safely dispose of medical devices.
- Assist with investigations and reporting of actual and potential incidents or hazards involving medical devices.
- Generate and evaluate ideas for novel medical devices.
- Have the ability to specify, design, develop and manufacture prototype medical devices.
- Have the ability to modify medical devices safely in accordance with manufacturers' recommendations, international standards and codes of practice.
- Produce documentation including operator instructions, technical manuals and reports.
- Assess risks associated with work activity.
- Participate in the development and maintenance of health, safety and security practices in the workplace.
- Report incidents associated with work activity.
- Manage personal effectiveness by reflection and review of practice and participating in continuing professional development.

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Scope of Practice - Radiation Engineering Technologist

A Radiation Engineering Technologist works in a multidisciplinary team supporting the delivery of radiotherapy and radiology services.

Broad overview

The Radiation Engineering Technologist must be able to carry out repairs, servicing, modifications and calibrations on a full range of radiotherapy and radiology devices and their hardware, software and supporting equipment. This involves the following:

Linear accelerators, radiotherapy simulators, brachytherapy equipment, orthovoltage therapy equipment, CT scanners, diagnostic x-ray equipment, gamma cameras, ultrasound scanners.

These tasks are carried out in line with national regulations and local rules maintaining manufacturer specifications for performance. The Radiation Engineering Technologist ensure that quality and engineering records are accurately maintained and manage and maintain appropriate levels of essential spare parts.

The Radiation Engineering Technologist assists in the installation and commissioning process including liaison with the other professions involved. The Radiation Engineering Technologist are also involved in the design, development and manufacture of treatment aids, participates in the technical support of equipment trials, and provides comprehensive technical support to other healthcare professionals.

Specialised tasks

The newly qualified Radiation Engineering Technologist must be able to:

- Undertake quality control, following specified procedures, for CT scanners, simulators, treatment planning systems, radiotherapy treatment units, diagnostic radiology units and dosimetry equipment.
- Check the characteristics of the ionising radiation beam.
- Check the optical and radiation alignment of the radiation beam.
- Dismantle and assemble vacuum systems safely.
- Assess the risks involved when working on high voltage systems and electromechanical drives.
- Carry out adjustments to beam parameters on linear accelerators and radiology equipment.
- Identify faults and take remedial action.
- Identify issues that will affect the clinical performance of the radiation beam.
- Carry out appropriate handover procedures.
- Use radiation measurement equipment.
- Verify the correct functioning of safety and operational interlock systems.
- Assess risks associated with work activity.
- Participate in the development and maintenance of health, safety and security practices in the workplace.
- Report incidents associated with work activity.
- Manage personal effectiveness by reflection and review of practice and participating in continuing professional development.

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Scope of Practice - Rehabilitation Engineering Technologist

A Rehabilitation Engineering Technologist works in a multidisciplinary team supporting the delivery of rehabilitation equipment services in hospitals and in the community.

Broad overview

Rehabilitation Engineering can be defined as the clinical application of engineering principles and technology in the development of specialist devices and the provision of services to meet the needs of individuals with disabilities. Rehabilitation Engineering is concerned with improving the physical, mental and social function of a person with disabilities by the provision of appropriate assistive devices. It may also involve the reduction of environmental barriers.

Rehabilitation Engineering Technologists contribute to patient assessments for assistive devices. Rehabilitation Engineering Technologists design bespoke devices that are not commercially available, conducting a full risk analysis on the device to ensure that it is “fit for purpose”. They specify, install and commission new equipment and contribute to the monitoring of repair and maintenance contracts. The work of a Rehabilitation Engineering Technologist extends beyond the hospital environment into the wider community and frequently involves domiciliary assessments, visits to special schools, day centres and other community facilities.

Specialised tasks

The newly qualified Rehabilitation Engineering Technologist must be able to:

- Have the ability to design, develop and manufacture novel, cost effective assistive device solutions where commercial options are not available.
- Confirm that equipment used for measurement and assessment is calibrated, fully operational and available for use.
- Recommend commercial solutions to meet individual client needs.
- Have the ability to customise, integrate and install commercially available assistive device technology to meet specific client needs.
- Assess and manage risks associated with use, provision, and development of assistive devices.
- Maintain, analyse and manipulate paper and computerised record systems.
- Ensure assistive technology devices used for assessment are fully functional.
- Take appropriate anthropometric measurements to ensure correct equipment is specified.
- Ensure appropriate information is recorded taking into account the need for client confidentiality.
- Specify and fit assistive technology device accessories taking into account relevant legislation and safety considerations.
- Programme electronic assistive technology systems to match device parameters to the client's abilities.
- Train users and carers in the safe use of assistive technology..
- Contribute to the provision of advice, support and training of healthcare professionals on the use of assistive technology devices, legislation and developments in technology.

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- Liase with companies over the provision of assistive technology equipment and engineering and technical services.
- Assess risks associated with work activity.
- Participate in the development and maintenance of health, safety and security practices in the workplace.
- Report incidents associated with work activity.
- Manage personal effectiveness by reflection and review of practice and participating in continuing professional development.

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Scope of Practice - Renal Technologist

The Renal Technologist provides specialised equipment management services to Renal Dialysis units, including the management and operation of specialised water treatment plants. The Renal Technologist also provides specialised equipment services to the Critical Care environment and the community, supporting a range of equipment providing various Renal Replacement Therapies such as Haemofiltration, Plasma Exchange and Peritoneal Dialysis.

Broad overview

The role and function of a Renal Technologist involves operating over the full life cycle of dialysis and associated equipment (including home dialysis) and water treatment plants. Starting from initial evaluation and specification through selection, procurement, acceptance, introduction to clinical use, user training, its safe and accurate use by planned maintenance, repair and calibration and safety testing, to the identification of the end of its life cycle and its eventual safe disposal and planned replacement. They ensure that water quality from water treatment systems are fit for purpose for dialysis equipment and routinely monitor water quality.

They perform a vital role in the formal assessment of dialysis equipment and water treatment plants providing valuable comparisons of specifications, performance and function to other healthcare professionals. They provide technical support and advice to all staff and patients associated with the Renal Unit and participate in staff, patient and technologist training.

Specialised tasks

The newly qualified Renal Technologist must be able to:

- Participate in assessing work pressures and prioritising workload to ensure an adequate and effective technical service is provided to renal staff, carers and patients, whether in the hospital or community environment.
- Repair, calibrate and programme haemodialysis machines and equipment associated with other Renal Replacement Therapies such as Haemofiltration, Haemodiafiltration, Plasma Exchange and Peritoneal Dialysis, in line with the department policy and manufacturers' policies and guidelines.
- Repair, service and maintain equipment associated with dialysis, in line with the department policy and manufacturers' policies and guidelines.
- Conduct routine preventative and corrective maintenance on all haemodialysis equipment in line with the department policy and manufacturers' policies and guidelines.
- Ensure that calibrated test equipment is used during maintenance and repair.
- Recognise and diagnose faults during treatment, and provide corrective action whilst maintaining patient safety.
- Provide quality assurance for dialysis related equipment.
- Participate in the commissioning and acceptance of new dialysis equipment and validating its performance.
- Follow the correct procedures required to document and record work done to dialysis and associated equipment and that it is in place prior to clinical use.

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- Prepare the environment, install equipment for dialysis treatment and verify performance for clinical use.
- Install, service, repair and maintain water treatment systems including filtration systems, softeners, activated carbon systems and reverse osmosis units.
- Ensure that purified water is provided for dialysis equipment and maintain quality control systems.
- Collect and analyse water samples for quality control.
- Be aware of the water quality Standards and participate in the design of water treatment systems to meet the needs of renal units.
- Decontaminate equipment that has been used to treat patients infected with blood borne viruses such as Hepatitis B, Hepatitis C and HIV.
- Be aware of the appropriate stock levels and assist with the maintenance, storage and ordering of spare parts necessary to maintain an effective and efficient technical service.
- Maintain an awareness of developments in renal replacement therapy.
- Provide support and advice to staff and carers providing dialysis treatments, regardless of location.
- Follow procedures to quarantine suspect equipment and assist with further technical investigations.
- Assess risks associated with work activity.
- Participate in the development and maintenance of health, safety and security practices in the workplace.
- Report incidents associated with work activity.
- Manage personal effectiveness by reflection and review of practice and participating in continuing professional development.