



Promoting higher quality

**The Quality Assurance Agency
for Higher Education**

**Benchmark statement:
Health care programmes**

Phase 1

Radiography

Subject benchmark statements: Health care programmes

Subject benchmark statements provide a means of describing the nature and characteristics of programmes of study and training in health care. They also represent general expectations about standards for the award of qualifications at a given level and articulate the attributes and capabilities that those possessing such qualifications should be able to demonstrate.

Subject benchmark statements are used for a variety of purposes. Primarily, they are an important external source of reference when new programmes are being designed and developed. They provide general guidance for articulating the learning outcomes associated with the programme but are not a specification of a detailed curriculum. Benchmark statements provide for variety and flexibility in the design of programmes and encourage innovation within an agreed overall conceptual framework.

Subject benchmark statements also provide support in the pursuit of internal quality assurance. They enable the learning outcomes specified for a particular programme to be reviewed and evaluated against agreed general expectations about standards.

Finally, subject benchmark statements are one of a number of external sources of information that are drawn upon for the purposes of academic review* and for making judgements about threshold standards being met. Reviewers do not use subject benchmark statements as a crude checklist for these purposes however. Rather, they are used in conjunction with the relevant programme specifications, the associated documentation of the relevant professional and statutory regulatory bodies, the institution's own self evaluation documentation, together with primary data in order to enable reviewers to come to a rounded judgement based on a broad range of evidence.

The benchmarking of standards in health care subjects is undertaken by groups of appropriate specialists drawn from higher education institutions, service providers and the professional and statutory regulatory bodies. The statements represent the first attempt to make explicit in published form the general academic characteristics and standards of awards in these subjects in the UK. In due course, the statements will be revised to reflect developments in the subjects and the experiences of institutions, academic review and others that are working with it.

* academic review in this context refers to the Agency's arrangements for external assurance of quality and standards. Further information regarding these may be found in the *Handbook for academic review*, which can be found on the Agency's web site.

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Foreword

This benchmark statement describes the nature and standards of programmes of study in radiography, that leads to awards made by higher education institutions in the United Kingdom (UK) in the subject.

It has been developed in collaboration with a number of other health care professions and these are listed below. Although initial work was undertaken in subject specific groups, the analysis of these early drafts identified a number of features which all the subject groups shared. It was, therefore, agreed by each of the specialist benchmark groups that their respective statements could be cast using a common structure. As work progressed it became increasingly apparent that there was considerable overlap within the details of the subject-specific statements and a common health professions framework was emerging. This emerging framework is, accordingly, displayed in each of the subject statements in order to illustrate on the one hand, the shared context upon which the education and training of health care professionals rests and, on the other, the uniquely profession-specific context within which programmes are organised. It is important to emphasise that benchmark statements are not cast in tablets of stone and will need to be revisited in the light of experience and further developments in health care. Moreover, we are confident that the emerging framework has the potential to embrace other health related professions such as social work, dentistry, medicine and other therapies. It is anticipated that further work in a second phase of the project could lead to an overarching health professions framework.

The initial section of this statement sets out the health professions framework under three main headings:

- A Expectations of the health professional in providing patient/client services;
- B The application of practice in securing, maintaining or improving health and well-being;
- C The knowledge, understanding and skills that underpin the education and training of health care professionals.

The main section of this statement, in addition to describing the nature and extent of programmes leading to awards in radiography, describes the profession-specific expectations and requirements under the same three categories.

The key feature in this statement, as in the associated statements, is the explicit articulation of the academic and practitioner standards associated with the award in radiography. This duality reflects the significance of the academic award as the route to registration for professional practice and formal recognition by the professional and statutory regulatory bodies. The threshold standards set out the expectations of health professionals entering their first post immediately on qualification.

The section on standards accords with the relevant level descriptor for awards in the qualifications frameworks published by the Quality Assurance Agency for Higher Education.

The section on teaching, learning and assessment draws attention to the central role of practice in the design of learning opportunities for students and the importance of ensuring that professional competence developed through practice is adequately assessed and rewarded. It also notes how essential it is that the integration of theory and practice is a planned process within the overall arrangements made for teaching and learning.

The statement acknowledges the need to put the prospective client/patient at the centre of the student's learning experience and to promote within that experience the importance of team-working and cross-professional collaboration and communication. Implicit in the statement are the opportunities that exist for shared learning across professional boundaries, particularly in the latter stages of training when inter-professional matters can be addressed most productively. It is essential that the opportunities that exist for shared learning in practice are optimised, as well as best use being made of similar opportunities that prevail more obviously in classroom-based activities.

This statement and the associated statements will therefore allow higher education institutions, in partnership with service providers (where appropriate), to make informed curriculum choices about the construction of shared learning experiences. In this context, shared learning is seen as one of a number of means of promoting improved collaborative practice and addressing a range of issues which span professional accountability and professional relationships.

Finally, the statement does not set a national curriculum for programmes leading to awards in radiography. It acknowledges that the requirements of the professional and statutory regulatory bodies need to be incorporated into the design of programmes. It seeks to encourage higher education institutions and service providers to work collaboratively in the design and delivery of their curricula. Its essential feature is the specification of threshold standards, incorporating academic and practitioner elements, against which higher education institutions are expected, as a minimum, to set their standards for the award.

¹ *Dietetics, Health Visiting, Midwifery, Nursing, Occupational Therapy, Orthoptics, Physiotherapy, Podiatry (Chiroprody), Prosthetics and Orthotics, Radiography, and Speech & Language Therapy.*

An emerging health professions framework

The subject specific statements for radiography have been set within the emerging health professions framework outlined below. As indicated in the foreword, this framework developed as a result of the benchmarking work undertaken collaboratively by 11 different health professional groups. Further evolution of the framework is anticipated through a second phase of the project which will address its goodness of fit with a range of other health and social care professions benchmark statements.

A Expectations of the health professional in providing patient/client services

This section articulates the expectations of a registered professional within health and social care services. It describes what is regarded as a minimum range of expectations of a professional that will provide safe and competent practice for patients/clients in a variety of health and social care contexts.

A1 Professional autonomy and accountability

The award holder should be able to:

- maintain the standards and requirements of professional and statutory regulatory bodies;
- adhere to relevant codes of conduct;
- understand the legal and ethical responsibilities of professional practice;
- maintain the principles and practice of patient/client confidentiality;
- practise in accordance with current legislation applicable to health care professionals;
- exercise a professional duty of care to patients/clients/carers;
- recognise the obligation to maintain fitness for practice and the need for continuing professional development;
- contribute to the development and dissemination of evidence-based practice within professional contexts;
- uphold the principles and practice of clinical governance.

A2 Professional relationships

The award holder should be able to:

- participate effectively in inter-professional and multi-agency approaches to health and social care where appropriate;
- recognise professional scope of practice and make referrals where appropriate;
- work, where appropriate, with other health and social care professionals and support staff and patients/clients/carers to maximise health outcomes;
- maintain relationships with patients/clients/carers that are culturally sensitive and respect their rights and special needs.

A3 Personal and professional skills

The award holder should be able to:

- demonstrate the ability to deliver quality patient/client-centred care;
- practise in an anti-discriminatory, anti-oppressive manner;
- draw upon appropriate knowledge and skills in order to make professional judgements, recognising the limits of his/her practice;
- communicate effectively with patients/clients/carers and other relevant parties when providing care;
- assist other health care professionals, support staff and patients/clients/carers in maximising health outcomes;
- prioritise workload and manage time effectively;
- engage in self-directed learning that promotes professional development;
- practise with an appropriate degree of self-protection;
- contribute to the well-being and safety of all people in the work place.

A4 Profession and employer context

The award holder should be able to:

- show an understanding of his/her role within health and social care services;
- demonstrate an understanding of government policies for the provision of health and social care;
- take responsibility for his/her own professional development;
- recognise the value of research and other scholarly activity in relation to the development of the profession and of patient/client care.

B The application of practice in securing, maintaining or improving health and well-being

All health care professionals draw from the knowledge and understanding associated with their particular profession. This knowledge and understanding is acquired from theory and practice. It forms the basis for making professional decisions and judgements about the deployment in practice of a range of appropriate skills and behaviours, with the aim of meeting the health and social care needs both of individual clients/patients and of groups, communities and populations. These decisions and judgements are made in the context of considerable variation in the presentation, the setting and in the characteristics of the client/patient health and social care needs. They often take place against a backdrop of uncertainty and change in the structures and mechanisms of health and social care delivery.

Sound professional practice is essentially a process of problem solving. It is characterised by four major phases:

- the identification and analytical assessment of health and social care needs;
- the formulation of plans and strategies for meeting health and social care needs;
- the performance of appropriate, prioritised health promoting/health educating/caring/diagnostic/therapeutic activities;
- the critical evaluation of the impact of, or response to, these activities.

B1 Identification and assessment of health and social care needs

The award holder should be able to:

- gather relevant information from a wide range of sources including electronic data;
- adopt systematic approaches to analysing and evaluating the information collected;
- communicate effectively with the client/patient, (and his/her relatives/carers), group/community/population, about their health and social care needs;
- use a range of assessment techniques appropriate to the situation and make provisional identification of relevant determinants of health and physical, psychological, social and cultural needs/problems;
- recognise the place and contribution of his/her assessment within the total health care profile/package, through effective communication with other members of the health and social care team.

B2 Formulation of plans and strategies for meeting health and social care needs

The award holder should be able to:

- work with the client/patient, (and his/her relatives/carers), group/community/population, to consider the range of activities that are appropriate/feasible/acceptable, including the possibility of referral to other members of the health and social care team and agencies;
- plan care within the context of holistic health management and the contributions of others;
- use reasoning and problem solving skills to make judgements/decisions in prioritising actions;
- formulate specific management plans for meeting needs/problems, setting these within a timescale and taking account of finite resources;
- record professional judgements and decisions taken;
- synthesise theory and practice.

B3 Practice

The award holder should be able to:

- conduct appropriate activities skilfully and in accordance with best/evidence-based practice;
- contribute to the promotion of social inclusion;
- monitor and review the ongoing effectiveness of the planned activity;
- involve client/patient/members of group/community/population appropriately in ongoing effectiveness of plan;
- maintain records appropriately;
- educate others to enable them to influence the health behaviour of individuals and groups;
- motivate individuals or groups in order to improve awareness, learning and behaviour that contribute to healthy living;
- recognise opportunities to influence health and social policy and practices.

B4 Evaluation

The award holder should be able to:

- measure and evaluate critically the outcomes of professional activities;
- reflect on and review practice;
- participate in audit and other quality assurance procedures;
- contribute to risk management activities.

C Knowledge, understanding and skills that underpin the education and training of health care professionals

The education and training of health care professionals draws from a range of well-established scientific disciplines that provide the underpinning knowledge and understanding for sound practice. Each health care profession will draw from these disciplines differently and to varying extents to meet the requirements of their specialty. It is this contextualisation of knowledge, understanding and skills that is characteristic of the learning in specific health care programmes. Consequently, in this introductory section, the attributes and capabilities expected of the student are expressed at a generalised level.

C1 Knowledge and understanding

The award holder should be able to demonstrate:

- understanding of the key concepts of the disciplines that underpin the education and training of all health care professionals, and detailed knowledge of some of these. The latter would include a broad understanding of:
 - the structure and function of the human body, together with a knowledge of dysfunction and pathology;
 - health and social care philosophy and policy, and its translation into ethical and evidenced based practice;
 - the relevance of the social and psychological sciences to health and healthcare;
 - the role of health care practitioners in the promotion of health and health education;
 - the legislation and professional and statutory codes of conduct that affect health and social care practice.

C2 Skills

Information gathering

The award holder should be able to demonstrate:

- an ability to gather and evaluate evidence and information from a wide range of sources;
- an ability to use methods of enquiry to collect and interpret data in order to provide information that would inform or benefit practice.

Problem solving

The award holder should be able to demonstrate:

- logical and systematic thinking;
- an ability to draw reasoned conclusions and sustainable judgements.

Communication

The award holder should be able to demonstrate:

- effective skills in communicating information, advice, instruction and professional opinion to colleagues, patients, clients, their relatives and carers; and, when necessary, to groups of colleagues or clients.

Numeracy

The award holder should be able to demonstrate:

- ability in understanding, manipulating, interpreting and presenting numerical data.

Information technology

The award holder should be able to demonstrate:

- an ability to engage with technology, particularly the effective and efficient use of information and communication technology.

Benchmark statement for radiography, both diagnostic and therapeutic

Introduction

Radiography is one of the Professions Supplementary to Medicine (PSM) as established by the PSM Act, 1960. Its education and training has been regulated since that time by the Radiographers Board at the Council for Professions Supplementary to Medicine (the statutory regulatory body) and the Society (later the College) of Radiographers (the professional body). All radiography education is delivered in higher education institutions (HEIs) and all registerable qualifications obtained in the United Kingdom (UK) are awards of UK HEIs that have validated those awards conjointly with the statutory regulatory body and the professional body. Two distinct disciplines of radiography are recognised: diagnostic radiography and therapeutic radiography.

Radiography requires the safe use of ionising and non-ionising radiation to achieve a diagnostic or therapeutic health gain. Radiographers require an ability to interpret and effectively execute information referred from other health care professionals, in order to maximise health gain whilst minimising radiation dose to the patient. Exposure to ionising radiation carries risk to both the individual and future generations. The largest controllable factor contributing to the total population dose is the medical uses of radiation. The profession of radiography is unique in that all of its practitioners accept individual responsibility for minimising the radiation dose to both individual patients and the genetic inheritance of the public at large.

Radiography is concerned with diagnostic and interventional procedures, radiation treatments, health surveillance screening and research with additional involvement in occupational medicine and pre-immigration screening. Radiographers practise within an ethical and legal framework. A key part of the radiographer's role is to manage complex interpersonal dynamics, and to act as an advocate for each patient. Team work is a notable feature of practice in both inter-professional and intra-disciplinary frameworks although individual and autonomous practice is also a significant feature.

Diagnostic radiographers are responsible for providing safe, rapid and accurate diagnostic imaging examinations in a wide range of clinical situations, using a range of imaging modalities and techniques so that appropriate management and treatment of patients and clients may proceed. They are also responsible for the physical and psychosocial care of patients whilst in their care.

Therapeutic radiographers are responsible for the safe and accurate planning and delivery of radiation treatment; employing imaging procedures, and taking responsibility for the physical and psychosocial well-being of the patient. This dimension of their practice extends well beyond the radiation treatment phase as they assist patients to manage their disease and the sequelae of treatment.

Graduates of radiography programmes must be able to practise safely and independently, so ensuring the confidence of both patients and the broad health care sector. Safe practice requires an education based on sound scientific and technical knowledge, critical examination of evidence informing practice and development, and enhancement over time in an ethos of continuing professional development. Accordingly, undergraduate programmes in both diagnostic and therapeutic radiography need to address subject knowledge and skills, transferable skills, and clinical outcomes and behaviours. However, in keeping with an underpinning professional philosophy that expects curriculum development and innovation to be a continuous process, HEIs, in partnership with health care providers and agencies, are charged with the responsibility of creating curricula that enable both the development of competence to practise, and incorporation of new and emerging developments within the discipline. Similarly, HEIs may decide on the mode of delivery, management, content and organisation of programmes, although there is an expectation that the education process will be facilitated by considerable contact with patients in relevant and appropriate health care settings. There is also an expectation that assessment of students' capability for practice will be undertaken in the clinical environment, at least in part. Again, the methods used are a matter for HEIs to determine.

Teaching, learning and assessment

Decisions about the strategies and methods for teaching, learning and assessment are for institutions to determine, but should complement the learning outcomes associated with health profession programmes. It is not for benchmark statements to promulgate any one, or combination of, approaches over others. However, this benchmark statement promotes an integrative approach to the application of theory and practice. It underlines the significance attached to the design of learning opportunities that facilitate the acquisition of professional capabilities and to assessment regimes that ensure these are being both delivered and rewarded to an appropriate standard. Fundamental to the basis upon which students are prepared for their professional career, is the provision of programmes of academic study and practice-based learning which lay the foundation for career-long professional development and lifelong learning to support best professional practice and the maintenance of professional standards.

Benchmark statement for diagnostic radiography

Nature and extent of programmes in diagnostic radiography

Diagnostic radiography is concerned with a range of patients and clients, as well as a range of imaging modalities. Examinations undertaken span the life-cycle of the population, from fetal life and ante-natal care to old age; and the extremes of health, from screening well women and men to coping with patients in the terminal stages of life or suffering acute, often severe, illness or trauma. Practice also encompasses post mortem and forensic investigations.

The identification, evaluation and monitoring of systemic disease, skeletal and soft tissue abnormalities, and trauma are the major focus of diagnostic radiography. Significantly, radiographers provide this service throughout the 24-hour day, often working alone or in very small teams, and integrating their work with that of emergency or acute care medical teams.

Radiography encompasses a number of sub-specialities, notably computed tomography, magnetic resonance imaging, ultrasound including Doppler imaging, nuclear medicine and interventional practice. The profession also plays a key role in implementing health improvement programmes, for example the breast screening service and cancer care services, and influencing and responding to government health policy.

Radiographic practice is unusual within the health care professions in that it is characterised by very short episodes of care during which intense and concentrated activity is focused on individual patients. A mastery of interpersonal skills and a high level of communication skills is, therefore, required for effective practice. Radiographers usually have a very limited time in which to establish rapport and effective communication with their patients who are invariably anxious and whose health status is often acutely and/or severely compromised. Concurrent with this is the requirement for rapid decision-making and effective clinical reasoning to ensure that the examination most appropriate to each patient's condition and diagnostic problem is carried out.

Radiographers are responsible for the physical and psychological well-being of patients for their defined episodes of the care continuum and, therefore, radiography must be practised with regard to medical emergencies and other situations which may arise during treatment or examination.

Most diagnostic radiography is performed in the acute health care sector in medical imaging departments, but significant numbers of patients are examined in hospital wards, accident and emergency departments and operating departments. Some work is also carried out in domiciliary environments, prisons and mortuaries. Almost all patients (approximately 96%), whilst being cared for in hospital, will be examined by a radiographer at some stage during their investigation and treatment. Increasingly, too, patients are being examined within primary health care settings.

A The diagnostic radiographer as a registered health care practitioner; expectations held by the profession, employers and public

A1 Professional autonomy and accountability of the diagnostic radiographer

The award holder should be able to:

- appreciate the significance of professional regulation;
- understand the legal responsibilities and ethical considerations of professional self-regulation;
- respect the need to maintain the integrity of the profession and not bring it into disrepute;
- take account of the expectation to maintain registered professional status through appropriate means;
- demonstrate probity in public and private matters.

A2 Professional relationships of the diagnostic radiographer

The award holder should be able to:

- build and sustain professional working relationships with other staff or experts involved in the examination, treatment and care of patients and clients;
- manage professional and support staff and students effectively and efficiently in accordance with accepted practice needs.

A3 Personal and professional skills of the diagnostic radiographer

The award holder should be able to:

- identify and perform the most appropriate diagnostic imaging examination required for each patient;
- select imaging equipment, techniques and exposure parameters, to ensure that radiation dose is minimised and image appearances are optimised;
- perform his/her duties in accordance with current ionising radiation legislation and other legislation governing employment and professional status;
- recognise and respond to the physical, psychological and social needs of patients and clients as these become apparent during the imaging examination;
- identify normal human anatomical structures seen on radiographic images;
- recognise and respond appropriately to abnormal, aberrant and pathological appearances on radiographic images;
- communicate effectively with patients and their carers, peers, other health care professions and other agencies;
- articulate the significance of continuing professional development and the maintenance of competence.

A4 Profession and employer context

The award holder should be able to:

- behave in accordance with codes of professional conduct;
- care for and respect patients and clients so that they are able to maintain their human dignity and rights;
- act responsibly at all times towards patients, clients and other members of the health care team;
- exemplify good character within the professional context, and internalise professional standards in private life;
- recognise the value of research and other scholarly activity to the development of the profession;
- initiate and conduct research within the field of diagnostic imaging;
- engage in lifelong learning, developing new skills relevant to changing technology and practice and changing patterns of health care.

B Principles and concepts held by the profession of diagnostic radiography which are applied to secure, maintain or improve health and well-being

B1 Identification and assessment of health needs

The award holder should be able to:

- make appropriate clinical decisions informed by a knowledge of anatomy and pathology, imaging science, and patient treatment and care;
- assess information given on referral in order to justify examinations;
- use protocols and evidence to assist in justifying and determining the nature of examinations to be carried out.

B2 Formulation of plans and strategies and their application in practice

The award holder should be able to:

- plan and conduct the complete radiographic episode in conjunction with all other aspects of the patient's care needs in the clinical environment;
- conduct diagnostic imaging examinations with due regard to health and safety and other health care protocols, for example infection control;
- assume responsibility for the radiation protection of other health care professionals in the vicinity;
- demonstrate the applications of information technology, data processing, storage, retrieval and manipulation in diagnostic imaging;
- provide accurate comments and feedback to aid diagnosis, subsequent treatment and management of patients;
- bring work to a satisfactory conclusion, including accurate completion of necessary documentation;
- meet deadlines for the completion of work to required standards.

B3 Evaluation

The award holder should be able to:

- capitalise on opportunities for health education as they may arise in the conduct of their normal practice;
- evaluate the diagnostic imaging examination and the resultant images against the anticipated clinical outcome;
- evaluate the functioning of the imaging system;
- demonstrate reflective practice in the light of sound clinical and scientific knowledge, and an understanding of the holistic needs of patients from a variety of social and clinical contexts;
- recognise the limitations to his/her scope of competence and seek advice and guidance accordingly.

C Knowledge, understanding and skills that underpin the education and training of diagnostic radiographers

C1 Knowledge and understanding

The award holder should be able to demonstrate:

- knowledge and understanding of the radiation physics, protection, biology, and dosimetry underpinning radiographic examinations, together with detailed knowledge of the associated current legislation and regulations;
- knowledge of normal human anatomy including its development and change from fetal life to old age. Included within this are the normal variations and aberrations that occur within the population. Particularly important, is a thorough knowledge and understanding of normal and aberrant anatomical appearances as demonstrated on diagnostic images. Detailed knowledge of normal functional anatomy and physiology in relation to dynamic and physiologically based imaging examinations is also essential;
- knowledge of pathological processes and physiological parameters to facilitate clinical judgements about the nature of the imaging examination to be carried out, and to ensure safe practice so that the patient's condition is not exacerbated by the examination. The manifestation of pathological processes on diagnostic images is also essential so that judgements about the efficacy of the examination can be made, the need for additional imaging determined, and an initial interpretation of the examination formulated;
- knowledge of the manifestation and course of disease and trauma processes, focused on clinical signs and symptoms that patients may exhibit at the time of presentation for their initial imaging investigation, and on how these change as conditions progress. Essentially, knowledge and understanding of how these influence the examination to be carried out is required;
- how diagnostic radiographers can influence and support health promotion and health education in their client populations. Particularly important in this context is educating the general public about the risks and benefits of diagnostic imaging examinations so that patients and clients can make informed judgements about, and give informed consent for, their examinations;
- knowledge and understanding of the scientific basis of the range of diagnostic imaging processes so that images are generated and manipulated effectively and appropriately in relation to the pathology or trauma to be demonstrated. Technical evaluation and interpretation of images produced, together with an ability to make judgements about the acceptability of the quality of the images in the context of the patient's condition, are also essential skills;
- knowledge and understanding of the range of technological equipment used in diagnostic imaging so that equipment choices inform safe and efficient practice;
- knowledge of the pharmacology of contrast agents and drugs used in diagnostic imaging examinations and emergency resuscitation, together with an understanding of the related legislation and regulations;
- understanding of the methods of administration of contrast agents and drugs, including intravenous administration;
- knowledge and understanding of the legislative, policy, ethical and research frameworks that underpin, inform and influence the practice of diagnostic radiographers. In particular, detailed knowledge of current legislation relating to the use of ionising radiation for medical purposes is essential;
- knowledge of behavioural and communication sciences and in depth understanding of their relevance and application to the care of people undergoing diagnostic imaging procedures as part of the continuum of their health care. Such understanding also encompasses relatives and carers;
- understanding of the philosophy underpinning the development of the profession of radiography and the practice of diagnostic radiography;
- knowledge and understanding of the diagnostic radiographic process and standard radiographic examinations;
- knowledge of specialist imaging examinations and interventions;
- understanding of the current developments and trends in the science and practice of radiography and diagnostic imaging.

C2 Skills

Capacity for reflection

The award holder should be able to demonstrate the ability to:

- critically appraise the science and practice of diagnostic radiography;
- reflect on the potential and limitations of professional knowledge;
- evaluate the impact of professional knowledge on practice.

Gathering and evaluating information and evidence

The award holder should be able to demonstrate:

- synthesis of knowledge and understanding of the scientific basis of diagnostic imaging and application to practice;
- accurate analysis and processing of information and data in order to conduct examinations efficiently and effectively;
- clinical reasoning based on judgements made from the verbal and physical presentation of an individual and information from a variety of sources including the referring practitioner; evaluation, in an appropriate and timely fashion, of the specific clinical situation encountered; and evaluative judgements of technical and clinical outcomes;
- professional judgement skills in order to make informed, sensitive and ethically sound professional judgements and also to evaluate and interpret diagnostic images produced;
- reflection on, and during, practice;
- the ability to think logically, systematically, and conceptually.

Problem-solving

The award holder should be able to demonstrate the ability to:

- seek appropriate solutions to problems encountered in clinical practice in the light of relevant guidelines and evidence, the nature and presentation of the patient, and the location in which the examination is conducted;
- analyse and process information and data accurately in order to conduct examinations efficiently and effectively;
- sequence and adapt the radiographic process in the light of patient care needs, required clinical and radiographic outcomes, and available resources.

Practice

The award holder should be able to demonstrate the ability to:

- assess the patient's needs through interrogation of the clinical history in order to determine the precise nature of the examination to be conducted;
- justify and match radiographic examination or imaging modality to clinical need, based on evaluation of evidence from professional or patient based sources;
- prepare the patient, both physically and psychologically, in order to carry out an effective clinical examination;
- position patients and clients accurately, safely and sensitively for examinations;
- manipulate the range of technological equipment safely and efficiently;
- generate and manipulate images (including verification of exposure factors) effectively and appropriately in relation to the pathology or trauma to be demonstrated;
- evaluate and interpret images produced, making judgements about the acceptability of the quality of the images in the context of the patient's condition. This includes making judgements about the need to undertake further imaging procedures or additional projections/procedures and the need to make judgements about the absence or presence and possible nature of trauma or pathology demonstrated;

- record and report findings appropriately;
- apply effective moving and handling skills in order to protect patients and self from injury or further injury or, in the case of patients, further aggravation of an existing condition which could be concomitant with the reason for presentation. On occasion this will involve the movement of patients with severe trauma, acute pain and/or clinical shock and pre-existing physical deformity;
- initiate resuscitation when necessary;
- introduce contrast agents into the body when appropriate, including intravenous administration;
- manage time effectively, including prioritisation of work load whilst delivering high quality care.

Communication and interpersonal

The award holder should be able to demonstrate:

- appropriate and effective inter- and intra-professional communication in written, oral and presentation formats;
- effective supervision of students and other staff;
- use of a wide range of information sources, for example, manufacturers' technical information and government policies and papers, in order to provide qualitative reports about the nature of the service, and trends and changes in the service;
- the integration of research and procedural data in order to produce reports contributing to effective patient management;
- the ability to collect and interrogate data relative to the performance of both the individual practitioner and the local service to monitor and influence practice.

Numeracy

The award holder should be able to demonstrate:

- confidence and competence in manipulating exposure parameters and variables in order to optimise dose and image quality considerations, according to the unique needs/interests of each patient and the examination being undertaken;
- numerical competence in determining doses required for contrast agents, analgesic and emergency drugs;
- sufficient familiarity with, and competence in, manipulation of likely radiation doses and variables in order to advise/inform patients and referring clinicians of the relative risks arising from individual procedures;
- the ability to collect, interrogate, interpret and present relevant data from a range of sources and by a variety of methods;
- arithmetical and statistical competence in order to interrogate data generated through audit and research.

Technology

The award holder should be able to demonstrate:

- confidence and competence in using the technology required for moving and handling patients, integrated into the diagnostic imaging process;
- effective use of information communication technology in relation to information about or from patients, service management, teaching and learning, continuing professional development and research;
- confidence and competence in utilising the extensive range of image generation, manipulation, display and recording equipment and technology used in radiographic practice.

Academic and practitioner standards in diagnostic radiography

On successful completion of undergraduate programmes designed to provide an award that also confers eligibility for state registration as a diagnostic radiographer, graduates should be able to demonstrate the following clinical skills and behaviours, underpinned by the subject knowledge and understanding described below. The articulation of the standards should be regarded as the minimum requirement for the award of an honours degree in the subject.

A Working as a professional in diagnostic radiography

Communication and management skills

The award holder should be able to:

- use effectively information technology and data processing, storage, retrieval and manipulation in diagnostic imaging;
- develop and sustain professional working relationships with colleagues involved in the examination, treatment and care of patients and clients;
- meet deadlines for the completion of work to required standards;
- bring work to a satisfactory conclusion, including completion of necessary documentation.

Transferable skills

The award holder should be able to:

- communicate in English, both orally and in writing;
- interpret written instructions accurately and safely;
- apply numerical skills accurately to radiographic information and data;
- interpret and use numerical and statistical information accurately;
- use computing and information technology to select, analyse, present and communicate radiographic information;
- perform assigned tasks safely and accurately within a team setting and participate in group activities to achieve team goals;
- instruct other people clearly and precisely, orally and in writing, to undertake simple tasks;
- work safely and accurately within time management constraints;
- recognise and work within the limitations of his/her own personal and professional skills;
- undertake independent and self-directed study and learning;
- identify and present material and the evidence-base to support a reasoned argument.

Professional behaviours

The award holder should be able to:

- behave in accordance with codes of professional conduct;
- explain the differences between codes of conduct arising from professional and from statutory sources;
- care for and respect patients and clients so that they are able to maintain their human dignity and rights;
- act responsibly at all times towards patients, clients and members of the health care team;
- exemplify good character within the professional context, and internalise professional standards in private life.

B Application of principles and concepts

Clinical reasoning skills

The award holder should be able to:

- recognise the nature of the clinical examination requested, plan a suitable course of action and make reasoned choice between alternatives available;
- demonstrate sound professional judgement and the ability to evaluate referral information on the clinical needs of the patients before selecting the appropriate examination;
- apply scientific and ethical principles to the practice of diagnostic radiography;
- evaluate the risks and benefits of different imaging techniques;
- adapt working practices to meet the needs of individual patients and situations;
- demonstrate application to practice of professional codes of conduct, guidelines, policies and protocols;
- think logically and systematically.

Clinical skills and behaviours

The award holder should be able to:

- carry out the range of standard clinical examinations required of a newly qualified radiographer, safely, efficiently and with a high degree of accuracy;
- care for the patients and clients he/she will encounter in his/her first post with due regard for human dignity and rights of all members of society;
- work appropriately with other health care professionals within a multi-professional environment;
- contribute to departmental risk management, audit and quality assurance activities;
- use research findings and other sources of information, where appropriate, in his/her practice;
- participate in applied research in the clinical setting;
- demonstrate reliability and integrity in all matters associated with practice in radiography;
- demonstrate probity in both public and private matters consistent with being a state registered practitioner.

Psychomotor skills

The award holder should be able to:

- manipulate technological equipment used in diagnostic imaging safely and efficiently;
- position patients/clients for examination, accurately, safely and sensitively.

Clinical outcomes

The award holder should be able to:

- undertake the role of practitioner in accordance with the Ionising Radiation (Medical Exposure) Regulations 2000;
- identify and perform the most appropriate imaging examination required for each patient;
- assess information given on referral in order to justify examinations, informed by pre-determined protocols where appropriate;
- select imaging equipment, techniques and exposure parameters to ensure that radiation dose is minimised and image appearances are optimised;
- perform duties in accordance with current ionising radiation legislation and regulations;
- recognise and respond to the physical, psychological and social needs of patients and clients as these become apparent during the imaging examination;
- identify normal human anatomical structures seen on radiographic images;
- recognise and respond appropriately to abnormal, aberrant and pathological appearances on radiographic images;

- complete documentation accurately and promptly;
- assume responsibility for managing a list of patients and clients so that they are seen in accordance with their appointment times, or are prioritised according to clinical need;
- assume responsibility for assessing the quality of his/her own work and, when necessary, for remedying faults;
- seek assistance or consult colleagues when appropriate;
- work as a member of a health care team within the diagnostic imaging department and in other relevant health care environments;
- apply research findings to practice;
- participate in research projects undertaken within the clinical department.

C Subject knowledge and understanding

The award holder should be able to:

- describe the philosophy underpinning practice in diagnostic radiography;
- demonstrate understanding of the physical principles underpinning diagnostic imaging;
- describe the nature of ionising and non-ionising radiation and their use in medicine, and demonstrate understanding of the effects of radiation on human tissue;
- describe normal and normal variant human anatomy, physiology and biochemistry;
- describe specific pathological processes and their imaging appearances;
- demonstrate understanding of the technology used in diagnostic imaging;
- demonstrate understanding of the range of clinical examinations in diagnostic radiography;
- describe and exemplify effective management of standard episodes of care;
- describe the pharmacology of the limited range of drugs and contrast agents used in diagnostic imaging;
- describe and exemplify care for people undergoing diagnostic imaging examinations, their families and their carers, based on sociological and psychological principles;
- describe the legal, policy, ethical and research frameworks in which diagnostic radiography is practised;
- explain the differences between codes of conduct arising from professional and from statutory sources.

Benchmark statement for therapeutic radiography

Nature and extent of programmes in therapeutic radiography

Therapeutic radiographers practise at the patient and radiation-technology interface in cancer management and care, within an ethical, legal and professional framework. One in every two cancer patients receives some form of radiotherapy during the course of their disease, and therapeutic radiographers are pivotal to the successful holistic care of these people. Non-malignant conditions are also occasionally treated with radiation.

The radiographer selects appropriate patient positions, immobilisation and tumour localisation methods for the planning of radiation therapy. The decision-making process for this requires knowledge of normal and abnormal, gross and microscopic anatomy, and the patho-physiology of cancer. In addition, these processes demand high level utilisation of specialist computerised systems and numerical competence. Problem-solving skills and the development of novel strategies are frequently required to ensure effective and individualised preparation for treatment.

Patient positioning and immobilisation is carried out using a diverse range of materials, technologies and equipment. This demands specialist knowledge and skills vital to the therapeutic radiographer, who also needs to develop a caring rapport with the patient at this initial stage in their treatment.

Tumour localisation and treatment plan verification precede accurate and safe treatment, and the therapeutic radiographer has responsibility for the sophisticated techniques used in this area of practice. This demands the knowledge and skills to select from, and use, a range of imaging modalities, for example plain film and contrast agent studies, fluoroscopy, computed tomography, magnetic resonance imaging, radionuclide imaging, ultrasound, and positron emission tomography.

The production of a radiation dose distribution also falls within the remit of the therapeutic radiographer. This requires manipulation of sophisticated computerised systems and integration of knowledge of radiobiology, regional and cross sectional anatomy and fundamental concepts of the interaction of radiation and matter.

Therapeutic radiographers use clinical reasoning skills to interpret data (derived from the foregoing processes) to deliver therapeutic doses of high-energy radiation to the planned treatment volume. These same skills are used at each treatment event to assess and monitor the physical and psychological well-being of the patient. These procedures require meticulous record-keeping to ensure continuity of patient management and the fulfilment of legal obligation.

The radiographer is responsible for ensuring that the equipment and the patient are correctly aligned one with the other for each radiation exposure and throughout the entire treatment episode. This requires skills of spatial awareness, manual dexterity and visual precision.

The maintenance and quality assurance of sophisticated machinery is key to ensuring safe and accurate treatment and the radiographer plays a vital part in the quality management system. Radiographers are able to recognise faults and malfunctions/deviations from normal operation and the possible implications of such faults on treatment delivery.

Therapeutic radiographers conduct treatment reviews to ensure continuous monitoring and care of the patient during radiation treatment and provide follow-up care and physical and emotional support to the patient and their relatives and carers.

The responsibility of the therapeutic radiographer for the physical and psychological well-being of patients extends from ensuring their continuous attendance for treatment to the recognition of complex and potentially dangerous developments in their conditions. Concurrent cancer treatments impact on each other and the radiographer needs to monitor the interaction of radiation therapy with, for example, cytotoxic drugs and surgery.

Therapeutic radiographers identify and advise the patient about the likely sequelae of radiation therapy, support them during symptomatic periods, and provide suitable management strategies or appropriate onward referral. This aspect of practice requires knowledge of medicines to prevent and alleviate the side effects of radiation therapy and the provision of these under patient care directions.

A key feature of practice is the need to manage complex interpersonal dynamics and to act as an advocate for each patient. The focus here is on sensitivity to the impact of a life threatening disease and its treatment on the individual patient. This demands a high level of competence in communication, and the development of rapport and empathy.

Therapeutic radiographers are autonomous practitioners with responsibility for evaluating their own work and using reflection to enhance their practice. However, their practice is characterised by high levels of intra-professional team work and inter-professional collaboration. All radiation therapy is provided within the specialist setting of accredited cancer centres. By this means the highest level of patient care, support and radiation protection can be ensured.

Therapeutic radiographers have a role in the management of financial and human resources of cancer centres, with accountability and responsibility for diverse staff groups and clinical services within the centre. They also support the professional development of colleagues and pre-registration students.

An important facet of the practice of therapeutic radiography is a responsibility for audit, and clinical research.

The role of the therapeutic radiographer is changing and expanding rapidly. The profession has a key role in influencing and implementing health improvement programmes and responding to government health policy.

A The therapeutic radiographer as a registered health care practitioner; expectations held by the profession, employers and public

A1 Professional autonomy and accountability of the therapeutic radiographer

The award holder should be able to:

- appreciate the significance of professional regulation;
- practise within the framework of current legislation that governs the use of ionising radiation for medical purposes;
- practise within ethical and evidence-based frameworks;
- demonstrate reliability and integrity in all matters associated with practice in therapeutic radiography;
- take account of the expectation to maintain registered professional status through appropriate means;
- demonstrate probity in both public and private matters consistent with being a state registered practitioner.

A2 Professional relationships of the therapeutic radiographer

The award holder should be able to:

- participate effectively in inter-professional approaches to oncology management;
- acknowledge the limitations of professional competence and be able to apply appropriate referral procedures when necessary;
- manage professional and support staff effectively and efficiently in accordance with accepted practice needs;
- teach and supervise students and colleagues;
- care for patients and their carers with due regard for human dignity and rights of all members of society;
- collaborate with external agencies such as Macmillan nurses, and community services in the provision of continuing care for patients with cancer.

A3 Personal and professional skills of the therapeutic radiographer

The award holder should be able to:

- make informed, sensitive and ethically sound professional judgements;
- manage time effectively;
- prioritise work load whilst delivering high quality care;
- manage personal and professional development of self;
- display a competent and confident approach to practice.

A4 Profession and employer context

The award holder should be able to:

- demonstrate an understanding of the historical roots of health care in the UK and of the current developments in the health service;
- promote healthy living and cancer awareness;
- recognise the value of research and other scholarly activities in the development of the science and practice of therapeutic radiography.

B Principles and concepts held by the profession of therapeutic radiography which are applied to secure maintain, or improve, health and well-being

B1 Identification and assessment of health needs

The award holder should be able to:

- gather information from a wide range of sources, for example, patient history, radiographic images and biochemical reports, and by a variety of methods, including physically, verbally, electronically generated and from graphical representations;
- systematically analyse and evaluate the information;
- make judgements from the verbal and physical presentation of a patient and information from referring practitioners;
- evaluate each clinical situation and the range of available and appropriate interventions that may be required in a timely fashion;
- identify and assess physical, psychological and cultural needs/events, for example the assessment of a radiation response that requires a course of treatment to be interrupted.

B2 Formulation of plans and strategies, and their application in practice

The award holder should be able to:

- conduct appropriate imaging and treatment interventions within agreed protocols;
- manage complex and unpredictable situations, for example the adaptation of treatment plans, radiation incidents, prioritisation of work load and use of resources;
- ensure the physical and radiation safety of all individuals in his/her immediate work environment;
- monitor and review the ongoing well-being of the patient through daily assessment and formal review;
- formulate and provide information to patients and their carers about the treatment process and procedures;
- maintain appropriate records of all aspects of clinical practice;
- record patient and technical data, professional judgements and actions.

B3 Evaluation

The award holder should be able to:

- make evaluative judgements on technical and clinical outcomes, recording and reporting the findings appropriately;
- contribute to risk assessment, audit and quality assurance;
- identify and implement appropriate corrective actions;
- evaluate and interpret research findings and other sources of information and apply these, where appropriate, to practice;
- provide a concise and accurate summary of all radiation exposures for the use of other health care professionals, and in fulfilment of current regulations.

C Knowledge, understanding and skills that underpin the education and training of therapeutic radiographers

C1 Knowledge and understanding

The award holder should be able to demonstrate:

- knowledge and understanding of the physical principles of radiation generation, interaction, modification and protection underpinning radiation therapy, together with detailed knowledge of the associated current legislation and regulations;
- knowledge and understanding of the risk benefit philosophy and principles involved in the practice of therapeutic radiography;

- understanding of the scientific principle of the differential cell killing ability of ionising radiation as the basis on which the practice of therapeutic radiography is founded;
- knowledge of the biochemical science of radiation pathophysiology;
- knowledge of the structure and function of the human body in health and disease, with particular emphasis on regional and cross sectional anatomy of the head and trunk, histology, haematology, and the lymphatic and immune systems;
- knowledge of oncology, the pathophysiology of solid and systemic malignancies, epidemiology, aetiology and the management and impact of cancer;
- knowledge of concurrent and common pathologies and mechanisms of injury;
- knowledge of the pharmacology of contrast agents, cytotoxic drugs and drugs used in the relief of symptoms encountered frequently within the oncology setting;
- understanding of the methods of administration of contrast agents and drugs, including intravenous administration;
- knowledge and understanding of the range of technological equipment used in therapeutic radiography;
- understanding of the philosophy underpinning the development of the profession of radiography and the practice of therapeutic radiography;
- knowledge of behavioural and communication sciences, and in depth understanding of their relevance and application to the care of people with cancer and undergoing cancer treatment, particularly radiation therapy;
- understanding of the role of the therapeutic radiographer in the promotion of health and health education in relation to cancer prevention and treatment;
- knowledge and understanding of the legislative, policy, ethical and research frameworks that underpin, inform and influence the practice of therapeutic radiographers. In particular, detailed knowledge of current legislation relating to the use of ionising radiation for medical purposes is essential;
- understanding of the current developments and trends in the science and practice of radiography and cancer management and therapy.

C2 Skills

Capacity for reflection

The award holder should be able to demonstrate the ability to:

- critically appraise the science and practice of therapeutic radiography;
- reflect on the potential and limitations of professional knowledge;
- evaluate the impact of professional knowledge on the outcomes of practice.

Gathering and evaluating information and evidence

The award holder should be able to demonstrate:

- synthesis and application of knowledge and understanding of the scientific basis of radiation therapy and the practice of therapeutic radiography;
- analysis and processing of data accurately in order to conduct treatment preparation procedures and deliver radiation therapy efficiently and effectively;
- clinical reasoning based on judgements made from the collection, interrogation, and interpretation of data from a range of sources, for example patient history, radiographic images and biochemical reports and provided by a variety of methods, including verbally, electronically generated means and from graphical representations;
- the ability to make informed, sensitive and ethically sound professional judgements and to evaluate the outcome of each part of the radiation therapy process, as well as each treatment incident;
- reflection on, and during, practice.

Problem-solving

The award holder should be able to:

- identify the problems encountered at the patient radiation technology interface and find appropriate solutions to such problems;
- analyse and process information and data accurately in order to conduct radiation treatments efficiently and effectively;
- plan and adapt the radiation treatment procedures in the light of patient care needs and the required treatment outcome;
- make reasoned judgements and independent decisions;
- think logically, systematically and conceptually;
- participate in applied research in the oncology setting.

Practice

The award holder should be able to demonstrate the ability to:

- prepare the patient both physically and psychologically, in order to carry out an effective clinical procedure;
- immobilise the patient for safe and accurate treatment preparation and delivery;
- localise the target volume in relation to external surface markings and/or anatomical reference points;
- generate a treatment plan and verify the treatment parameters to ensure delivery of the optimal radiation prescription;
- judge the correctness of the radiation prescription and interpret it in such a way that radiation therapy is delivered accurately and reproducibly;
- accurately operate radiotherapy equipment;
- assess, monitor and care for the patient;
- apply effective moving and handling skills in order to protect patients and self;
- record and report outcomes of procedures appropriately;
- initiate resuscitation when necessary;
- introduce contrast agents into the body when appropriate, including intravenous administration;
- manage time effectively, including prioritisation of work load whilst delivering high quality care.

Communication and inter-personal

The award holder should be able to demonstrate:

- use of information from a wide range of sources, for example manufacturers' technical information and government policies and papers in order to provide qualitative reports about the nature of the service, and trends and changes in the service;
- the integration of research and procedural data in order to produce reports contributing to effective patient management;
- the ability to collect and interrogate data relative to the performance of both the individual practitioner and the local service to monitor and influence practice;
- insight into, and skill in, understanding the behaviour of people undergoing examinations and treatments within the oncology setting;
- appropriate and effective inter- and intra-professional communication in written, oral and presentation formats;
- the ability to provide support and information to patients and their carers in a timely, appropriate and sensitive manner;
- effective supervision of students and other staff.

Numeracy

The award holder should be able to demonstrate :

- competence in mathematical processes involved in radiation dose calculations and distribution;
- the ability to collect, interrogate, interpret and present relevant data from a range of sources and by a variety of methods;
- arithmetical and statistical competence in order to interrogate data generated through audit and research.

Technology

The award holder should be able to demonstrate:

- confidence and competence in engaging with the information technology associated with therapeutic radiography, in particular image registration, data transfer systems between treatment preparation and delivery, parameter selection and confirmation systems, and hospital information systems;
- effective use of information communication technology in relation to information about or from patients, service management, teaching and learning, continuing professional development and research;
- spatial awareness, visual precision and manual dexterity in the manipulation of imaging equipment and treatment units and accessories safely and efficiently.

Academic and practitioner standards in therapeutic radiography

On successful completion of undergraduate programmes designed to provide an award that also confers eligibility for state registration as a therapeutic radiographer, graduates should be able to demonstrate the following clinical skills and behaviours, underpinned by the subject knowledge and understanding described below. The articulation of these standards should be regarded as the minimum requirement for the award of an honours degree in the subject.

A Working as a professional in therapeutic radiography

Communication and management skills

The award holder should be able to:

- make effective use of information technology, data processing, storage, retrieval and manipulation in radiation therapy;
- develop and sustain professional working relationships with colleagues involved in the examination, treatment and care of patients and clients;
- meet deadlines for the completion of work to required standards.

Transferable skills

The award holder should be able to:

- communicate clearly in English, both orally and in writing;
- interpret written instructions accurately and safely;
- apply numerical skills accurately to radiotherapeutic information and data;
- interpret and use numerical and statistical information accurately;
- use computing and information technology to select, analyse, present and communicate radiographic information;
- recognise and work within the limitations of his/her own personal and professional skills;
- undertake independent and self-directed study and learning;
- identify and present material and the evidence-base to support a reasoned argument;
- think logically and systematically;
- apply research findings to practice.

Professional behaviours

The award holder should be able to:

- exemplify good character within the professional context, and internalise professional standards in private life;
- behave in accordance with codes governing professional conduct;
- perform duties in accordance with the current ionising radiation legislation and regulations;
- act responsibly at all times, towards patients, their carers, and members of the health care team;
- work efficiently and effectively within an inter-professional team environment;
- perform assigned tasks safely and accurately within a team setting and participate in group activities to achieve team goals;
- build and sustain professional working relationships with other staff or experts involved in treatment and care of patients;
- care for patients in a manner that respects and enables them to maintain their human dignity;
- meet deadlines for the completion of work to required standards within the scope of his/her competence;
- instruct other people clearly and precisely, orally, and in writing, to undertake simple tasks;

- work safely and accurately within time management constraints;
- undertake independent and self-directed study and learning;
- participate in developments in the science and practice of therapeutic radiography.

B Application of principles and concepts

Clinical reasoning skills

The award holder should be able to:

- recognise the nature of the task in hand, plan a course of action and make appropriate choices between the alternatives available;
- understand referral information and make sound professional judgements based on the clinical needs of the patient;
- understand the risks and benefits of different imaging techniques and radiation treatments.

Clinical skills and behaviours

The award holder should be able to:

- demonstrate competence in a defined range of the pre-treatment and treatment procedures and processes;
- calculate accurately radiation doses and distributions;
- adapt working practices to meet the needs of individual patients and situations.

Psychomotor skills

The award holder should be able to:

- position and immobilise the patient for safe and accurate treatment preparation and delivery;
- localise the target volume in relation to external surface markings and/or anatomical reference points;
- operate radiotherapy equipment safely and accurately.

Clinical outcomes

The award holder should be able to:

- undertake the role of practitioner in accordance with the Ionising Radiations (Medical Exposure) Regulations 2000;
- generate a treatment plan and the verification of the treatment parameters to ensure delivery of the optimal radiation prescription;
- judge the correctness of the radiation prescription and interpret it in such a way that radiation therapy is delivered accurately and reproducibly;
- recognise, monitor and respond to the care and information needs of patients, their relatives and carers;
- apply information technology to data processing, storage, retrieval and manipulation in radiotherapy;
- recognise faults and malfunctions/deviations from normal operation and the possible implications of such faults on treatment delivery;
- contribute to quality assurance procedures;
- complete documentation accurately and promptly;
- seek assistance, consult colleagues or refer on when appropriate.

C Subject knowledge and understanding

The award holder should be able to:

- describe the risk-benefit philosophy underpinning practice in therapeutic radiography;
- describe the nature of ionising and non-ionising radiations, their application to cancer treatment, and their effects on human tissues;

- describe the principles of the imaging processes involved in oncology management;
- describe normal anatomy, physiology and biochemistry;
- describe specific malignant and concurrent pathologies, sequelae and their imaging appearances;
- identify the appropriate management of a range of tumours;
- describe the technology and equipment used in radiation therapy;
- describe the principles of the operation of equipment and technology;
- appraise pre-treatment and treatment procedures and processes in therapeutic radiography;
- describe the sociological and psychological aspects of care for people undergoing examinations and treatments, their families and carers;
- describe the pharmacology of contrast agents and drugs used in the oncology setting.

Appendix 1

Radiography benchmark group membership

Derek Adrian-Harris	University of Portsmouth
Lesley Forsyth	Grampian University Hospitals NHS Trust
Geraldine Francis	Kingston University & St. George's Hospital Medical School
Marilyn Hammick	Oxford Brookes University
Julia Henderson	University of Hertfordshire
Rosemary Klem	University of Central England in Birmingham
Audrey Paterson (facilitator)	Canterbury Christ Church University College
Pauline Reeves	University of Wales, Bangor

The benchmarking group would also like to acknowledge the work of the College of Radiographers/Radiographers Board benchmark group which contributed significantly to this statement.

Members of this group were:

Kathryn Burgess	University of Liverpool
John Newton	University of Wales College of Medicine
Audrey Paterson	Canterbury Christ Church University College
Richard Price	University of Hertfordshire

Appendix 2

Benchmark steering group membership

Mrs Margaret Andrews	North East Wales Institute of Higher Education
Mr David Ashcroft	Society of Chiropodists & Podiatrists
Mrs Linda Auty	Leeds Metropolitan University
Miss Lesley Barrowman	National Board for Nursing, Midwifery & Health Visiting for Northern Ireland
Mrs Valerie Beale	Somerset Health Authority
Ms Mary Boyle	National Board for Nursing, Midwifery & Health Visiting for Scotland
Mrs Ann Clarke	Bedford Hospital NHS Trust
Ms Helen Davis	Royal Hallamshire Hospital, Sheffield
Professor Anne de Looy	Queen Margaret University College, Edinburgh
Miss Faye Doris	University of Plymouth
Mr Martin Duckworth	College of St Mark & St John, Plymouth
Mr Brian Ellis	Queen Margaret University College, Edinburgh
Miss Anne Fagan (deceased)	Hospital of St John & St Elizabeth, London
Mrs Janice Gosby	UK Central Council for Nursing, Midwifery & Health Visiting
Ms Valerie Hall	University of Brighton
Mrs Julia Henderson	University of Hertfordshire
Ms Anne Hopkins	University of Wales Swansea
Mr Stephen Hutchins	University of Salford
Mr Tom Langlands	English National Board for Nursing, Midwifery and Health Visiting
Ms June Leishman	University of Abertay, Dundee
Professor Jeffrey Lucas	University of Bradford
Professor Dame Jill Macleod-Clark (co-chair)	University of Southampton
Ms Diane Marks-Maran	Thames Valley University
Mrs Susan Montague	University of Hertfordshire
Mrs Christine Mullen	South Manchester University Hospital NHS Trust
Mr Luke O'Byrne	East Berkshire NHS Trust
Mrs Audrey Paterson	Canterbury Christ Church University College
Ms Robyn Phillips	Welsh National Board for Nursing, Midwifery & Health Visiting
Professor Mike Pittilo (co-chair)	Kingston University & St George's Medical Hospital
Ms Lorna Povey	Wolverhampton Health Care NHS Trust
Mrs Jarina Rashid-Porter	Coventry Healthcare NHS Trust
Mr Gwilym Roberts	College of Occupational Therapists
Ms Jenny Routledge	University of East Anglia
Mr Ian Rutherford	University of Nottingham
Mrs Sandra Sexton	University of Strathclyde
Ms Gail Stephenson	University of Liverpool
Professor Averil Stewart	Queen Margaret University College, Edinburgh
Professor Mary Watkins	University of Plymouth