***RPA2000* MPE1**

**THE Competence Certification Schemes Applicable wef 01/01/23**

**MEDICAL PHYSICS EXPERT CERTIFICATION SCHEME**

**MPE1: Application Form for Initial Certification of Competence**

**to be a Medical Physics Expert under IRMER**

Before completing this form, please read Document MPE2 “Instructions and Guidance for the Creation of a Portfolio of Evidence for MPE Certification”.

**Use BLACK INK** or **TYPE to complete the form**.

**Instructions for the Applicant:**

* Complete Parts 1, 2, 3, and 5 of this Application Form.
* Complete Tables 1 and 2 in Part 6 of this Application Form
* Ask a suitable person to complete the Authentication at Part 4 of this Application Form.
* Preferably take a copy of ***all the material*** that you are sending to RPA 2000, since none will normally be returned to you.
* Send the completed form and your fee, together with your complete Portfolio of Evidence, to:

|  |  |
| --- | --- |
| **RPA 2000 Administrative Office****DS009, Dartington Hall****DARTINGTON****Devon, TQ9 6EN** | **Tel : 01803 847993** **Email :** **admin@****rpa2000.org.uk** |

**PART 1. APPLICANT**

|  |  |  |
| --- | --- | --- |
| Last name: | Title: | First names: |
| Business address: | Tel. No: |
| Email: |
| Address for correspondence: | Tel. No. |
| Email: |
| To enable suitable assessors to be identified, please indicate the workplace environment and your intended scope of MPE practice. If the application identifies a single area of practice to be assessed, the evidence should be predominantly from that area. If the application identifies 2 areas of practice to be assessed, there should be a significant proportion of evidence from each area.  |
|  | NHS | Private healthcare provider | University research facilities | Private research facilities | Other, e.g. MOD, please specify |
| Diagnostic Radiology |  |  |  |  |  |
| Nuclear Medicine |  |  |  |  |  |
| Radiotherapy |  |  |  |  |  |
| Other, e.g. Dental, chiropractor |  |  |  |  |  |

**PART 2. QUALIFICATIONS AND PROFESSIONAL/LEARNED SOCIETIES**

**2.1. Degrees, Diplomas and Academic Awards**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Title** | **University or Awarding Body** | **Date awarded** | **Grade** | **Principal Subjects** |
|  |  |  |  |  |
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**2.2. Current professional qualifications, e.g. HCPC Registration, CRadP**

|  |  |  |
| --- | --- | --- |
| **Awarding/Professional body** | **Grade / Registration No** | **Year****Gained/awarded** |
|  |  |  |
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**2.3 Current Membership of Professional and Learned Societies, e.g. IPEM, BIR, SRP**

|  |  |  |
| --- | --- | --- |
| **Society** | **Grade** | **Year****Membership****commenced** |
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**PART 3. Professional Record**

**3.1. Positions of employment (within the last 10 years) where relevant to this application. Please include a Job Description for your present post.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **From** | **To** | **Employer** | **Position** | **Grade** |
|  | Present |  |  |  |
|  |  |  |  |  |
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**3.2. Current organisational responsibility**

Please provide a radiation protection management organisational chart (in your employing organisation) indicating your position in that structure.

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**PART 4. AUTHENTICATION BY REFEREE**

I declare that I have examined the portfolio of evidence compiled by the applicant and that it reflects the extent and nature of their own work. In my opinion, the applicant has sufficient post-STP (or equivalent) experience at a Detailed Understanding level to be awarded a Certificate of Competence as a Medical Physics Expert.

I declare that I know of no reason why the applicant would be unsuitable to be a Medical Physics Expert.

|  |
| --- |
| Your name: |
| Your job title: |
| Your address: |
| Your Tel. No: | Your email: |
| Your professional relationship to applicant: |
| Are you an MPE? Yes/No |
| Any additional comments: |
| Signed: | Date: |

**PART 5. Declaration by applicant**

* I certify that: (i) my portfolio has been compiled in accordance with the Instructions for the Creation of a Portfolio of Evidence for MPE Certification [Document MPE2], (ii) the essential items listed in the following table are included:

| Checklist of essential items | Requirement Reference | Check |
| --- | --- | --- |
| Portfolio items are numbered and indexed in a single ring folder, with a **contents list** that details the items of evidence. | 3.1 |  |
| A **summary section**, not exceeding 5-6 pages in length is included, where each of the major items of my evidence is summarised into a short contextual paragraph that clearly identifies the competence(ies) or experience(s) that it supports. | 3.1.iii4.1.viii |  |
| Each piece of evidence has a **linking note** that explains why it addresses a particular competence.  | 3.1.vi 3.4.i |  |
| The application has been made using the MPE1 application form and **Cross Reference Tables 1 & 2** in the application form have been completed. (The layout or contents of the tables must not be altered.) | 4.1.iii 4.3.v4.4.x |  |
| If the application identifies a single area of practice to be assessed against, the evidence is predominantly from that area.If the application identifies more than one area of practice to be assessed against, the evidence is sufficiently strong in each area without adding to the length of the portfolio.Where multiple areas of practice are identified in the application, a lead assessor from each area will be appointed and they will each assess the portfolio against their own area. | 4.1.iii4.1.v |  |
| Certificates from qualifying training are included, together with evidence and information of assessment associated with the training. | 4.3.i4.3.iv |  |
| The examples given in Cross Reference Tables 1 and 2 in the document MPE1 application form have been noted. Whilst it is not expected that the submitted evidence matches the examples, the examples should be used to identify the kind of evidence required. The submitted evidence should demonstrate expertise in the area of practice. | 4.1.vii |  |
| The evidence is sufficiently wide-ranging to indicate familiarity with the breadth of situations implied by the area(s) of practice identified in the application. | 4.2.iv |  |
| For practical competence demonstration, each Table 2 sub-topic has a single significant item of evidence. Up to 3 additional items can be included to support the significant item. (Assessors may not read more than 4 items.) | 3.3.iii3.3.iv3.3.v |  |
| No more than 25 items have been included. For items with multiple parts, the parts are sufficiently closely related to be clearly part of the same item. | 3.3.ii |  |
| For items where the evidence is embedded within a larger document, the relevant parts are clearly identified. | 3.4.ii |  |
| Each item has been assessed for suitability through the question “How does this evidence show that I have the basic knowledge, competence and/or experience?” | 4.2.i |  |
| Practical competency evidence is:* from your own work,
* dated,
* predominantly from the last 5 years.

Any evidence older than 5 years should relate to unique work and be accompanied by evidence that knowledge and skills have not been lost in the subsequent period. | 4.2.ii |  |
| For items that consist solely of workplace documentation (e.g. policies/procedures/record of calculations), the linking notes explain the intellectual process of production. The linking notes should make clear the extent of the contribution you made to the documentation. For example, where you have updated documentation rather than authoring it you should explain or show the changes that you made. You should also include background/details of the situation that led to the need for change. | 4.2.iii4.4.ix4.2.vi |  |
| Multi-author items have been annotated clearly to show the extent of your contribution and your relationship to the others. | 4.2.vi |  |
| No confidential patient information is included. | 4.2.vii |  |
| Evidence does not contain information that compromises any sensitivities relating to the employer’s business or its employees. Do not redact names of other professionals in your organisation, where their role is effectively a matter of public record. Where your items rely on communication from such professionals, identification of them can help to demonstrate the positive acceptance of advice that you give. | 4.2.viii |  |
| No items have been included that could compromise the security of radioactive materials. | 4.2.ix |  |
| **Authentication** is made by a referee (or referees) that the contents truly reflect the extent and nature of your own work. Referees should be in a position to confirm that you have sufficient experience to be awarded a Certificate of Competence as a MPE. | 3.1.i |  |

**Additionally:**

* I certify that the information given by me in this application is complete and correct.
* I acknowledge that further evidence could be requested by RPA 2000 and undertake to supply such evidence within any specified timeframe (usually about 65 days from the request).
* If I do not supply any requested further evidence by the specified date, I fully accept that my application for certification will normally be immediately terminated, and my application fee forfeited.
* I fully acknowledge and accept all the conditions and implications contained in the ‘RPA 2000 Code of Technical Conduct’.
* I acknowledge that, at approximately five yearly intervals, RPA 2000 may be required to provide a small number of completed portfolios to another organisation strictly only for audit purposes and consent to my portfolio being provided for such purposes, if so requested.
* I understand that failure to provide all the essential items identified above could mean that my portfolio is returned for modification, without being submitted for assessment.
* I understand that my Portfolio of Evidence will **not** normally be returned. ***(Applicants are strongly advised to keep their own copy of this application form and all the material that accompanies it).***
* ***FEE PAYMENT*** [you will automatically receive a receipt; see [here](http://www.rpa2000.org.uk/about-rpa-2000/fees/) for payment options]:

***Either***

 I am a ***current member*** of AURPO/IPEM/SRP and enclose the member’s fee of £………. in accordance with the current fee information on the [RPA 2000 website](http://www.rpa2000.org.uk/about-rpa-2000/fees/).

***Or***

I am a ***not a member*** of AURPO/IPEM/SRP and enclose the non-member’s fee of £………. in accordance with the current fee information on the [RPA 2000 website](http://www.rpa2000.org.uk/about-rpa-2000/fees/).

**Signature of Applicant……………………………………………Date…………………………..**

**PART 6.**

**Cross Reference Table No. 1**

**Underpinning Knowledge for Medical Physics Experts**

| **DH****No.** | **Topic** | **Depth** | **Sub-topics** | **Evidence****reference** | **Assessment** |
| --- | --- | --- | --- | --- | --- |
| **Sufficient** | **Insufficient** |
| **A1**  | **Basic atomic and nuclear physics** | **BU** | * Atomic structure and composition of the nucleus
* Stable and unstable isotopes, activity
* Types of radioactive decay
* Nuclear fission
* Half life and decay constants
* Radioactive equilibria
* The effects of time, distance and shielding
* Generation of x-rays
* Excitation and ionisation
* Quantities and units
 |  |  |  |
| **A2** | **Basic biology** | **BU** | * Gross anatomy and physiology relevant to imaging and therapy using ionising radiation
 |  |  |  |
| **A3** | **Interaction of radiation with matter** | **BU** | * Attenuation
* Scattering and absorption
* Charged particles, photons and neutrons
* Types of nuclear reactions
* Induced radioactivity
 |  |  |  |
| **A4** | **Biological effects of radiation** | **BU** | * Deterministic biological effects of ionising radiation
* Stochastic biological effects of ionising radiation
* The dose–response relationship
* Effects of whole body irradiation
* Effects of partial body irradiation
* Quantities and units
 |  |  |  |
| **A5** | **Basis of radiation protection standards** | **BU** | * **Linear hypothesis for** stochastic effects
* Threshold for tissue reactions
* Epidemiological studies
 |  |  |  |
| **A6** | **ICRP principles** | **BU** | * Justification of practices
* Optimisation of exposures
* Dose Limits
 |  |  |  |
| **A7** | **Legal and regulatory basis** |  |  |  |  |  |
| **A7a** | **International legislation** | **GA** | * International recommendations and conventions (IAEA, ICRP, ICRU, WHO, UNSCEAR)
* EC Directive 2013/59/Euratom
 |  |  |  |
| A7b | **National legislation and regulations which apply to medical exposures** |  | As applied to the scope of practice indicated in Part 1For related practical competences see B1.1 – B1.2 in Table 2 |  |  |  |
|  | **IRMER** | **DU** | * The requirements of IRMER and its practical implementation
* The role of the MPE
* Statutory and non-statutory guidance
* The role of the competent authority(ies)
 |  |  |  |
|  | **Other** | **BU** | * Any other legislation directly relevant to medical exposures
* Any replacement legislation, as appropriate.
 |  |  |  |
| A7c | **National legislation and regulations relating to working with ionising radiation** | **GA** | Key national legislation and regulations, including competent authorities. (Include any amendment or replacement legislation, if appropriate.)* Legislative framework in the UK
* UK Regulatory bodies and regulatory system
* Knowledge of the main requirements of the following legislation and principles and guidance including:
* The Ionising Radiations Regulations 2017 and associated guidance
	+ Designation of areas
	+ Local rules and contingency plans
	+ Classification of workers
	+ Reporting of equipment failures
	+ Duties of employees
	+ The role of the RPA and RPS
* The Environmental Permitting Regulations 2016 (EPR16)/The Environmental Authorisations (Scotland) Regulations 2018 (EASR18)/The Radioactive Substances Act 1993 (RSA93), exemptions from EPR16/EASR18/RSA93 and associated guidance
	+ The role of the RWA
* The Justification of Practices Involving Ionising Radiations Regulations 2004
 |  |  |  |
| A7d | **Other relevant legislation** | **GA** | For example:* Human Medicines Regulations 2012 and amendments
* Regulations relating to ethical approval for research exposures
* General health and safety regulations
 |  |  |  |
| A8 | Good Clinical/Scientific Practice | GA |  |  |  |  |
| A9 | **Liaison with other radiation protection professionals** | BU | Liaison with other radiation protection experts, for example:* the RPA regarding facility design and reporting of exposures much greater than intended due to equipment faults
* the RWA regarding management of radioactive waste
 |  |  |  |
| **A10** | **Other exposures using medical radiological equipment** | **GA** | Use of medical radiological equipment for undertaking non-clinical exposures, for example:* For legal purposes
* For sports assessment
* Well-person/asymptomatic assessment
 |  |  |  |
| **A11** | **Emerging technologies** | **GA** |  |  |  |  |

A general awareness of all types of medical exposure is required for all MPE applicants. The following table should be completed, even though detailed understanding will be provided in the next section for the scope of practice identified in Part 1.

The items of evidence provided for Detailed Understanding may be referenced here to demonstrate General Awareness.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **DHSC****No.** | **Topic** | **Depth** | **Sub-topics** | **Evidence****Reference** | **Assessment** |
| **Sufficient** | **Insufficient** |
| **A12** | **Diagnostic Radiology** | **GA** | * Clinical uses of x-ray imaging
* Fundamentals of x-ray imaging
* Fundamentals of image acquisition, storage and display
* Standardised interventional techniques
* Specialised techniques, e.g. vascular imaging
* Use of contrast media
* National screening programmes
* ICT interconnectivity and data integrity
 |  |  |  |
| **A13** | **Radiotherapy** | **GA** | * Clinical uses of radiotherapy, including use in benign disease and palliative exposures
* Fundamentals of radiotherapy, e.g. available equipment/sources, treatment planning
* Radiobiological aspects for radiotherapy
* ICT interconnectivity and data integrity
 |  |  |  |
| **A14** | **Nuclear Medicine** | **GA** | * Clinical uses of nuclear medicine
* Fundamentals of diagnostic use
* Fundamentals of therapeutic use
* Fundamentals of image acquisition, storage and display
* Preparation, dispensing and administration of radiopharmaceuticals
* ICT interconnectivity and data integrity
 |  |  |  |

Detailed Understanding should be demonstrated for the following Topics. The evidence provided should be relevant to the scope of practice indicated in Part 1 of this form. As a result, Guidance as opposed to specific Sub-Topics has been provided to assist the applicant select suitable evidence.

| **DH****No.** | **Topic** | **Depth** | Guidance on evidence to be included | Evidencereference | Assessment |
| --- | --- | --- | --- | --- | --- |
| Sufficient | Insufficient |
| A15 | Equipment Management |  | For related practical competences see B2.1 – B2.3 in Table 2 |  |  |  |
| A15a | Specification and evaluation of medical radiological equipment | DU | * Demonstrate knowledge of how equipment works, what it does, limitations, features, lifetime
* Regulatory requirements for medical devices, e.g. EC marking etc
 |  |  |  |
| A15b | Acceptance and commissioning of medical radiological equipment | DU | Include reference to:* Relevant Manufacturer’s acceptance criteria
* Relevant international, national and local standards for commissioning

Demonstrate knowledge of* Appropriate selection, operation, calibration and traceability of dosimetric measurement devices
* Operation and use of other test equipment for setting up or confirming correct operation of medical radiological equipment performance, e.g. image quality

For radiotherapy * Definitive calibration of medical radiological equipment
 |  |  |  |
| A15c | Quality assurance | DU | Demonstrate knowledge of:* Relevant Test protocols for quality control of medical radiological equipment and any ancillary equipment that affects the medical exposure
* Relevant International and national standards for quality assurance programmes and quality control testing
* Requirement (what, when who) for notification of faults and hazard warnings
* Action to be taken after breakdown, component replacement or any other event which has resulted in service engineer intervention
 |  |  |  |
| A16 | Dosimetry |  | As applied to the scope of practice indicated in Part 1For related practical competences see B3.1 – B3.4 in Table 2 |  |  |  |
| A16a | Dosimetric quantities | DU | * Dosimetric quantities for medical exposures
* Methods used for dose measurement / calculation
* Physical properties of different radiation source emissions, particle beams etc. as relevant to the application
 |  |  |  |
| A16b | Dose assurance | DU | * Statutory, (inter)national and institutional/organisation requirements for patient dosimetry (ICRU, NPL, ICRP etc)
* International, national and local guidance for the estimation of radiological harm
* Critical evaluation of available dosemeters, including design, operation, accuracy, precision, linearity etc
* Systems for monitoring exposures
 |  |  |  |
| A16c | Organ dosimetry techniques | DU | For radiotherapy:* Dose calculation algorithms for photon and electron transport
* Appropriate clinical advice on treatment selection, including choice of modality, plan complexity and beam parameters;
* What makes an optimum treatment plan for external beam / brachytherapy
* Generation of patient-specific dose distributions using inversely modulated techniques

For other modalities:* Methods for calculating organ doses from whole and part body exposures, as appropriate, including fetal dose estimates and doses resulting from accidental or mis-aligned radiation beams
 |  |  |  |
| A16d | Determination and communication of risk to the patient or subject | DU | * Awareness of techniques for determination of risk to individuals undergoing, or exposed as a result of, a medical exposure
 |  |  |  |
| A17 | Medical Exposure Optimisation |  | As applied to the scope of practice indicated in Part 1For related practical competences see B4.1 – B4.3 in Table 2 |  |  |  |
| A17a | Imaging performance required to achieve desired objective | BU | * Normal and pathological appearances in medical images
* Role of imaging procedures in medical exposures
 |  |  |  |
| A17b | Technical performance and clinical applications | DU | * Technical performance of relevant modalities / techniques
* Clinical applications of each relevant modality / technique
* Adaption of modalities / techniques to specific patient or subject groups, e.g. paediatrics
* Principles of image reconstruction and image processing
* Theory of human image perception / observer performance
* Methods for assessing clinical image quality using appropriate phantoms, human subjects, objective image quality measures and observer studies (as appropriate to speciality).
* Importance of geometrical accuracy of imaging devices particularly for radiation oncology;
* Methods for management of organ motion in own area of practice, where relevant e.g. gating, use of fiducials, measurement and correction of geometric offsets;
* Adaptation of technique to respond to changes in patient presentation, where relevant;
* Derivation of quantitative indices from images
 |  |  |  |
| A17c | Management of risks to individuals undergoing medical exposures | DU | * Principles of patient or subject risk management, including justification, dose optimisation and the use of radiation protection devices
* Qualitative and quantitative assessments of risk to the patient or subject and any associated carer or comforter
* Knowledge of side effects – early and late from radiation exposure
* Analysis of unintended under / over dose of radiation
* Critical evaluation of alternative methods to imaging with ionising radiation
* Advising on the management of patients or subjects with implanted devices, including pacemakers, artificial hips and tissue expanders, if relevant

For research exposures* Ethical review of all exposures resulting from the research protocols
* Setting and use of dose constraints
* Selection of study participants

For radiotherapy* Checking treatment plans produced by others, ensuring the plan is optimal, safe and accurate;
* Auditing and reviewing set-up errors and recommended margins for different sites and techniques (e.g. GTV, CTV, PTV, PRV).
 |  |  |  |

 **CROSS REFERENCE TABLE No. 2**

**Evidence to demonstrate practical competence and workplace experience**

Note: You are not required to provide evidence for every suggestion in the guidance, but you should provide sufficient to demonstrate that you have covered the competence.

| **DHSC****No.** | Sub-topics | Guidance for the applicant on the type of evidence that might be submitted | EvidenceReference | AssessorDecision |
| --- | --- | --- | --- | --- |
| **Medical Exposure Regulations** |
| **B1.1** | Requirements of IRMER and practical implementation in the workplace | Practical application of and compliance with IRMER and any associated approved codes of practice or best practice guidance, for example:* Provision of a detailed audit report of a work environment (e.g. Brachytherapy Physics or a treatment site such as head and neck) showing compliance with IRMER accompanied by appropriate recommendations for actions to address any issues. The report should address compliance with ALL regulations and identify why any regulations do not apply to that particular work environment.
* Evidence of involvement in review of Employer’s Procedures/Policy or associated forms
* Advice to employer/service users
* Minutes and action lists from Department or Employer meetings, e.g. Radiation Protection Committee, relevant to IRMER compliance, in which the applicant was an active participant
 |  |  |
| **B1.2** | **The role of the MPE** | For the MPE scope specified in Part 1 of the application form, provide evidence relating to MPE duties not specifically included later in this table, for example:* Ability to provide appropriate advice to employers and other persons regarding the application of IRMER
* Development of a training course or training materials for IRMER duty holders. (Delivery of training developed by others is NOT sufficient.)
* The training of practitioners and other staff in practical aspects of IRMER
* Evidence of contribution to a MDT / dose optimisation team / short life optimisation working party / contribution at a medical exposures committee meeting
* Evidence of involvement in review of Employer’s Procedures/Policy or associated forms
* Advice to employer/service users
 |  |  |
| **Medical Radiological Equipment Management** |
| **B2.1** | **Specification and evaluation**  | Evidence that you understand the operation, features, limitations and working life of the equipment used in your workplace for medical exposures and can provide suitable advice to the employer regarding the specification of new equipment. For example:* Contribute to the specification of equipment in a clinical environment to support equipment procurement
* Contribution to responses to tenders, including completing tender score sheets or evidence of equipment scoring against specified criteria
* Demonstrate identification and appropriate use of relevant health technology assessment reports, scientific literature, technical journals, manufacturers information, user groups etc
* Evidence of training from the equipment supplier regarding intended use, optional features, limitations and expected working life
 |  |  |
| **B2.2** | **Acceptance and commissioning**  | Evidence that you can identify and undertake appropriate action (e.g. equipment set up and performance tests) prior to the first clinical use of the equipment. For example:* Acceptance test or commissioning report where the applicant performed or led the tests undertaken and prepared the report
* Selection, operation and use of test equipment for setting up or confirming correct operation of medical radiological equipment performance
* ICT interconnectivity with patient management systems and associated data integrity
* Handover process for medical radiological equipment which is safe for clinical use
* Evidence to identify appropriate action to take when equipment falls outside acceptable criteria during acceptance testing or commissioning
 |  |  |
| **B2.3** | **Quality assurance** | Evidence that you can identify and undertake appropriate checks and tests to confirm that equipment is performing within the specified criteria, and may include reference to the relevant International and national standards for quality assurance programmes and quality control testing. Evidence may include:* Identification/specification of test protocols and equipment for quality control of medical radiological equipment and any ancillary equipment that affects the medical exposure
* Routine quality assurance reports where the applicant has performed or led the test undertaken and prepared the report. (This is unlikely to be sufficient without additional evidence.)
* Audit of annual QA testing, including identification and reporting of trends
* Assessment of deviations in performance parameters from reference levels and interpreting their relevance
* Preparation of quality assurance testing protocols for operators.
* Discussion with the manufacturer/service agent about test results or trends
* Requirement (what, when, who) for notification of faults and hazard warnings

You should also demonstrate that you can give appropriate advice on the action which is required when equipment fails these quality assurance tests or checks*.* This could include consideration of the following where relevant: * Fault-reporting, liaison with service agents and provision of a recommended solution
* Action to be taken after breakdown, component replacement or any other event which has resulted in service engineer intervention
* Appropriate action when equipment falls outside acceptable performance criteria
* Handover process of medical radiological equipment when safe for clinical use following modification or repair
 |  |  |
| **Dosimetry** |
| **B3.1** | **Dosimetric quantities** | Evidence of the identification and use of appropriate dosimetric quantities to allow the radiation dose to the individual undergoing the exposure to be measured or quantified. Suitable evidence is likely to cover the following: * The undertaking, supervision and interpretation of dosimetry measurements
* Review of dose measurement techniques in local department, including comparison with other available methods
* Report on generation of diagnostic reference levels for local equipment
* Report on calibration of dosimetric devices
* The conversion of dosimetric quantities measured in air or other medium(s) to relevant dosimetric quantities in tissue
 |  |  |
| **B3.2** | **Dose assurance** | Evidence that you can identify and implement appropriate practical arrangements to demonstrate that the dose received by an individual undergoing a medical exposure is as expected to confirm that the risk of harm has been accurately communicated to the Practitioner. Suitable evidence might consider Statutory, (inter)national and institutional/organisational requirements for patient dosimetry (ICRU, NPL, ICRP etc). Evidence may include the following:* Critical evaluation of available dosemeters including design, operation, accuracy, precision, linearity etc
* Audit of activity administered or patient doses for routine exposures (including radiotherapy planning imaging), including identification of trends, doses exceeding those intended and any action required
* Report on generation of DRLs for local equipment
* Development and operation of patient dosimetry surveys and audits, including dosimeter selection and calibrations and data collection
* Development of rigorous dosimetry protocols
* Appropriate selection and use of radionuclide calibrator/ionisation chambers and traceability to primary standard
 |  |  |
| **B3.3** | **Organ dosimetry techniques** | Evidence that the applicant can calculate / estimate radiation dose associated with part body radiation exposures. Example evidence may include:* Review of literature regarding organ dosimetry techniques or validation of dose calculation algorithms and the associated limitations, relevant to the applicant’s area of practice

For Radiotherapy* Appropriate clinical advice on treatment selection, including choice of modality, plan complexity and beam parameters;
* Appropriate clinical advice on treatment selection, including choice of modality, plan complexity and beam parameters;
* Treatment planning practical skills, for example, advice on what makes an optimum treatment plan for external beam/brachytherapy or development of a planning protocol
* Critical assessment of the techniques or algorithms used to generate patient specific dose distributions using inverse planned/modulated techniques, or clinical advice given on dose distributions generated by these techniques.

For Nuclear Medicine* Use of image or measurement data to confirm distribution or clearance from the patient to estimate dose delivered

For Diagnostic Radiology* Use of appropriate methods for calculating normalised organ dose coefficients
* Organ dose estimates in own area of MPE practice (e.g. CT, radiography, fluoroscopy, mammography, dental, DEXA etc)
 |  |  |
| **B3.4** | Determination and communication of the risk of detriment to individuals | Evidence of understanding of the estimation of risk of harm associated with part body radiation exposures. This will include identification of appropriate techniques for the determination of and the communication of radiation risks to individuals, and to population(s), including risk to the foetus (if appropriate). The applicant does not need to demonstrate that they have communicated directly with the patient or subject. Evidence may include:* Preparation of information for the patient following an exposure much greater than intended
* Reflective report of discussion with a patient found to be pregnant following the exposure, including estimation of the risk to the foetus
* Advice to a patient or individual who is pregnant or breastfeeding
* Advice to the IRMER Practitioner
 |  |  |
| **Medical Exposure Optimisation** |
| **B4.1** | Imaging performance required to achieve desired imaging, diagnostic or treatment objective | In order to contribute to optimisation, the applicant must understand the clinical imaging requirements. Evidence may include:* Review of an imaging procedure in your area of practice;
* Development of image protocols for general or individual patient clinical presentations, with recommendations for optimising doses/images
* Effective communication with a multidisciplinary team, involvement in MDT optimisation group, optimisation advice to service users.
* Evidence of attending reporting sessions with medical consultant, including review of exposure parameters following session
* Review of normal and pathological appearances in medical images
 |  |  |
| **B4.2** | Technical performance and clinical applications | In order to contribute to optimisation, the applicant must understand the capabilities of the available equipment and be able to recommend/select the most appropriate equipment and exposure parameters for the medical exposure. Evidence may include:* Determination of imaging performance requirements and associated equipment settings for specific clinical tasks
* Evaluation of clinical image quality using appropriate phantoms or human subjects, objective image quality measures or observer studies as appropriate to speciality.
* Giving of advice on the choice of imaging / treatment modality for a specific clinical task
* Giving of advice regarding the adjustment of protocols to the needs of particular patients in studies that are complex, unusual, beyond-protocol and non-predictable
* Giving advice on protocol modifications for paediatric imaging with respect to diagnostic effectiveness and safety
* Contribute to the design of a protocol for a non-standard exam, including estimating the average local dose following implementation
* Advising on the use of immobilization (including stereotactic) devices
* Give technical contributions to a dose optimisation team
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| **B4.3** | Management of risks to individuals undergoing medical exposures | In order to assist the employer with the management of risks associated with medical exposures, the applicant must understand those risks and be able to communicate them in an effective and appropriate manner. Evidence may include:* Critical evaluation of alternative methods to imaging with ionising radiation
* Advising on the management of patients with implanted devices, including pacemakers, artificial hips where applicable
* Application of the concepts of justification and optimisation, particularly for high-dose or high-risk procedures, e.g. radiotherapy, interventional radiology, CT, health screening programmes, irradiation of children, neonates or the foetus, where applicable to your area of practice.
* Qualitative and quantitative assessments of patient risk and in other individuals subject to the medical exposure
* Provision of advice on policies and procedures under IRMER, with respect to managing risks of medical exposures
* Estimation of patient radiation risks for radiation incidents
* Investigation of radiation incidents, including possible corrective action
* For exposures involving the administration of radiopharmaceuticals, the radiation protection advice given to those in close contact with the patient

For Radiotherapy* Using relevant radiobiological dose-effect relationships to estimate patient risk (including adverse incidents involving high exposures);
* Auditing and reviewing set-up errors and recommended margins for different sites and techniques e.g. GTV, CTV, PTV, PRV

For research exposures, the following should be considered*:** Ethical review
* Setting of research procedure protocols as appropriate
* Selection and management of research participants, including the setting and use of dose constraints
* Involvement in IRAS applications/establishment of associated employer’s procedures
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