IPEM MR Safety Expert Experience Requirements
Applicant Guidance

General guidance

The IPEM MRSE Certificate of Competence focuses specifically on evaluating practical experience in MR Safety Expert (MRSE) activities through the portfolio, while knowledge of MR safety is assessed through the American Board of Magnetic Resonance Safety (ABMRS) MRSE exam.

The experience categories and sub-categories are specified in the *Experience Categories* document which can be downloaded from the IPEM website. In the portfolio, you must supply satisfactory evidence for 14 / 16 of the sub-categories and there must be at least one satisfactory piece of evidence per major category (8 / 8). Further detail of the categories and examples are given at the end of this document.

Simulated evidence (e.g., a hypothetical situation) is allowed but must not account for more than two of the sub-categories across the whole portfolio.

As this scheme certifies MRSE competence in the UK, the portfolio must include traceable references to the MHRA “Safety Guidelines for Magnetic Resonance Imaging Equipment in Clinical Use” in at least two sub-categories. These references should assess or demonstrate compliance with MHRA guidelines, or provide justification for any deviations, where applicable.

MR safety is primarily about protecting persons (patients, volunteers, staff, visitors, general public) from harm as a direct consequence of the static magnetic fields, switched gradient (time-varying) magnetic fields, radiofrequency (RF) fields, acoustic noise, and cryogens associated with an MR system. Any evidence submitted for a portfolio must have its primary focus on these. Indirect harm involving the use of acquired MR images (e.g., for radiotherapy planning) is not considered within the scope of the IPEM MRSE scheme, although the diagnostic or therapeutic effectiveness of MR data should be considered when MR sequence modifications are made for MR safety purposes.

Safety advice which requires medical training or judgment (e.g., related to contrast agents, prescription medications, sedation/anaesthesia, recovery, monitoring, medical procedures or interventions, proximity of implants or foreign bodies to sensitive tissues) is beyond the scope of practice for IPEM MRSE certified individuals. Consequently, evidence primarily based on medical safety considerations, such as those related to the examples above or similar topics, should not be included in the portfolio.

Evidence must be from your own work, dated, and predominantly taken from work carried out over the last five years. Some evidence of practical competency/experience may precede the five years where the work is intermittent in nature. If your portfolio contains a lot of evidence which is considered outdated, it may lead to rejection. Good practice is that all evidence should be dated appropriately and directly attributable to you.

The portfolio should include the following:

- A comprehensive contents list, detailing and indexing all your items of evidence, linking them to the sub-categories.
- A commentary on a piece of evidence or a collection of evidence, to provide extra context or detail about your personal contribution. A description of your thought processes on a piece of evidence may be helpful to assessors to demonstrate how you apply MRSE knowledge in everyday practice. Any commentaries should be concise and should not duplicate information which is in the evidence. While a commentary can enhance the evidence, it should not replace it. It is important to ensure that authorship, contribution, and competency are demonstrated within the evidence itself.
- All the documents that you are submitting as your items of evidence. You only have to include a few pages, if that is what is most relevant to your application, but on these your authorship should be clear and your contribution substantive.
- A completed *Experience Cross Reference Table* (which can be downloaded from the IPEM website) providing a cross-reference between the experience sub-category and the submitted evidence. If appropriate, mention which specific parts of your evidence are linked to each sub-category.
- Authentication (at the end of the *Experience Cross Reference Table*), by a suitable referee (e.g., line manager), that the contents truly reflect the extent and nature of your own work.

The portfolio should be fully digital (paper submissions will **not** be accepted). When embedding evidence into your portfolio, make sure you embed the contents and not a linked document. Be aware that pdf conversion does not support the “embed” technology used by Microsoft Word. Multiple documents (either pdf or .doc) are acceptable or documents can be combined into a single overarching file. Evidence can include scanned documents or screenshots, or photographs of relevant items. If several images or screenshots are being submitted to support a specific evidence category, please combine these into a document for ease of viewing.

Evidence may be any of the following:

- Finalised documents
- Review documents with evidence of input either inline within the document (e.g., track changes / comments) or separate document
- Correspondence (usually emails)
- Meeting minutes with clearly identified contribution by applicant
- Risk assessments including identification of risks and mitigation measures
- Reports
- Scanner outputs (e.g., protocol sheets / screengrabs)
- Explanatory notes
- Documented evidence of input – authored documents, reviewed documents, revised documents, correspondence relating to the document, minutes of meetings, etc.

Make sure you remove any private or patient-identifiable details where necessary. Blank out (redact) any other information which you do not wish to disclose to the assessors. It is not necessary to redact professional contact details. The content of all portfolios will be kept confidential by the allocated assessors.

In each piece of evidence, your contribution on MR safety aspects needs to be clear and substantive. It is not possible to be prescriptive about the exact number of pieces of evidence required for each sub-category, as it depends on the breadth and depth of the submitted documentation. Assessors will be looking for evidence that demonstrates active involvement and/or competency to a substantive depth and complexity. If the evidence submitted for a particular sub-category is too basic or minimal, then it is unlikely to be acceptable. Multiple examples that are considered to be relatively similar are unlikely to add value to your portfolio.

Where an experience category specifies “contribute/contribution to” this is a general term that captures almost every aspect of providing advice towards a particular output. Specifically, it includes one or more of the following activities:

- Propose; initiate; produce
- Review
- Revise

Category and specific guidance	Sub-category	Examples of evidence
1. Provide advice on the development and continuing evaluation of a safety framework for the MR Environment. *A safety framework encompasses the manner in which MR safety is assured related to a particular MR service, both within hospital governance structures and within the MR unit. It also specifies the requirements for key documents (e.g., local rules, standard operating procedures, risk assessments, checklists) and defining roles, and their associated responsibilities. This category is about organisational level duties and requires the applicant to demonstrate that they have experience in establishing the processes required. It is not about the content of the various key documents.*	**1.1 Contribute to specifying a local MR safety governance mechanism.** *This sub-category is about specifying or reviewing the governance mechanisms for reporting MR safety through hospital structures, e.g. reporting arrangements from MR Safety Group to another group within the organisation and/or reporting arrangements from MR Units to MR Safety Group. This information may be within the respective groups terms of reference (ToR). Other forms of specifying reporting arrangements within or outside an organisation may be acceptable.* ***Important**: the actual report that fulfils the governance mechanism will, in itself, **not** be sufficient. This sub-category is about setting up and/or reviewing the mechanism, not the enacting of the mechanism.*	• Contribution to key safety framework documents that specify requirements for governance / reporting mechanisms (e.g., an MR safety policy/procedure, MR safety group terms of reference; these must contain details of the governance mechanisms). • Emails or documents containing substantive advice on establishing a suitable governance structure.
	1.2 Contribute to defining MR safety framework requirements. *This sub-category is about the applicant showing evidence they have contributed to defining the requirements for what should be in place to ensure there is a robust MR safety framework. This can cover any part of the safety framework (excluding training which is covered in category 5). Examples include advising on what MR safety documentation needs to be in place, types of nominated persons with a safety role and their responsibilities, and requirements for risk assessments. This list is not exhaustive. In a similar manner to sub-category 1.1, the content of any safety documentation is not covered by this category (this is covered in category 2), unless those documents directly deal with the framework and/or the evidence required above.* ***Not acceptable evidence**: safety policies and procedures which do not state the requirement for documents; lists of nominated persons; risk assessments.*	• Contribution to key safety framework documents (e.g., MR safety policy/procedure, MR safety group terms of reference) that specify what documents and procedures an MR unit should have. • Emails or documents containing substantive advice on MR safety documentation requirements.

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2. Provide advice for the development of local rules and procedures to ensure the safe use of MR equipment. *This category relates to the applicant's input into the content of MR safety documents which relate to a) the area where the MR equipment is located and b) the use of MR equipment.* *In contrast to category 1, category 2 relates to the content of specific documents (e.g., local rules, SOPs) rather than the need for an overall safety framework. Documents describing how to practice safely within MR departments and MR Environments, or how to practically and safely carry out MR procedures, are for consideration in this category.* *Local Rules and SOPs might be lengthy, and the entire document should not be included. Each piece of evidence should be limited to a few relevant pages, and should include proof of authorship (e.g., title page, email). The included sections should show a substantive input on MR safety from the applicant.*	**2.1 Contribute to local rules and procedures within the MR unit.** *This sub-category relates to the applicant's contribution to the content of MR safety documents.*	• Contribution to the content of MR Local Rules. • Contribution to the content of policies and procedures that prescribe how MR safety is practically maintained within an MRI unit (e.g., out-of-hour access to MR Controlled Access Area, MR safety screening of patients and research subjects, etc.)
	2.2 Audit local rules and SOPs for compliance with national guidance and legislation. *This sub-category is specifically about auditing MR safety documents, intended as systematically reviewing their content for compliance with legislation and/or guidelines. Evidence of auditing, monitoring, or reporting on the effectiveness or the use of local safety policies or procedures is also acceptable.* ***Not acceptable evidence**: safety audits of MR equipment or facilities are not part of this category (these are covered in sub-category 7.2).*	• MR safety audits of safety documents and procedures. • Systematic review of local rules or SOPs against legislation and/or guidelines. • Report on monitoring the effectiveness or the use of local safety policies or procedures.

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3. Provide safety advice on the modification of MR sequences for MR safety purposes. *This category is about the modification of MR sequences (e.g., change sequence parameters to reduce SAR, acoustic noise, dB/dt) in order to safely scan particular patients or patient groups whilst providing acceptable diagnostic effectiveness (e.g., contrast, SNR, artefacts).* *For patients with medical implants or devices, changes could be based on restrictions set by implant manufacturers or following local risk assessments when there is either lack of information or manufacturer's conditions are not met.* *This category is not about any risk assessment carried out (this is covered in category 4), but about sequence parameter changes to enable MR scanning of a specific patient or a group of patients with similar implants or devices where equivalent restrictions apply.* *Changes to MR sequences must relate to MR safety, and consideration of the effects of these changes on the diagnostic quality of the images must be included in the evidence. The evidence can be further supported by including the reasoning behind any modifications chosen.*	**There are no sub-categories.** *A minimum of two independent pieces of evidence are required for this category. Details of sequence and parameter changes and effect on safety and image quality should be provided. If the evidence submitted is too basic or minimal, then it is unlikely to be acceptable.* ***Not acceptable evidence**: adjustments to MR sequence parameters where the primary aim is to enhance diagnostic effectiveness (e.g., reducing artifacts from implants or optimising image quality) without addressing MR safety issues.*	• Sequence parameter modifications to meet MR conditions in the form of screengrabs, DICOM header comparisons, parameter printouts, and including radiologist's feedback on image diagnostic quality. • Review or audit of a modified MR sequence protocol in relation to safety e.g., review a SAR limited protocol in a number of patients.

Category and specific guidance	Sub-category	Examples of evidence
4. Provide safety advice regarding MR procedures for individual subjects or for subject groups. This includes advice regarding safety related to implanted devices, metallic foreign bodies, tattoos, and other similar issues. *This category is about situations that require more than just a simple relay of MR Conditional restrictions from manufacturer to user. The advice may require interpretation and advice on practical ways to adhere to MR conditions, risk assessment and advice on appropriate MR conditions in the absence of advice or when MR conditions cannot be adhered to. It includes advice regarding safety related to implanted devices, metallic foreign bodies, tattoos, and other similar issues.*	**4.1 Provide advice for adhering to MR conditions of implanted medical devices with an MR Conditional label.** *This sub-category relates to complex MR labelling information that MR Operators require assistance to interpret and determine how to comply in practice with the MR conditions. Conditions may require detailed review and understanding of the MR scanner specifications (e.g., maximum spatial field gradients).*	• Advice to MR operator on practical implementation of MR conditions. • New policy/procedure for adhering to MR conditions of specific implant or device.
	4.2 Provide advice for MR Unlabelled medical devices or MR Conditional devices where the MR conditions cannot be met. *This sub-category includes those situations where medical devices are unlabelled or the stated MR conditions cannot practically be complied with whilst maintaining diagnostic effectiveness. Examples should demonstrate consideration and understanding of multiple hazards and your thought processes around determining and mitigating the risks of scanning an MR Unlabelled implant as defined by the MHRA.*	• Advice on scanning a patient with an MR Conditional device where the MR conditions cannot be met. • Risk assessment (including risk mitigation strategies) of a patient with an MR Unlabelled medical device.
	4.3 Provide advice for non-medical implants and body adornments. *This sub-category relates to assessing the likely risks involved with non-medical device situations based on knowledge of their construction or composition, evidence, location, and types of scans performed and possible ways to mitigate the risks.*	• Advice on scanning a patient with a non-medical implant or body adornment. • Risk assessment (including risk mitigation strategies) of a patient with a non-medical implant or body adornment. • Contribution to generic policy/procedure for scanning persons with non-medical implants and/or body adornments.

Category and specific guidance	Sub-category	Examples of evidence
5. Provide advice on MR Safety training programs and incident reporting. *This category concerns advice on training staff for MR safety and reporting incidents. Refer to each sub-category for further details.*	**5.1 Review and revise training needs for different staff groups, and/or produce appropriate training material.** *Evidence should show that you can identify appropriate training needs for different groups of staff who need to access an MR installation. Show evidence that you can develop training materials or update existing training material. It will not be considered sufficient to show that you were the trainer in MR training sessions, using material created by others. Use category 8.1 to show evidence of training sessions where you have maintained and improved your own knowledge of MR safety.*	• Definitions of different staff groups and classification of training needs. • Policy/procedure document for induction of new staff, showing MR training needs. • Online or classroom training materials for different groups of MR staff (identify your own contribution or updates). • Written audit report of a training program.
	5.2 Provide advice on adverse incident investigations. *Adverse incidents can range from "catastrophic" (death or serious harm by projectile events) to "near miss". Investigation of adverse incidents is essential to understand the root cause and provide feedback to update safety procedures and safety training programs. "Near miss" incidents provide a learning opportunity for prevention of more serious events.*	• Report or email concerning an adverse incident, including root cause assessment. • Excerpt from incident reporting management tool (e.g., MHRA Yellow Card or local incident reporting system entry). • Report showing how an adverse incident led to an update of safety procedures and/or training. • Minutes of meetings where adverse incidents are discussed and advice is given by applicant.

Category and specific guidance	Sub-category	Examples of evidence
6. Provide safety advice regarding the selection, procurement, siting and installation of the MR system and related equipment. *This category is about providing MR safety advice and guidance relevant to the selection and procurement of MR systems, such as enhanced safety features. It is also about being part of the team tasked with designing a suitable MRI department factoring MR safety in the design, from the earliest scoping phase of site choice to detailed design plans. In addition, it is concerned with giving advice prior to and during the installation phase and highlighting potential safety issues. Modifications of MR departments and their surroundings are also relevant to this category, as is MR safety advice on the procurement, selection and use of related equipment, such as an MR Conditional anaesthetic machine.*	**6.1 Contribute to the specification or selection of MR systems or related equipment.** *This sub-category is about consideration of MR safety issues when procuring equipment which may include the MR system itself but also extends to procurement of ancillary equipment such as anaesthetic equipment, interventional equipment, infusion pumps and patient accessories. If software is used it must be MRI safety related.*	• Select safety related documentation from procurement process with named involvement. • Input into specification or selection of MR ancillary equipment e.g., anaesthetic machines, infusion pumps, ferromagnetic detection systems. • Input into specification for safety related features of an MR system.

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	6.2 Contribute to design and siting and/or installation of an MR system. *This sub-category is about the planning or design phase of a new MRI project, such as MR safety advice related to proposed sites and designs and guidance on requirements of the new department/installation.*	• Advice given on the scoping exercise for the siting of a new MRI department. • Production of initial draft plans of MRI department. • Input into MRI department planning in relation to MR safety aspects (e.g., extent of MR controlled access area, quench pipe issues, floor demarcation zones). • Input into MR safety signage requirements. • Emails discussing quench pipe and quench pipe exhaust. • Lecture given to design team on MR safety requirements. • MR safety guidance given as part of the MR design team (e.g., minutes or emails detailing advice). • Advice given on proposed modifications of an MRI department and its environs (e.g., email advice to Estates department). • Specification of MRI scanner room door.

Category and specific guidance	Sub-category	Examples of evidence
7. Provide safety advice as part of acceptance testing prior to the clinical or human research use of the MR equipment, following any major maintenance procedure, and as part of regular post-installation checks. *This category is about performing safety checks in an MRI facility both at Acceptance Testing stage and during regular MR Safety Audits post-installation.* *Acceptance Testing is a broad activity typically incorporating both system performance and safety measures. This category should show evidence of experience related to safety. Where detailed safety related measurements have been performed these should be included.* *MR Safety Audits could include regular post-installation checks of the MR safety arrangements and equipment in place in an MRI facility. The audit may also be a checklist of requirements for the site.* ***Important**: this category is **not** about reviewing a site's MR safety documentation (this is covered in category 2).*	**7.1 Contribute to safety related acceptance tests of an MR unit.** *This sub-category is about the post-installation phase of a new MRI system and the related infrastructure, auditing against safety guidelines and providing input for on-going issues.*	• Input into the development of an MR unit acceptance safety check process. • MR safety site report with reference to MHRA guidelines, identifying areas of deficiency. • Measurements of the actual magnetic fringe field outside of the MR Environment. • Verification of the actual magnetic field isocontour for ancillary equipment on the floor of the MRI magnet room. • Follow-up emails regarding on-going issues.
	7.2 Contribute to regular post-installation MR unit safety checks. *This sub-category is about auditing a site against relevant guidelines and issuing advice based on the results of the audit. These audits may occur regularly for the lifetime of the MR system / unit.*	• Input into development of MR unit safety check audit process. • MR safety site report with reference to MHRA guidelines, identifying areas of deficiency. • Evidence of MR safety checks (e.g., correct operation of the oxygen sensor alarm, correct MR safety labelling of ancillary equipment, correct signage, verification of the quench pipe route and exit, etc.)
8. Establish and maintain links with any appropriate district, regional, and/or professional bodies. *This category is about linking up with professional colleagues to further develop your own knowledge and understanding of MR safety issues, as well as contributing to MR safety developments within the wider MR community.*	**8.1 Attend/contribute to MR safety update / training events organised by national or international professional bodies and reflect on learning.** *This sub-category is about attendance and subsequent reflections on learning for formal MR safety scientific or educational events. Attendance at meetings without proof of active contribution or subsequent reflection will not be deemed sufficient evidence.*	• Attendance certificate **and** reflections on learning for relevant national/international meetings, e.g., IPEM MR Safety Update, ISMRM safety workshop/virtual meeting. • Abstracts/copies of presentations or other contributions to relevant national/international MR safety meetings. • Provide feedback on meeting to colleagues.

Category and specific guidance	Sub-category	Examples of evidence
	8.2 Active engagement with relevant specialist groups, professional bodies, or other relevant organisations. *This sub-category is about contribution to MR safety conversations within specialist groups outside of your local institution. Examples of this second sub-category may include groups at a district/regional level, or at a national/international level via professional bodies. It may include formal membership of specialist groups as well as examples of correspondence (either directly or via mailbases) on MR safety related matters.*	• Dates of membership of relevant groups/committees within professional bodies/other relevant organisations. Where relevant, description of your role or examples of your contribution within these groups. • Contributions to MR safety conversations on the MR Physics mailbase. • Responses to international / national / regional MR-safety related consultation documents.

References

Calamante F, Ittermann B, Kanal E, Norris D. Recommended responsibilities for management of MR safety. Vol. 44, Journal of Magnetic Resonance Imaging. Wiley; 2016. p. 1067–9. Available from: http://dx.doi.org/10.1002/jmri.25282

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