

## MRI Local Rules for Operators

Version 6

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### Document History

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6.0	Added safety rules for pregnant staff	A Gouws	October 2019
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### Referenced Documents:

Title	Type
Pregnancy and Work in Diagnostic Imaging Departments - 2nd Edition	External Document
Safety Questionnaire and Consent for Participants: Modality - MRI	Form
YNI Patient Safety Questionnaire	Form
YNiC Clinical Diagnostic Policy	Web Policy
Infection Control Policy	Document
MRI Safety Manual for Operators	Document
MRI Safety Questionnaire Explanation for Operators	Document
MRI Training Scheme for Level 0, Level 1 and Level 2 Operators	Document
MHRA Guidelines	External Document

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# 1. Introduction

These Local Rules apply to the use of York Neuroimaging Centre MRI scanning facilities. They are to be used alongside the Safety Manual for Operators, YNiC and York Diagnostic Imaging policy documents and the MHRA guidelines. A copy of these Local Rules must be kept for ease of reference in the MRI Scan Control Room. All staff whose duties may require them to work within the inner controlled area need to be fully conversant with these guidelines. It is important to note that YNiC has two, 3T MRI scanners and these are general rules for operators. Specific training on how to use the different instruments is not set out in this document.

## 2. Supervision of Exposed Persons

### 2.1. The MRI Responsible Person

The MRI Responsible Person is Professor A Morland. In his absence this function is assumed by his nominated delegate (A Wade or A Gouws). The Responsible Person carries overall responsibility for the MR facility, its staffing and operation.

### 2.2. Authorised Personnel

A list of authorised operators will be maintained and will include Level 3, Level 2, Level 1 and level 0 operators (Category A). Only levels 3, 2 and 1 operators from Category A are allowed to enter the inner controlled Area (Scanner Room) unaccompanied; all other personnel must be supervised by a Level 1, 2 or 3 operator.

A list of categories of personnel, their responsibilities and their training requirements are detailed in appendix B of the safety manual for operators and is summarised in section 5 of this document.

There is a duty under the Health and Safety at Work Act for every employee while at work:

- to take reasonable care for the health and safety of himself and of other persons who may be affected by his acts or omissions at work;
- to cooperate with his employer or any other relevant person to meet the requirements imposed on the employer as is necessary to ensure safety and welfare.

## 3. Control of Access to MRI Controlled Areas

### 3.1 General

Access to all areas of the MRI scanning facilities is controlled by electronic locks. Access 'fobs' or 'cards' are coded to allow access to areas of the centre on the basis of privileges granted to individual fob/card holders. It is essential therefore that all individuals holding fobs or cards do not lend or give them to other individuals. There is one fob/card available for loan for brief periods and to individuals who need temporary access to the changing area. This fob can only be loaned by the Administrator. The fobs have a unique identification code and each time they are used to access areas, the event is logged on a computer. It is also essential that no doors with fob/card-activated locks are propped open.

Emergency exit from the MRI areas can be made without fobs or cards as there are emergency release mechanisms – 'break glass to exit'. This also applies to the fire exits.

It is also important to note that YNiC is also made secure at the end of the working day by locking doors with keys and setting alarms. Frequently operators will be given keys and codes to secure the building. It is essential that those operators keep the keys and do not lend them to others and that they are able to secure the building, if they are the last to leave.

### **3.2 Scanner Room and Equipment Room**

The Scanner Room and Equipment Room form the Inner Controlled Area. Access to these rooms is only permitted whilst accompanied and supervised by a level 3, 2 or 1 operator. These rooms contain the high magnetic field (more than 5 Gauss). All patients, visitors, clinicians and volunteers are required to complete a Safety Questionnaire before being allowed to enter these rooms. They must also be informed of the dangers of loose metallic objects, have any such objects removed to a safe place, and informed of other MRI safety issues. All patients, research participants and visitors who are escorted into the inner controlled area (scan room) must complete a screening questionnaire and must undergo a final screening check at the scan room entrance, to include metal detector screening by a trained operator.

The Scanner Room itself is accessed from the Control Room only and by means of a key that must remain always in the Control room. The key to the Inner Controlled Area is kept in the top pedestal drawer under the system control desk, except in the event of a fire (see section 4). This key must only be used by level 3, 2 and 1 operators. In an emergency this authorization may extend to cover the emergency service personnel and emergency maintenance personnel.

The door to the Scanner Room must always remain closed and should be locked when the scanner is left unsupervised and out of hours. Only level 3, 2 and 1 operators may enter the Scanner Room unsupervised. All other personnel may enter only under the supervision of a level 3, 2 or 1 operator. Be in no doubt, any individual who enters the Scanner Room must be deemed safe to be there by the operator.

The Equipment Room is an area which is accessible to only Level 3 operators, specific YNiC staff and Engineers working for the manufacturers or for YNiC. If any level 2 and 1 operators need access to this area, they must seek approval in writing. The area must be thought of as an extension of the Scanner Room in terms of safety issues relating to magnetic fields.

### **3.3 Control Room**

The Control Room is the Outer Controlled Area and is accessible to all categories of staff. This area although controlled is outside the 5 Gauss line. Access to the Control Room is via a security fob-operated doors, from the MRI corridor.

**UNDER NO CIRCUMSTANCES SHOULD THIS DOOR BE LEFT PROPPED OPEN**

Fob/card access for this door is only to be given to staff whose duties may require them to enter the outer controlled area.

Visitors to the MRI unit may enter the Outer Controlled Area under the supervision and responsibility of a staff member who has fob access. If they need to enter the Inner Controlled Area then completion of a Safety Questionnaire, removal of metallic objects and supervision by a level 2 operator is required.

Out of normal working hours the Control Room is locked. If an operator is the last user of a scanner they must ensure that the doors are locked.

### **3.4 Corridor Office (TMS)**

This is an area outside the magnetic field of the scanner. It is used as a TMS laboratory and is not to be accessed by unauthorised personnel.

### **3.5 Interview Office**

This is an area outside the magnetic field of the scanner. It is used to interview patients / volunteers in privacy.

### **3.6 Preparation Area**

This is in the main MRI corridor. This is an area outside the magnetic field of the scanner and is used only by Authorised Personnel, screened MRI patients/volunteers and emergency personnel (when necessary). Access is restricted due of the close proximity of the Scanner Room. Access to this area is via self-locking security doors from the Control Room or from reception.

***THIS AREA IS NOT A KITCHEN AND MUST NOT BE USED FOR THE PREPARATION OF ANY FOOD OR DRINK ITEMS UNDER ANY CIRCUMSTANCES***

### **3.7 Reception Office**

This is a magnetically-safe area, however confidential information is kept in this office and therefore access is restricted. Level 3, 2 and 1 operators have access and it is essential that they handle confidential material appropriately and DO NOT leave it accessible to other individuals.

### **3.8 Waiting Area**

This is a magnetically-safe area used by staff, patients and participants. Access to this area is via the main entrance to YNiC.

## **4. Operational Safety**

Nurse call buttons and table releases **must** be tested every 6 months.

MRI operators have a duty to familiarise themselves with the *MRI Local Rules* (this document) and emergency procedures.

### **4.1 Medical Emergency**

The primary aim of the operators working in the MRI suite in the event of a medical emergency is to alert the emergency services and remove the patient/participant from the dangers of the magnetic environment to a safe area where emergency medical treatment may be carried out.

The rescuer should ensure his own safety first before touching the patient. The rescuer should take all reasonable precautions to ensure the safety of the patient/participant.

### **4.2 Procedure for Cardiac Arrest:**

The person **must** be assessed for responsiveness, i.e. gently shaking them and shouting, “Are you

alright?”. If the person is unresponsive and/or his/her vital signs are deteriorating the following procedure **must** be carried out:

- Summon local assistance by activating the nearest ‘nurse call’ buttons or pull cord.
- Alert emergency services by dialling 9-323-333. State - “Biocentre, York Neuroimaging, York science Park, YO10 5NY”.
- Commence resuscitation as soon as possible.
- If the person is in the scanner remove them from the magnet and transfer them from the Scanner Room to the Recovery Room using the undocking mechanism of the scanner table. Elevate the cot sides to prevent patient rolling off during transit. Ensure that the doorway from the main corridor to the Recovery Room is open.
- Once the person has been taken to the Recovery Room commence emergency resuscitation first aid (CPR). AED (Heartstart automatic defib) can be used only if operator is trained in its use. Ensure Scanner room door is CLOSED after removal of patient.
- Telephone through to reception to explain the situation. Ask the member of staff at reception to ensure that no other patients or unauthorized persons enter the Controlled Areas during the emergency and can direct the emergency team to the patient/participant.
- Continue first aid until the arrival of the emergency services who will then take medical control of the patient.
- Assist emergency services with any patient management or transfer.
- Following a medical emergency an Incident Report form must be completed .
- Organise the replacement of used emergency drugs.

***UNDER NO CIRCUMSTANCES SHOULD RESUSCITATION EQUIPMENT BE TAKEN INTO THE INNER CONTROLLED AREA***

### **4.3 Fire**

YNiC operate a fire sweeper policy. The MRI operator acts as the sweeper for the MRI department and corridor. Upon hearing a fire alarm they **must** don the Fire Warden High Visibility Jacket and proceed with evacuation. It is their responsibility to ensure all rooms including toilet and changing area are vacated and report to the fire brigade upon their arrival that MRI is unoccupied.

#### **4.3.1 Fire in another part of the building**

Upon hearing a fire alarm they **must** don the Fire Warden High Visibility Jacket and proceed with evacuation.

1. If a person is in the scanner, remove them manually from the MRI scanner and leave the scan room locking the door behind you. (Retain the key in case the emergency services require access)
2. If it is safe to do so, Isolate equipment from the power (Emergency System Stop Button Located in the Control Room or in the Equipment Room).
3. If it is safe to do so turn off Medical Gases Isolation valves located in the MRI corridor.
4. Evacuate the area closing all doors and assemble at Deans Acre.

### 4.3.2 Fire in any part of the MRI department

- Activate the fire call by breaking the nearest fire alarm call point.
- There is only 1 fire alarm in the MR suite. It is located to the right of the fire exit door on the MRI corridor.
- Push the Emergency System Stop on the wall in the Control Room to isolate the power supply to the scanner.
- Remove the patient/volunteer manually from the MRI scanner.
- Dial 9-323-333 and give the location of the fire. Advise emergency services there is MR equipment on site.
- Evacuate the patient/volunteer and all staff from the unit, by the nearest exit.
- If safe to do so, isolate the power supply to any electrical equipment. The mains power isolator is located in the Equipment Room.
- If safe to do so, turn off Medical Gases Isolation valves. These are located in the panel on the wall in the MR corridor.
- Close all doors as you leave.
- The MRI operator **must** proceed to designated Assembly Point (Dean's Acre).

On arrival of the Fire Brigade the Operator in charge **must** inform the fire officers of the dangers of the magnetic field, and the ceiling ducted air conditioning

***THE FIRE MUST BE FOUGHT BY THE FIRE BRIGADE FROM THE SCANNER ROOM DOOR (INNER CONTROLLED AREA). THE MAGNET MUST ONLY BE QUENCHED IF THERE IS A PERSON TRAPPED BY A FERROMAGNETIC OBJECT AGAINST THE MAGNET OR AT THE INSISTENCE OF THE SENIOR FIRE OFFICER***

### 4.4 Ferromagnetic Object Emergencies

In the event of a ferromagnetic object being taken into the Inner Controlled Area:

- The MRI Responsible Person **must** be informed immediately. If the incident occurs outside of normal working hours, call the on-call telephone (07908 614895)
- If injury has taken place, and it is deemed that the ferromagnetic object may cause further danger, or is preventing the injured person to be removed to safety, then the emergency quenching procedure may be employed.
- The decision to quench the magnet **must** be made only if the ferromagnetic object traps a person against the magnet.
- If no person is severely injured, and there is little or no likelihood of such an injury taking place, then every attempt should be made to remove the object, without quenching the magnet. This may involve a controlled 'ramp-down', which **must** be performed by a GE Engineer.
- Any such incident **must** be reported using university incident reporting procedure.. The Director and the GE service department **must** also be informed as soon as possible.

### 4.5 Access Outside Normal Hours

In the event that personnel require access to the MRI suite, for example, in an emergency outside

normal working hours of 8:00am – 8:00pm Monday to Friday, they **must** telephone the on-call member of staff (07884 030005) for access to the site.

In the case of emergency the on-call phone (07884 030005) **must** be contacted as soon as possible.

In all instances, persons entering the Controlled Areas **must** follow the advice of the on-call member of staff.

## **5. MRI Safety**

All Category A personnel are required to read and sign to confirm understanding of this document and *MRI Safety Manual for operators*.

**General principal:** If it is not already in the inner controlled area it **must not** be taken into the inner controlled except by a level 3 operator who will be responsible for appropriate testing and approval for use.

### **5.1 Rules for Operators**

MRI operators are responsible for the safe and efficient management of the scanner. They should identify and report (to an MR Radiographer or Director) any problems or safety issues that arise in the course of carrying out their duties and they should take steps to prevent any accidents occurring.

### **5.2 Category A: MRI Operators (Level 0, 1, 2 and 3)**

These are persons whose activities require them to work within the inner controlled area.

They must have completed training appropriate to the activities they are required to perform and should not perform activities for which they have not been trained unless they are being supervised by a level 2 or 3 operator. (See MRI Operator training scheme).

All operators have a duty of care to patients/participants, staff and their colleagues. Duty of care involves the individual acting in a way that will not endanger staff or patients/participants by any misuse of equipment, by reporting of faults and unsafe practices, and taking steps identified to avoid accidents or injury to themselves and others.

Manufacturer service personnel are automatically conferred Category A status and are responsible for their training and actions

### **5.3 Category B: Other persons in the inner controlled area**

On occasion a person undergoing a scan may require another individual to be present in the room during the scan. These persons **must**

- satisfactorily complete the safety screening form
- remove all metal objects (jewellery etc) from their person prior to entering
- Only enter the inner controlled area under instruction from a level 3 operator
- wear appropriate hearing protection
- made aware of the risks associated with their presence in the room

### **5.4 Category C: Clerical and domestic service personnel**

These are staff whose duties will bring them into the controlled area but not normally into the inner

controlled area. These persons **must** be aware that they are not permitted to enter the inner controlled area except under the direct supervision of a level 3 operator who will conduct all necessary safety checks prior to granting them access.

## **5.5 General Safety Rules**

The department **must** be kept clean and tidy at all times and **must** always be left in a state suitable to receive a clinical patient.

Environmental cleaning of the main department areas is carried out as required.

Environmental cleaning of the inner controlled area is carried out daily by the Radiographer.

Operators **must** clean any equipment that has been in contact with a patient or participant immediately after use. (This is an important part of infection control).

The emergency box and the Laerdal mask **must** be displayed in a prominent position. It is the responsibility of the operator to notify the Radiographer to arrange for the replenishment of any stocks used.

It is not recommended that drinks be consumed in the Control Room. It is, however, recognised that due to the nature of the work it may be inevitable that drinks will be consumed. If this is the case, cups should be disposable and disposed of straight away after use and they should not be placed anywhere near electrical equipment.

Consumption of food within the Control Room is, again, not recommended. If staff are unable to take a short break, outside of the Control Room to consume food then measures should be taken to do so discretely. Food should not be consumed in the presence of patients or visitors. Cups or plates should not be left on show and should be removed as soon as is feasible.

The outer door to the MRI control room **must** be kept closed at all times.

Only level 1, level 2 or level 3 operators will have fob access to the MRI suite (i.e. access to the outer and inner MRI controlled areas). Level 0's are not allowed into either the inner or outer MRI controlled areas without the presence of at least a level 1 operator in the suite.

During scanning, at least two operators must remain in the controlled areas while the participant or patient is in the inner controlled area. Thus, at no point should there be fewer than two qualified operators (one of whom is at least a level 1 operator) in the MRI suite if there is a person being scanned. Following a scan, if the participant / patient has been safely removed from the inner controlled area (scan room), the level 0 operator can leave the MRI suite to prepare the next participant so long as the previous participant is being debriefed in the outer controlled area by the level 1 (or higher) operator.

## **5.6 Pregnancy and work in the inner controlled area**

It is the responsibility of an operator to notify the YNiC Director when they are pregnant

Individuals who are pregnant are permitted to operate the MRI scanners, including taking participants into and out of the controlled area, that is the scanner room. However, they may not remain in the controlled area (the scanner room) during a scan. To be clear that means that operators who are pregnant must not act as chaperones in the scanner room.

In the late stages of pregnancy, emergency removal of individuals from the scanner is likely to prove a challenge to pregnant operators in terms of manual handling. We will work with operators to ensure that they will not be expected to operate when their capacity to perform manual handling is limited by pregnancy.

This policy has been developed in order to conform with recommendations outlined in the British Institute of Radiology's publication 'Pregnancy and Work in Diagnostic Imaging Departments - 2nd Edition'.

## **6. Management of Patients**

Patients will only be scanned by clinically trained, HPC registered radiographic staff. The care and management of patients and their records are fully documented in YDI clinical policies which will be followed at all times.

### **6.1 Infection Control and Sharps Policy**

The Infection Control Policy is to be followed at all times.

### **6.2 Rules for Visitors Accompanying Patients**

All visitors accompanying patients into the scanning environment **must** satisfactorily complete a Safety Questionnaire and be screened for metal objects prior to being admitted to the inner controlled area.

## **7. Management of Volunteers**

### **7.1 Specific Rules for Volunteers**

- Only level 3, 2 or 1 operators may scan volunteers (a level 0 operator training to become a level 1 operator may do so under the direct supervision of an appropriately experienced level 2 operator).
- Researchers book MRI scans for volunteers through the booking form on the YNiC website.
- The researchers are responsible for the volunteer until the volunteer is handed over to the MRI operator immediately prior to scanning.
- Volunteers must complete the Safety Questionnaire and Scan Consent form before scanning takes place, as well as any relevant project-specific consent forms.
- The volunteer, the researcher and the MRI operator must sign the Safety Questionnaire and Scan Consent form. It is the responsibility of the researcher to explain what is expected of the volunteer during the experiment and the responsibility of the MRI operator to explain the practicalities of the scan.
- Volunteers must be screened in two stages: once by the researcher and then again by the MRI operator just prior to scanning (where the researcher is to also be the operator another member of the research project team should perform the stage 1 screening). Volunteers must be screened for loose metallic objects, metallic objects in clothing and items of equipment that may be damaged by magnetic fields before entering the Controlled Area. Screening of volunteers must be made in line with the Guidelines of the MHRA and York Diagnostic Imaging policies (see Safety Manual for Operators). As part of the final screening procedure at the scan room entrance door, a metal detector screening of anyone entering the room should be undertaken by a trained operator.
- Volunteers will not normally be scanned if there is a contraindication on the screening form. It may be possible to scan a volunteer with some specific contraindications, but only after

receiving prior approval from YNiC staff. Sometimes the researchers may already have obtained prior approval through ethical applications to scan particular participant groups that will systematically have contraindications. Even so, each participant scan must receive prior approval for scanning. Prior approval will be documented by completing the appropriate section of the screening form.

- No persons under the age of 6 will be scanned without prior approval.
- All MR examinations performed for research purposes are subject to approval by the local the Research and Governance Committee.
- All volunteers must be kept under supervision during the MR examination. No volunteer may be left unattended at any time whilst in the MRI Scanner Room or Control Room.
- Volunteers may stop the scan at any time without giving a reason. Therefore if volunteers feel too claustrophobic or anxious to complete the scan, the scan must be stopped immediately.

## **7.2 Records and Archiving for Volunteers**

Records of all volunteers' examinations must be recorded in the MRI Research Log Book

The MHRA requires records of volunteers scanned to be kept for a minimum of 10 years.

The raw digital data from an MRI scan is kept for at least 10 years, as a permanent record of the procedure. Therefore all MRI operators must ensure the data is saved on the appropriate archiving media.

The following information for volunteers must be maintained in archived records:

- Volunteer Name
- Date of Birth
- Weight
- Body part (if not brain)
- Type of scan / List of scans performed
- Approximate time spent in the scanner
- Operator

The Research Log Book must have clear indications of all volunteer data specified above.

All volunteers and staff undergoing an MRI scan must also have details of sequences and time of scanning of the MRI procedure recorded in the Research Log Book kept within the centre. When a person (not the research volunteer) remains in the Inner Controlled Area during scanning (e.g. a chaperone), their details must also be recorded in the Research Log Book.

Staff should not scan, or be involved in the care of, relatives or friends who are referred to the unit for clinical MRI investigation.

## **8. General Management**

### **8.1 Patient/Volunteer Monitoring During MRI Scanning**

Every patient/volunteer is given a clear description of the MRI procedure and all questions addressed prior to the commencement of scanning.

It is the duty of Category A and B personnel to monitor every patient as follows:

- Every patient/volunteer must be given instructions as to how to contact the staff whilst being

scanned, including how to operate the panic button.

- The patient/volunteer intercom should be switched on at all times and, between scans at a suitable volume to hear patients/volunteers within the magnet.
- Ideally visual monitoring of the patient/volunteer via the RF window should be carried out. It is not acceptable to leave the control room and lose the opportunity to see the patient/volunteer. There are circumstances where research may involve turning the lights off in the Scanner room and under these compromised visual conditions, operators must take additional care to monitor the patient/volunteer via the intercom.
- Verbal monitoring of the patient/volunteer must occur after each scanning sequence.
- Where a chaperone is required, a suitable person must remain in the Scanner Room during the procedure to be in close visual and physical contact with the patient/volunteer.

## **8.2 Incident Reports**

Any accidents or serious incidents relating to equipment **must** be reported to the MR Responsible person. A record of the incident **must** be kept in the Incident/Accident Book. If necessary these incidents **must** also be reported to the manufacturers of the equipment and if appropriate the MDA. The Radiographer **must** also be informed of any untoward incidents involving equipment.

## **8.3 Equipment Faults/Maintenance**

The equipment is serviced and maintained on a regular basis by the manufacturers to their recommendations. A comprehensive emergency call-out system is also employed for dealing with urgent faults and image quality issues. At the time of service and maintenance image quality and performance checks are also carried out by the manufacturers. If deemed appropriate YNiC will also obtain an independent third party report on issues related to scanner performance or image quality.

It is the responsibility of all MRI operators to report all equipment failures or image quality issues in order that these can be dealt with in a timely fashion. No staff other than trained Manufacturer engineers must attempt to perform any maintenance or repair of the MRI equipment at any time. In the event of equipment failure or malfunction the MRI operators must not attempt to interfere with any of the high voltage equipment. Observations or simple testing at the request of the manufacturer's representative may be carried out providing the appropriate safety measures are addressed (i.e. turn off power supply to equipment before accessing). There is a danger of electrocution from all damaged or faulty equipment and MRI operators should not interfere with such equipment.

## **8.4 Helium Filling**

Manufacturers monitors helium levels remotely. Manufacturers will advise when the Helium level is falling abnormally or has reached a low level.

Helium filling is carried out by qualified engineers under the management of the manufacturers of the equipment. No patients or staff must enter the Controlled Area during helium filling.

System Helium level and magnet pressure are continuously monitored and can be observed in system software.