CPT® Codes for MRI Safety – A User's Guide

Colin M. Segovis, Jacob W. Ormsby, Cindy X. Yuan, Matthew J. Goette, Melissa M. Chen, Heidi A. Edmonson

ABSTRACT

The magnetic fields of the MR environment present unique safety challenges. Medical implants and retained foreign bodies can prevent patients from undergoing MR imaging due to interactions between the magnetic fields of the MR environment and the implant or foreign body. These hazards can be addressed through careful MR safety screening and MR examination customization, often allowing these patients with implants to undergo management-altering MR imaging. However, mitigating these risks takes additional time, expertise, and effort. Effective in 2025, this additional work is formally acknowledged with a new series of CPT® codes to report the work of assessing and addressing safety concerns associated with implants and foreign bodies in the MR environment. This user guide provides guidance on how to report these codes so physician led MR safety teams can be appropriately reimbursed for the additional work performed in preparing patients with implants or foreign bodies for MR imaging.

ABBREVIATIONS: ACR = American College of Radiology™; ASNR = American Society of Neuroradiology; CPT® = Common Procedural Terminology; QHP = Qualified Healthcare Professional; ARRT® = American Registry of Radiologic Technologists; ABMRS = American Board of Magnetic Resonance Safety; MRSO = Magnetic Resonance Safety Officer; MRMD = Magnetic Resonance Medical Director; MRSE = Magnetic Resonance Safety Expert.

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INTRODUCTION

MRI is the mainstay technique of neuroimaging. The MR environment, however, presents unique safety challenges due to high-strength magnetic fields. Further, patients with implants can be at increased risk of injury in the MR environment. The FDA recognizes the risks classifying medical implants as MR safe, MR conditional, or MR unsafe, as designated by ASTM International, ASTM F2503-23 Standard Practice for Marking Medical Devices and Other Items for Safety in the MR Environment.[1-3] The MR safety of implanted medical devices is established by the manufacturer, with validation by the FDA. By default, any device that has not been deemed MR conditional or MR safe is considered MR unsafe. To further complicate matters, the term "MR nonconditional" has also been used in the medical literature to describe cardiac devices that have been labeled "MR unsafe," but may not be completely unsafe in the MR environment.[4, 5] The labeling provided by the manufacturer is not an absolute contraindication to obtaining an MRI with the guidance of a team knowledgeable in MR safety. Additionally, the number of medical implant technologies and market penetration of active medical implants continues to increase. MR safety is evolving as the field gains experience with implants and foreign bodies. But the increasing complexity of MR conditional devices along with the time required to assess patient implants, modify medical device settings to meet manufacturers' MR conditions, and potentially modify MRI protocols to create a safe experience can require more time and effort then associated with the typical MRI creating a challenge for institution to offer MRI to patients with complex implants or foreign bodies.

Given the evolution of MR safety, the American College of Radiology (ACR) led the CPT® code change application, along with the support of American Society of Neuroradiology (ASNR) and other radiology societies, which resulted in the creation of Current Procedural Terminology (CPT®) codes that will be available for use in 2025.[6, 7] These codes allow for billing for the additional work required to perform complex safety assessments for patients at increased risk for harm in the MR environment due to the presence of a medical implant or foreign body. These codes allow for reporting the work required to modify imaging protocols or implants to safely perform MR exams. These codes describe the work of technologists, medical physicists, physicians, and/or other qualified healthcare professionals (QHP). This paper provides guidance on how to use these codes in a neuroradiology practice.

MR SAFETY CPT® CODES

The MR safety CPT® codes are designed to capture the work associated with specific tasks performed while planning for or performing an MR exam for a patient with an implant or foreign body which is at high risk of interaction with the MR environment. Specific personnel perform and report these tasks, as described in Table 1. CPT® codes capture the work of MR technologists and medical physicists as clinical staff time, which is part of the technical component, while the physician work is assigned to the professional component.[7] These codes are not meant to report the standard safety screening performed for all patients undergoing MR imaging, which is already included

in each MR exam's reimbursement. Similarly, these codes should not be used for all patients with implants or foreign bodies since not all patients will require the additional work. The MR safety CPT® codes should only be used when a safety situation requires extra work by the MR safety team outside of the facility's routine MR safety workflow, which includes MR conditional implants that may require precautions beyond Normal Operating Mode of the MR system, implants lacking MR conditional labeling, or implants or foreign bodies that are typically contraindicated for MR.

The first two CPT® codes in this family, 76014 and 76015, are used to report the MR safety assessment associated with an implant or foreign body, typically performed by an MR technologist. These two CPT® codes are time-based and do not include any physician work. 76014 captures the first 15 min of work associated with the implant or foreign body assessment. As with all time-based CPT® codes, this code can be reported when the mid-point (8 min) has passed. 76015 is used to report additional time after the initial 15 min but the unit of time changes to 30 min. A minimum of 16 additional minutes of work is needed to report 76015 after the first 15 min captured with 76014. Code 76015 should not be reported without 76014, and 76015 can be reported up to three times for a given case as appropriate. 76015 would be expected to be used in scenarios requiring prolonged assessment time, such as with complex, multiple, or incompletely documented implants. These codes are typically used before the date of the MR examination; however, they can be used on the same day in urgent clinical situations. The MR technologist must document the relevant details of any implants and/or foreign bodies, along with the work/time in the medical record to report the codes.

CPT® code 76016 is used to report an MR safety determination performed by a radiologist, or other MR safety-trained QHP, typically performed before the day of the MRI examination. This code is expected to be reported infrequently, as it is only for clinical scenarios which require a risk-benefit analysis due to unclear MR conditions, or when the exam may be contraindicated or limited by the presence of the implant or foreign body, but significant clinical information could be obtained from an MRI. 76016 is most likely performed by a radiologist but is not limited to radiologists. This code can be used on the same day as an MRI examination in urgent clinical scenarios. The code requires written documentation of the clinical scenario, risk-benefit analysis, potential alternate diagnostic tests, and recommendations to mitigate risk should the MR exam remain the chosen diagnostic test. A possible result of the work of 76016 is that the ordered MR exam is not recommended.

The safe performance of MRI in the presence of implants, foreign bodies, or other safety concerns may require work on the day of the MR examination in addition to the work typically associated with MR imaging. 76017, 76018, 76019 are designed for the additional work associated with these safety activities.

Code 76017 captures the work of customizing the MR protocol to address safety concerns identified during the MR safety assessment. The work is performed by a medical physicist and/or MR safety expert to comply with implant-related MR requirements while maintaining/optimizing diagnostic image quality. This code is not time-based. The work is done in collaboration with the supervising physician or QHP. The work must be documented in the medical record by the physician or QHP; best practice may be to have an independent physics report or co-signed report (by medical physicist & physician).

Code 76018 is used to report work done by the MR team on the same day of the MRI to prepare implanted electronics for MRI. Many devices require changing the device to "MRI mode" or programming specific settings per manufacturer's instructions. This code is not time-based. This code is separate from a cardiac device interrogation performed by cardiology or a neurostimulation analysis-programming service performed by neurology or neurosurgery and should be reported if separate device programming is performed by the MR staff. Modification of the settings of the device to minimize interactions between the device and MR environment is performed under supervision of a qualified physician or QHP supervising the MR examination. Documentation of device modification by the physician or qualified QHP overseeing the MR scan is required.

Code 76019 is used to report the work of positioning and/or immobilizing an implant prior to MR imaging. This can include removal of a portion of the device or immobilization of the device with a physical restraint. An example is compression-wrapping of cochlear implants prior to an MRI per manufacturer's instructions. Immobilization or positioning of the implant is done on the day of the examination and performed under the supervision of a physician or other QHP. It is best practice to follow the manufacturer's recommendations including who the manufacturer suggests positions or immobilizes the device. This code is not time-based. Documentation of the work is required by the supervising physician or QHP.

Who can use the MR Safety Codes?

The MR safety codes should be used by individuals performing the work described by the codes, which can include MR technologists, MR safety experts, medical physicists, and physicians or QHPs. The personnel of the MR safety team are not defined by CPT®. It is best practice to follow guidelines established by expert bodies such as the ACR Manual on MR Safety.[2] At a minimum, it is best practice that any individual performing an MR safety procedure is designated as "Level 2 Personnel" for the MRI facility.[2] Technologists' qualifications for operation of an MRI are determined by local and state regulations. Supervision rules by a physician or qualified QHP are defined by the Centers for Medicare & Medicaid Services (CMS). It is best practice that technologists are registered as an MR technologist with a recognized credentialing body, such as the American Registry of Radiologic Technologists (ARRT®). Individuals may obtain board certification in MR safety such as that offered by the American Board of Magnetic Resonance Safety (ABMRS). Board certification as a

Magnetic Resonance Safety Officer (MRSO), Magnetic Resonance Medical Director (MRMD), or Magnetic Resonance Safety Expert (MRSE) is a best practice, but not required, to use the MR safety CPT® codes.

When to use the MR Safety Codes?

All patients must undergo a safety evaluation prior to MRI due to potential interactions between the high-strength magnetic fields of the MR environment and the patient. The MRI safety CPT® codes are for situations when the evaluation associated with a given MRI scan exceeds the typical safety activities associated with MR imaging and should *not* be used as part of routine MR imaging. The MRI safety CPT® codes are applicable to all clinical MR imaging regardless of field strength (e.g., 1.5T, 3T, 7T). Example scenarios and coding guidance are meant to be general and are available in the online supplemental appendix 1 (Table 1). Individual practice patterns may vary.

Conclusion:

The MR safety CPT® codes available starting in 2025 represent a recognition of the additional work required to safely perform MR examinations in patients with implants or foreign bodies. Radiologists, physicians and other QHPs, medical physicists, and MR technologists engaged in MR safety activities will be able to report the extra effort/time needed to keep these patients safe. This paper provides guidance on the use of these new codes from the perspective of neuroradiologists, subject matter experts, and medical physicists engaged in MR safety and reimbursement. The use of these codes should be reserved for the preparation of patients with implants or foreign bodies at high risk for interaction with MR magnetic fields that require additional work beyond the typical MR screening process. These codes are not inherently limited to radiology and can be used by individuals tasked with ensuring patient safety in the MR environment. Documentation in the medical record is required when reporting these codes. Documentation can be a distinct note or part of the diagnostic imaging report, depending upon the facility's reporting workflow. MR imaging should be made available to as many patients as possible. These codes recognize the importance of access to MRI, and the additional work required to ensure patients can safely undergo MR imaging.

Tables

Table 1: MR safety evaluation scenarios and associated codes available in Supplemental Materials.

Scenario	Description	Associated codes
1	MR safety evaluation performed by a technologist in advanced of the exam	76014
2	MR safety evaluation performed by a technologist in advanced of the exam	76014, 76015
3	MR safety evaluation performed by a technologist and radiologist	76014, 76016
4	MRI safety evaluation performed by a technologist, physicist, radiologist in advanced of the exam with exam customization on the day of the exam	76014, 76015, 76016, 76017
5	MR safety evaluation performed by a technologist in advanced of the exam and preparation of implant by the MR team on the day of the exam	76014, 76018
6	MR safety evaluation performed by a technologist in advanced of the exam and immobilization of an implant by a qualified provider	76014, 76015, 76019
7	MRI safety evaluation performed by a technologist and radiologist with a "no scan" recommendation	76014, 76016
8	MR safety evaluation performed by a technologist in advanced of the exam	No code applicable

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SUPPLEMENTAL FILES

CPT® Codes for MRI Safety – A User's Guide

Online Supplemental Material

Additional MRI Safety Scenarios and Associated CPT® Codes

The following scenarios represent additional examples of potential application of the MRI safety CPT® codes.

Scenario 1:

A 56-year-old male with a history of an implanted spinal stimulator and anterior lumbar fusion presents for MRI lumbar spine with and without contrast. The patient reports worsening left foot numbness over the last 4 weeks. The technologist contacts the patient 3 days prior to the examination to conduct a safety screening for MRI. The patient reports the presence of a spinal stimulator. There is no information about the patient's implanted spinal stimulator in the facility's implant database. The technologist collects the information and enters the information into the facility's implant database. After completing the patient interview, the technologist verifies implant components with the manufacturer's implant registry, researches the MR safety conditions of the patient's spinal stimulator, determines the implant is MR conditional, and reviews the manufacturer's recommended MRI scan parameters. The technologist determines that the manufacturer-recommended MRI scan parameters can be met and documents the appropriate manufacturer's scan parameters in the patient's medical record. The technologist spent 15 minutes conducting the implant assessment. On the day of the MRI, the MR imaging is performed using the recommended manufacturer's conditions.

The appropriate code to use is 76014. The MR technologist performed an MR safety assessment, and the total time required for the assessment was 15 min. Documentation of the work must be part of the medical record. Example technologist documentation is available in the supplemental material. The radiologist was not directly involved in the MR safety assessment. Based on the initial safety assessment, no additional input was required to personalize imaging protocols or change device settings.

Scenario 2:

A 65-year-old female with a history of an implanted bladder stimulator presents for MRI brain with and without contrast. The patient reports new right arm weakness that developed 2 weeks ago. The technologist contacts the patient 1 day prior to the examination to conduct a safety screening for MRI. The patient reports the presence of an implanted bladder stimulator but does not have any information about the stimulator. There is no information about the patient's implanted bladder stimulator in the facility's implant database. The patient reports that the bladder stimulator was placed by an out-of-state provider 2 years ago. The patient can provide the name and practice location of the provider, but no other information. After completing the patient interview, the technologist can find the contact information for the provider that placed the implant. The provider's office has a record of the patient's implant and sends the documentation to the technologist. The technologist researches the MR safety conditions of the patient's bladder stimulator, determines the implant is MR conditional, and reviews the manufacturer's recommended MRI scan parameters. The technologist determines that the manufacturer-recommended MRI scan parameters can be met and documents the appropriate manufacturer's scan parameters in the patient's medical record. The technologist spent 35 minutes conducting the implant assessment. On the day of the MRI, the MR imaging is performed using the recommended manufacturer's conditions.

The appropriate codes to use are 76014 and 76015. The MR technologist performed an MR safety assessment, and the total time for the assessment was 40 min; 76014 is used to report the initial 15 min and 76015 is used to report the additional 25 min. Documentation of the work must be part of the medical record. The radiologist was not directly involved in the MR safety assessment. Based on the initial safety assessment, no additional input was required to personalize imaging protocols or change device settings.

Scenario 3:

A 75-year-old male presents for MRI brain without contrast for progressive memory loss. The technologist contacts the patient 7 days prior to the examination to conduct a safety screening for MRI. The patient reports he has a spinal stimulator. The technologist collects

the information and enters the information into the facility's implant database. After completing the patient interview, the technologist verifies implant components with the manufacturer's implant registry, researches the MR safety conditions of the patient's spinal stimulator, determines the implant is MR conditional, and reviews the manufacturer's recommended MRI scan parameters. The technologist determines that the manufacturer-recommended MRI scan parameters can be met and documents the appropriate manufacturer's scan parameters in the patient's medical record. The patient also reports that he "was shot as a kid" and was told there is a bullet close to his spine but cannot provide any more information. The technologist documents a potential contraindication for MRI in the medical record. The technologist verifies the presence of a prior CT abdomen pelvis is available for review in the facility's PACS. The technologist spent a total of 25 min of time performing the safety assessment and obtaining information. In advance of the examination, the technologist contacts the radiologist and presents the information to the radiologist. The radiologist reviews the patient's information, including the exam ordered, the reason for the examination, and available imaging. The radiologist reviews the implant information and manufacturer's conditions. The radiologist performs a risk-benefit analysis of the proposed MRI examination, including review of available imaging. The radiologist determines the ballistic material is lower risk based on the location and fragmentation pattern of the ballistic material and does not require modification of the MRI examination protocol.[8] The technologist updates the medical record to reflect the findings of the MR safety determination.

The appropriate codes to use are 76014 and 76016. The MR technologist performed an MR safety assessment, and the total time for the assessment was 25 min; 76014 is used to report the initial 15 min but the threshold for 76015 was not met. 76016 is used to report the radiologist effort. Documentation of the work by the technologist and radiologist must be part of the medical record. Example radiologist documentation is available in the supplemental material.

Scenario 4:

A 60-year-old female presents for an MRI brain without contrast for increasing right upper extremity tremor. The patient has an implanted active neurostimulator and an abandoned lead fragment from a sacral nerve stimulator previously used for bladder control. The technologist contacts the patient 7 days prior to the examination to conduct a safety screening for MRI. The patient reports the presence of the neurostimulator and abandoned lead and provides the implant information to the MR technologist. There is no information about the patient's implants in the facility's implant database. After completing the patient interview, the technologist researches the MR safety conditions of the patient's implants and determines that the intact neurostimulator is MR conditional, but it is unclear whether the abandoned lead fragment meets the manufacturer's conditions since the pulse generator was removed and the lead was cut. The technologist documents the presence of the stimulator with associated conditions in the facility's implant database, along with the abandoned lead. The technologist spent a total of 65 min of time performing the MR safety assessment. In advance of the day of the examination, the technologist contacts the radiologist. The radiologist reviews the patient's information, including the exam ordered, the reason for the examination, available imaging, and implant information. The radiologist performs a risk-benefit analysis of the study and determines a physics consultation is needed to determine if safe scanning conditions can be configured for the requested exam. The medical physicist reviews the information and provides recommendations for reducing risk of performing the exam to the radiologist. The radiologist determines the benefit of the MR exam to be high and the risk low-to-moderate. The radiologist approves the examination with MRI scan parameters prescribed by the MR physicist. The MR physicist and radiologist document their work in the medical record. The technologist updates the facility's implant database with the conclusions of the MR safety determination. On the day of the examination, the MR physicist works with the scanning MR technologist to customize the scan parameters of the MRI examination. The radiologist documents that custom MR scan parameters were used for the examination based on the MR safety determination and provides analysis of any limitations of the exam due to the exam customization.

The appropriate codes to use are 76014, 76015x2, 76016, and 76017. The MR technologist performed an MR safety assessment, and the total time for the assessment was 65 min; 76014 is used to report the first 15 min, 76015 is used to report the first additional 30 min, and 76015 is reported again for the next 20 min. 76016 is used to report the MR safety determination performed by the radiologist. 76017 is used to document that a medical physicist was consulted to minimize the safety risks of the examination through MRI examination customization. Documentation of the work by the technologist and radiologist must be part of the medical record. Additionally, the documentation for the MR safety determination performed by the radiologist in advance of the examination (76016) is separate from the documentation of the MR physics exam customization performed on the day of the examination (76017) reported by the supervising physician or QHP. A medical physics consultation should be co-signed by the supervising physician or QHP. Example documentation is available in the supplemental material. Alternative documentation examples can be found in Clinical Examples in Radiology published by the AMA.[9]

Scenario 5:

A 74-year-old male presents for an MRI brain with and without contrast to assess treatment response after gamma knife therapy for intracranial metastatic disease. The technologist contacts the patient 3 days prior to the examination to conduct a safety screening for MRI. The patient reports the presence of a cardiac implanted device. The MR technologist confirms the implant information with the patient. After completing the patient interview, the technologist researches the MR safety conditions of the patient's CIED, determines the implant is MR conditional, and reviews the manufacturer's recommended MRI scan parameters. The technologist determines that the

manufacturer-recommended MRI scan parameters can be met and documents the appropriate manufacturer's scan parameters in the patient's medical record. The technologist spent 15 minutes conducting the implant assessment. On the day of the MRI, the MR team, under the supervision of the radiologist, prepares the CIED for MRI using the manufacturer-provided remote interrogation system following the manufacturer's protocol prior to MRI examination. The MRI examination is performed. The patient is physiologically monitored during the MRI examination per institutional protocol. The implant preparation is documented by the radiologist in the medical record.

The appropriate codes to use are 76014 and 76018. The MR technologist performed an MR safety assessment in advance of the examination, and the total time for the assessment was 15 min. 76018 is used to report the preparation of the CIED under the supervision of the radiologist. The supervising radiologist is responsible for the altered therapeutic state of the patient while the CIED is in MRI mode, and for ensuring proper return to the prior therapeutic state following completion of the MRI examination. The technologist documents the MR safety assessment associated with 76014. The radiologist documents the preparation of the implant by the MR team to report 76018. An MR safety implant electronic preparation (76018) is different from a cardiac device interrogation performed by cardiology and can be reported separately if the MR safety implant electronic preparation is performed by a separate individual, typically part of the MR team.

Scenario 6:

A 65-year-old male presents for an MRI lumbar spine without contrast for progressive left lower extremity weakness. The patient has a right cochlear implant. The technologist contacts the patient 7 days prior to the examination to conduct a safety screening for MRI. The patient reports the presence of a right cochlear implant and provides the implant information to the MR technologist. After completing the patient interview, the technologist researches the MR safety conditions of the patient's implants, determines that the implant is MR conditional and that the implant requires physical immobilization. The technologist documents the presence of the implant and the associated conditions in the facility's implant database. Per institutional protocol, the MR technologist informs the patient's ENT provider that the patient will be undergoing MR imaging and coordinates with the ENT provider to have the cochlear implant immobilized on the day of the examination. The technologist documents the MR safety assessment. The technologist spent 35 min conducting the safety assessment. On the day of the examination, the ENT provider immobilizes the implant per manufacturer's instructions prior to the MRI examination and documents the implant immobilization. The MRI exam is performed.

The appropriate codes to use are 76014, 76015, and 76019. The MR technologist performed an MR safety assessment, and the total time for the assessment was 35 min; 76014 is used to report the first 15 min and 76015 is used to report the additional 25 min. In this case the radiologist is not involved in the implant immobilization. The ENT provider documents the procedure and reports 76019. The scanning technologist also updates the facility's implant database with patient tolerance of the head wrap and MRI examination.

Scenario 7:

A 75-year-old male presents to the emergency department for sudden onset right lower extremity paralysis, associated right lower extremity pain, and numbness in the buttocks. The patient reports a remote history of prostate cancer. An order for a MR lumbar spine with and without contrast is placed by the emergency department provider. The technologist conducts an MR safety evaluation per institution protocol, including reviewing the MR screening form by the patient, and learns the patient has an implanted spinal stimulator. The patient is visiting from out of state and has not been evaluated at the current facility previously. The patient does not have the implant card but is able to provide the name of the provider that implanted the spinal stimulator. The patient also states, "I don't think the implant is working".

The technologist contacts the provider who placed the implant, obtains the implant information and enters the information into the facility's implant database. The technologist verifies implant components with the manufacturer's implant registry, researches the MR safety conditions of the patient's spinal stimulator, and determines the implant is MR conditional at 1.5T. However, the MRI facility only has a 3T MRI. The technologist verifies a prior CT lumbar without contrast has been acquired during the current encounter and is available for review in the facility's PACS. The technologist spent a total of 25 min of time performing the safety assessment and obtaining information. The technologist contacts the radiologist to review the case given the clinical concern for acute cord syndrome and the lack of MR conditions for a 3T MRI. The radiologist reviews the patient's information, including the exam ordered, the reason for the examination, and available imaging. The radiologist reviews the implant information and manufacturer's conditions. The radiologist reviews the CT lumbar spine without contrast which demonstrates a frayed stimulator lead within the epidural space at L1. The radiologist performs a risk-benefit analysis of the proposed MRI examination. The radiologist determines that the exam is high-risk given the presence of a frayed spinal stimulator lead and lack of MR conditions, and recommends a CT myelogram of the lumbar spine.

The appropriate codes to use are 76014 and 76016. The MR technologist performed an MR safety assessment, and the total time for the assessment was 25 min; 76014 is used to report the initial 15 min but the threshold for 76015 was not met. 76016 is used to report the radiologist's effort. Documentation of the work by the technologist and radiologist must be part of the medical record. The MR safety assessment was performed on the same day but in advance of the exam which is appropriate in this scenario. Furthermore, the radiologist

recommended alternative imaging, a CT myelogram lumbar spine, due to the risks of exposing the patient to the MR environment in the presence of a frayed spinal stimulator lead.

Scenario 8:

A 56-year-old male with a history of an implanted spinal stimulator and anterior lumbar fusion presents for MRI brain with and without contrast. The patient reports new right arm weakness that developed 2 weeks ago. The technologist contacts the patient 1 day prior to the examination to conduct a safety screening for MRI. There is a record of the patient's implant in the facility's implant database including scan conditions from the manufacturer documented from a prior patient encounter. The patient has a card listing the implant information and the technologist confirms the implant information with the information in the facility's implant database – the implant is MR conditional. After completing the patient interview, the technologist verifies the information in the facility's implant database and the manufacturer's recommended scan conditions listed in the manufacturer's documentation. There are no variances in the conditions for the components with the manufacturer's implant registry and there are no special scan parameters to perform the MRI exam. The technologist documents review of the implant including the relevant MRI scan conditions. The technologist spent 5 minutes conducting the implant assessment. On the day of the MRI, the MR imaging is performed using the recommended manufacturer's conditions.

The MRI safety codes are to report work beyond the typically work assigned to the safety evaluation associated with routine MRI exams. This case does not meet the threshold for added work to safely prepare the patient for MR imaging. The implant information is readily available. The patient can safely interact with the environment without changing routine scan conditions.

Example Documentation

Sample MRI Technologist MRI Safety Evaluation

Example of documentation for a MR safety evaluation of a high-risk patient performed by an MR technologist associated with CPT® code 76014.

MRI Safety Assessment

Patient Information:

Patient: John Smith

Medical Record Number: 12345678

Exam: MRI lumbar spine with and without contrast

Clinical Indication: *Worsening left foot numbness over the last 4 weeks*

Safety Concern:

Implanted spinal stimulator

Safety Evaluation:

The patient reports the presence of a spinal stimulator during the MRI safety screening interview. Patient's implant records were reviewed. The implant requires special considerations for MR scanning to minimize risk.

Device type: Implanted spinal stimulator

Implanted device: Boston Scientific Precision Montage™ Implantable Pulse Generator (IPG) with Avista™ MRI Percutaneous Leads

Implanted device model: Precision Montage™ IPG: SC-1200; Avista™ Percutaneous Leads, 56 cm: SC-2408-56

Implanted device serial number: IPG: 987654321; Leads: 11111, 22222

The implanted spinal stimulator is MR CONDITIONAL per manufactures guidelines.

The following conditions are required to minimize risk of injury:

Stimulator system is full body eligible at 1.5T only in Normal Operating Mode (Whole body SAR ≤ 2.0 W/kg) using integrated whole body transmit coil.

Time spent performing MRI safety evaluation: 15 min

Electronically signed: Rhonda Blackman, RT(R)(MR), MRSO (MRSC™)

Sample Radiologist MRI Safety Evaluation

Example of documentation for a MR safety evaluation of a high-risk patient performed by a supervising radiologist associated with CPT® code 76016.

Sample Physicist Risk Analysis for MR Safety Determination

Example of documentation for an MR safety determination for a patient with multiple implant components at high potential for MR interactions, performed by a medical physicist in conjunction with a supervising physician or QHP associated with CPT® code 76016.

MR Safety Determination

Patient Information:

Patient: Jane Doe

Medical Record Number: 12345678

Exam: MRI brain without contrast

Clinical Indication: Increasing right upper extremity tremor

Safety Concern:

Presence of a responsive neurostimulator and an abandoned sacral stimulator lead

Safety Evaluation:

The patient, 60/F, 5'8" (1.727 m), 200 lbs (90.7 kg) reports the presence of an implanted responsive neurostimulator and an abandoned sacral stimulator lead for bladder control during the MR safety screening interview conducted by the technologist. The intact RNS® has published MR conditions, while the abandoned lead is currently unknown.

Device 1: RNS®

Make: Neuropace

Model: RNS-320-K

Serial: 987654321

Implant Date: 01/01/2019

MR Conditions:

Must be placed in MRI Mode

Field Strength: 1.5 T

Coil Restrictions: Full Body RF transmit only. Do not use head transmit/receive coil.

RF Restrictions: B_{1+rms} or SAR restrictions if landmarked above T8

B_{1+rms}: ≤ 2.95 μT (when landmarked above T2 for brain exam)

WB SAR: ≤ 0.6 W/kg (when landmarked above T2 for brain exam)

If B_{1+rms} is unavailable, then SAR must be used, which may result in a more restrictive MRI scan.

SAR – other: Active scan time ≤ 30 minutes per session

Max Spatial Field Gradient: 30 T/m (3000 G/cm)

Max Gradient Slew Rate: 200 T/m/s per axis

Data source: Manufacture's website - https://www.neuropace.com/wp-content/uploads/2021/02/neuropace-rns-system-mri-guidelines.pdf - last accessed 28-Oct-2024

Device 2: Abandoned Lead Fragment – approximate length 8 cm – Does NOT meet MR eligibility conditions

Make: Medtronic

Model: InterStim™ II Neuromodulator Model 3058 with Lead Model 978B1

Serial: Pulse Generator: 987654321; Lead: 33333

Implant Date: 01/01/2017

Explant Date: 12/31/2023

The pulse generator was removed and the lead was cut, retaining a portion of the lead near the sacrum. Approximate lead fragment length EXCEEDS 6 cm, as estimated from radiographs.

Eligibility Criteria:

Lead fragment length ≤ 6.0 cm

Distance from the lead fragment to other metallic components is ≥ 2.0 cm

Lead fragment location is sacral

Eligible lead models: 3098, 3889, 978A1, and 978B1

MR Conditions:

Full body eligible

Field Strength: 1.5 T or 3T

Max Spatial Field Gradient: 20 T/m (2000 G/cm)

Max Gradient Slew Rate: 200 T/m/s per axis

RF Coil Type: Body Transmit Coil (when centered above C7)

WB SAR: Normal Operating Mode (≤ 2.0 W/kg) or First Level Controlled Operating Mode (≤ 4.0 W/kg)

Data source: Manufacture's website - https://www.medtronic.com/content/dam/emanuals/neuro/M980291A_a_032_view_color.pdf - last accessed 28-Oct-2024

MRI Safety Risk Analysis:

Static Magnetic Field (B_0)

Translation & Rotation: LOW – Likely few ferromagnetic components to RNS® pulse generator and leads, or the abandoned lead, so risk is low, especially when staying within most conservative condition of 20 T/m.

Lenz's Law: LOW – Not enough conductive material

Device Incapacitation or Alteration: LOW – RNS® pulse generator has a battery that could be affected by B_0, but risk is still low while staying within MR conditions.

RF Magnetic Field (B_1)

Near-Field Effect Heating: LOW – Pad the patient from coming into contact with the sides of the bore of the magnet.

Heating from Induced Electric Fields: LOW-to-MODERATE – The abandoned lead fragment does not meet eligibility criteria. However, for brain MR, lead fragment will be >10 cm outside of RF body coil. Electric fields will still be induced at this location, but expected to be much lower than if the fragment were within the RF body coil. Use of T/R head coil would minimize heating concern for lead fragment, but is contraindicated for RNS® device. The RNS® device has RF limitations of $B_{1+rms} \leq 2.95$ μT, which will also reduce electric fields at location of lead fragment.

Time-Varying Gradient Magnetic Fields (dB/dt)

Vibration: LOW – Inform the patient that vibration can occur and maintain communication with patient throughout exam.

Induced Currents: LOW – The RNS® pulse generator and leads will be located at/near isocenter for a brain exam, where gradient strength is minimal, so the risk is low.

Peripheral Nerve Stimulation: LOW – It is plausible, though unlikely, that the abandoned lead fragment could enhance the risk of peripheral nerve stimulation. Maintain communication with the patient, if possible.

Medical Physics Recommendation:

Scanning the lead fragment is off-label since its length appears to be greater than 6.0 cm.

There is low-to-moderate risk of heating the RNS® leads and the lead fragment from induced electric fields.

Thes risk can be mitigated by closely following a restricted brain MR protocol at 1.5T using body transmit coil, $B_{1+rms} \leq 2.95$ μT, active scan time ≤ 30 minutes per session, maximum spatial field gradient ≤ 20 T/m, and maximum gradient slew rate ≤ 200 T/m/s per axis.

Electronically signed: Erica Smith, PhD, MRSE (MRSC™)

Supervising Radiologist: Yancy Garnet, MD

Radiologist Review and Recommendation:

I have reviewed the available patient information, including all available relevant clinical imaging. I have reviewed the associated medical physics documentation and recommendation. The length of the abandoned lead is greater than 6.0 cm as measured on planar radiographs. The distance from the lead fragment to other metallic components is ≥ 2.0 cm. The risk of the examination is low-to-moderate using recommended MRI scan conditions by medical physics. The benefit of the exam is high, with no other comparable diagnostic alternative, and could lead to change in patient management.

MRI brain exam approved with recommended MR scan conditions stated by medical physics. Schedule on a 1.5T system with medical physics customization.

Electronic Signed: Yancy Garnet, MD