

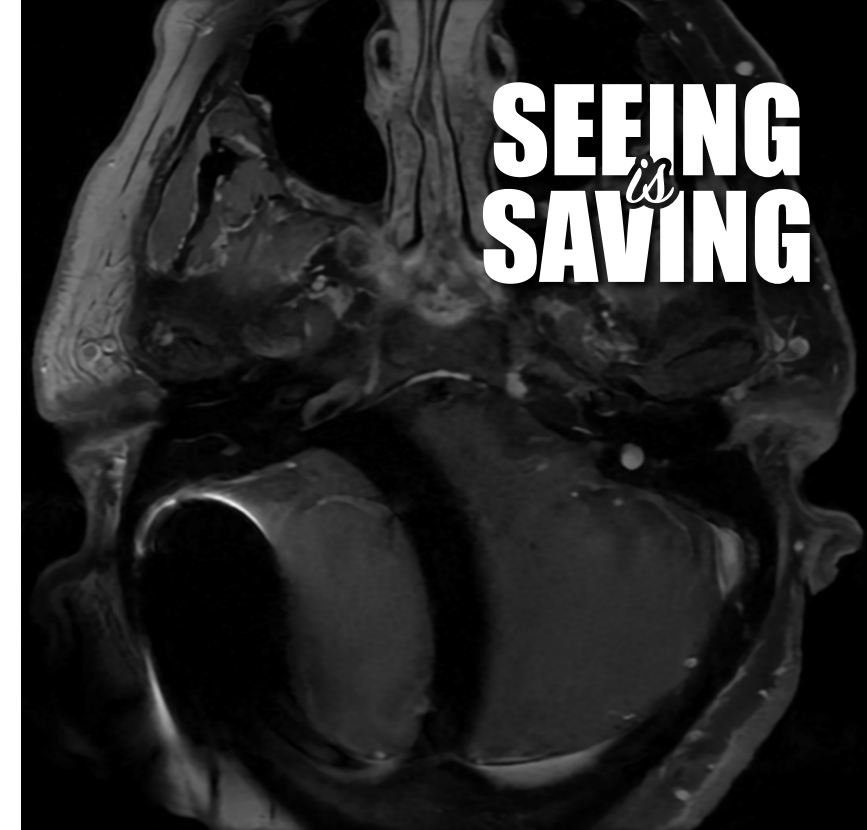


# FREQUENCY AND IMPACT OF USING INCOMPLETE INFORMATION WHEN ASSESSING PATIENTS WITH ACTIVE IMPLANTS FOR MR SCANNING

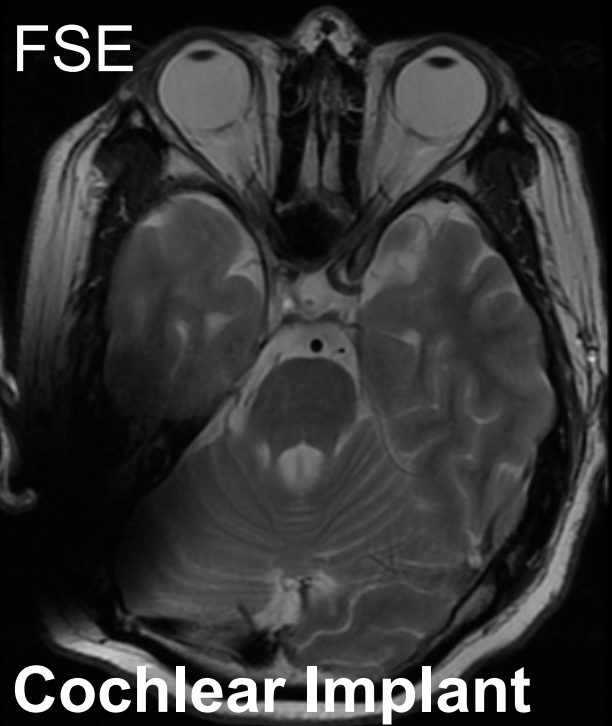
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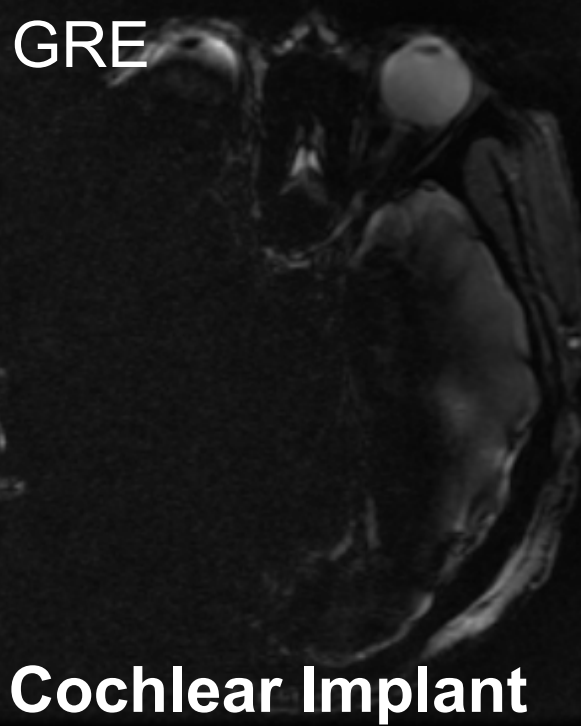


FSE



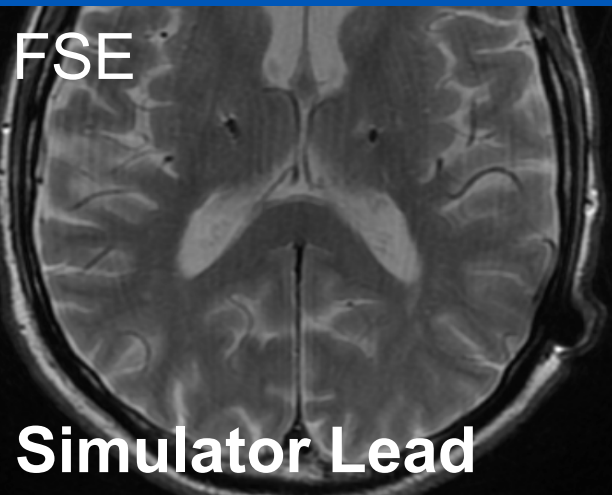
**Cochlear Implant**

GRE



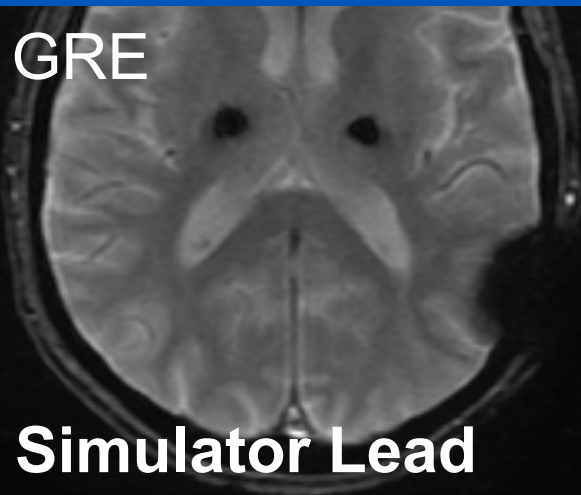
**Cochlear Implant**

FSE



**Simulator Lead**

GRE



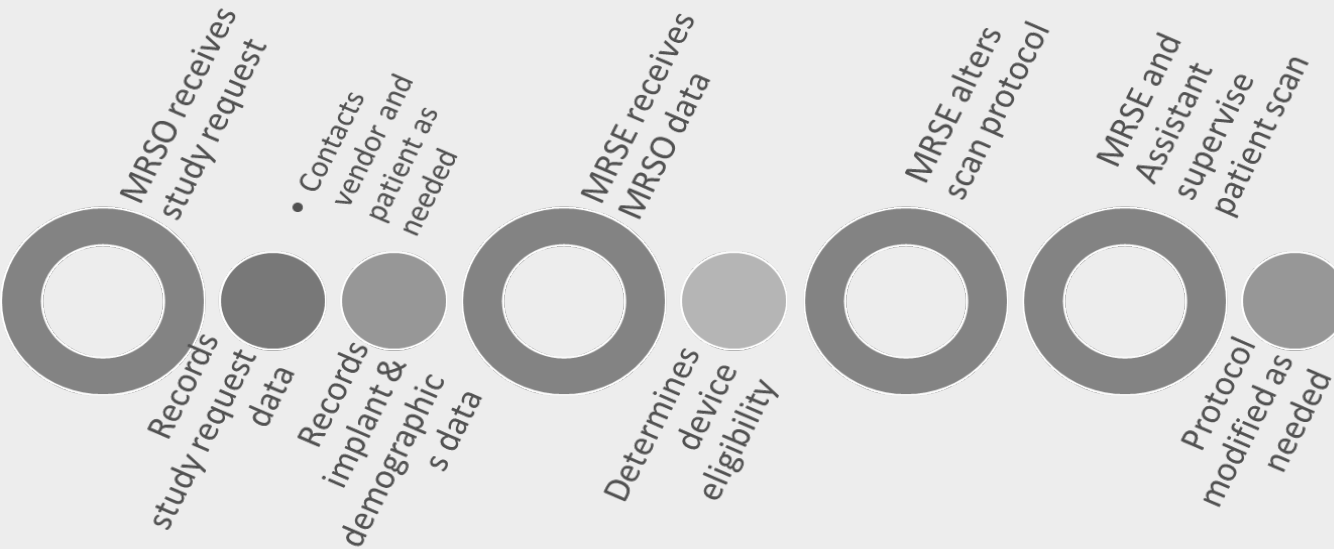
**Simulator Lead**

## WHY ALL THE HUBBUB ABOUT IMPLANTS AND MR?

- Implants add risk in the MR environment due to potential heating and movement within the patient
- Active implants have a power source and additionally have a malfunction risk
- Safe scanning requires identifying the manufacturer-defined scan requirements and confirming the patient scan can fulfill those requirements
- For the remainder of this poster we will only consider active implants and exclude passive and cardiac implanted electrical devices

# WHAT IS YOUR WORKFLOW FOR IMPLANT PATIENT SCANNING?

## Workflow for active implants (not cardiac)



- An MRSO is a technologist with additional certification and training in MR Safety
- The MRSO receives the order and records relevant patient/order information
  - This includes the vendor implant manual describing safety scanning conditions
- The data is assessed by an MR Safety Expert (MRSE) to determine if safe scanning conditions can be met and to determine protocol modifications
  - An MRSE is a physicist with additional certification and training in MR Safety

- If the MRSE determines the scan cannot meet the vendor conditions, the case is referred for further discussion
- The patient (depending on risk-benefit analysis) may:
  - Be referred to alternative modalities
  - Be denied for safety reasons with no alternative imaging
  - Be scanned off-label

# Is Physics Review Requested?

Yes

No

[Guideline for Selecting No Physics Needed](#)

\* must provide value

Patient First Name

Patient Last Name

Patient MRN (no dashes or spaces)

Diagnosis (Scanning Indication) from Epic:

Procedures (Exam Requested) from Epic

Priority

M-Number of Ordering physician

(M-Number can be found [HERE](#))

(If not Mayo ordering physician, then write NOT MAYO)

LASTNAME, FIRSTNAME, SERVICE OR DEPARTMENT of Ordering Physician

Ordering physician phone number

## Scan Information

Body part to be scanned:

\* must provide value

To your knowledge, will the patient be under sedation/non-communicative?

Yes

No

To your knowledge, have they been scanned in an MR machine since receiving their most recent implant?

Yes

No

\* must provide value

To your knowledge, does the patient have any abandoned leads?

Yes

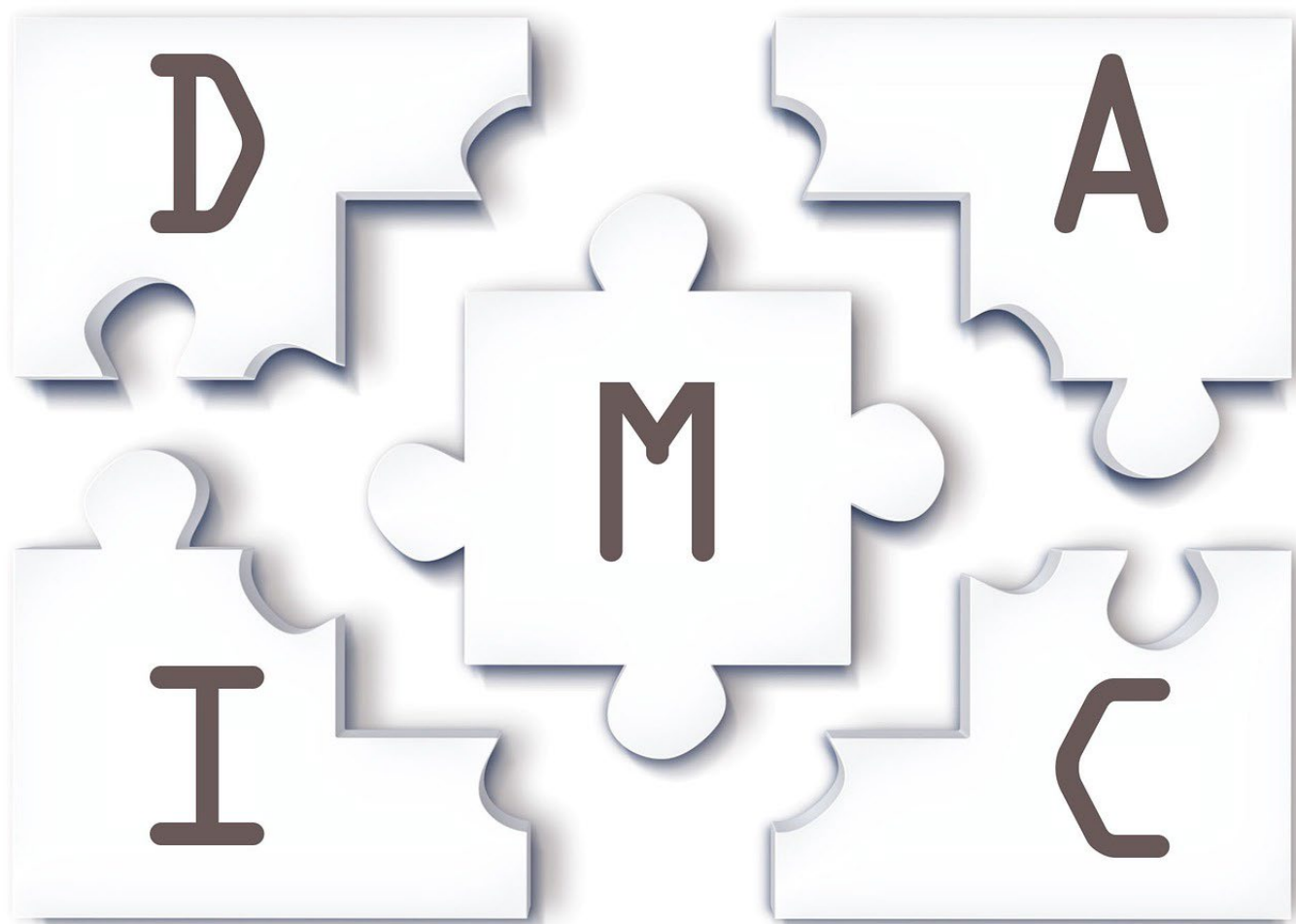
No

\* must provide value

# YOU HAVE A SYSTEM FOR THIS?

- A workflow management system for active implant scanning was developed and implemented in April of 2020
- A series of questions are answered for each patient to ensure that all necessary data is collected and considered during assessment
- Information for each patient (including vendor device manual) is stored in the system for handoff among teams (e.g., MRSO to MRSE)

# WHAT WAS THE QI PROJECT?



- This project assessed
  - how often collected data was incomplete
    - Incomplete meaning either missing or incorrect
  - what data was incomplete
  - could incomplete data impact assessment or scanning
- An intervention was implemented to mitigate the data most often found to be incomplete
- Data was collected for 4 months post-intervention to determine success

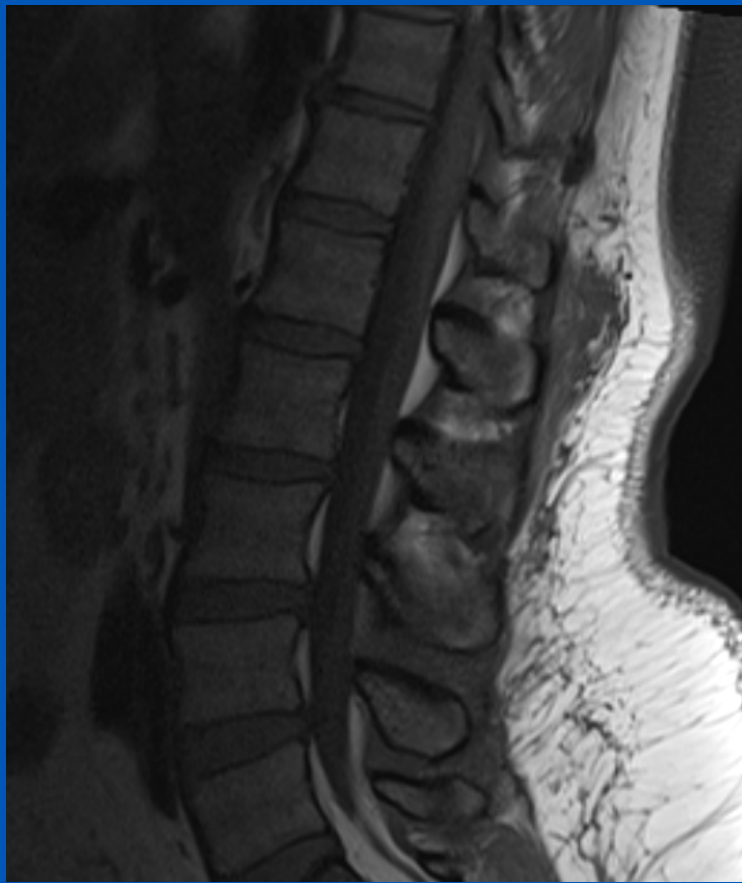


Complaint: Lower back pain

Implant: Cochlear

Issue: Old manual had heating limits were half of the new manual. Use of the old manual would have resulted in much worse image quality and possibly decision not to scan.

Finding: Disc bulge with left foraminal protrusion touching the L2 nerve root

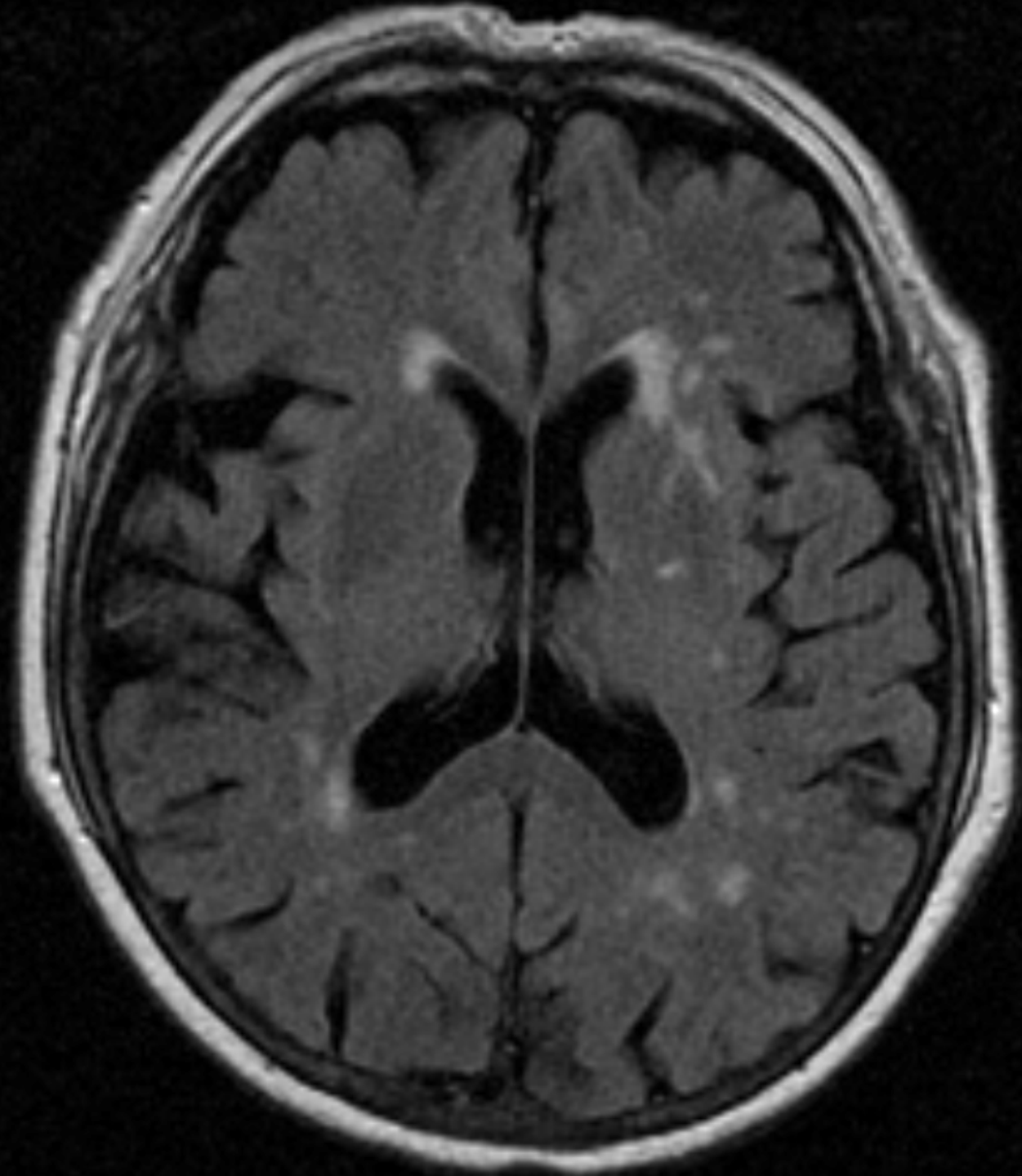


Of 109 cases recording what data was incomplete, 66 cases (54.1%) recorded if assessment or scanning could be impacted.

Of those, 31 cases (47%) would have impacted assessment or scanning if not caught.

## HOW OFTEN WAS DATA MISSING?

- 755 cases (518 unique patients) were assessed
- Incomplete data was recorded in 122 cases (16.2%).
  - Of the 122 cases with incomplete data, 109 cases (89.3%) recorded what data was incomplete
- Of the cases recording what data was incomplete, 81 cases (74.3%) were due to upload of an outdated or wrong manual
  - Largest single contributor
  - Other incomplete data included wrong model number & missing data related to cochlear head wrapping

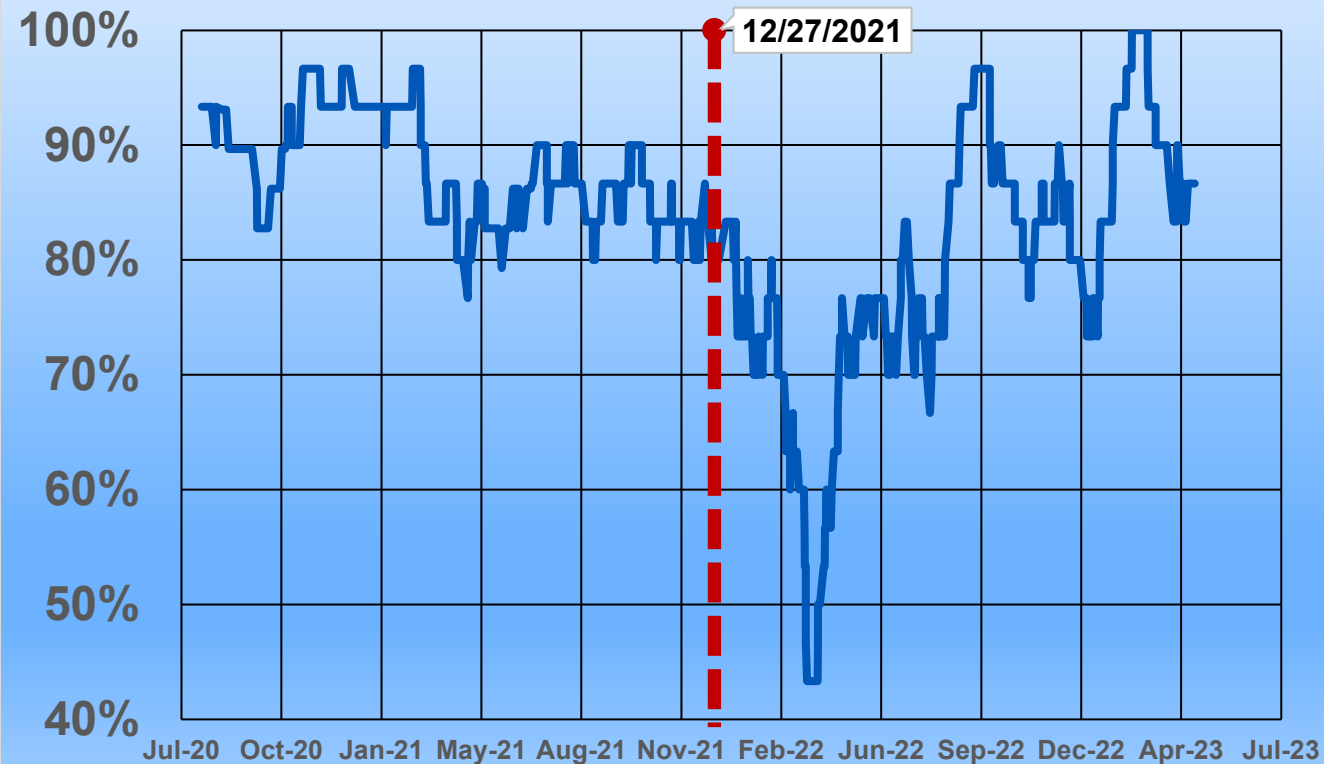


## GIVE ME A REAL-WORLD EXAMPLE

- Indication: Malignant Neoplasm Of Lung Upper Lobe Or Bronchus Right (HCC)
- Implant: Neurostimulator
- Order: Routine Brain W/WO
- Incomplete data: Outdated manual previously saved on MRSO desktop and repeatedly used instead of downloading new one
- Possible Impact: Old manual only allowed Transmit/Receive coil which would require a new protocol build and likely would have reduced quality. New manual allows Body Transmit coil with multi-channel head receiver
- Result using correct manual: Small vessel ischemic change, but no metastases

# DID THE INTERVENTION HELP?

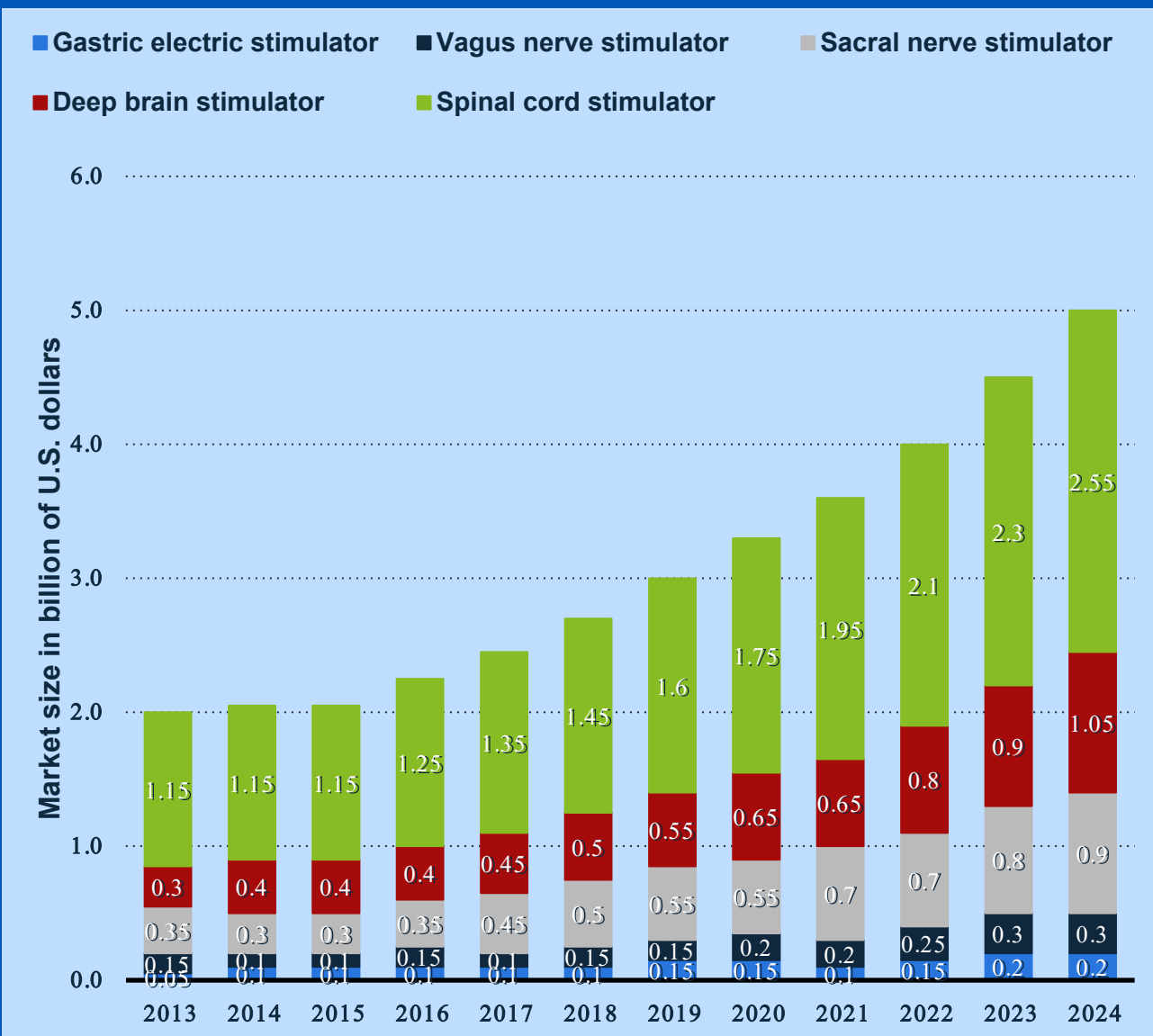
## Percentage with Complete and Correct Data



- Incorrect (typically outdated) manual was recorded as the most likely data to be incomplete
- On December 27/2021 a pop-up was added to the workflow manager
  - Contained a list of links to the implant vendor manual repositories
  - Retrieving the manual typically a two-click task
- Initially the completion rate plummeted due to:
  - Increased surveillance for incomplete data
  - Several new MRSO hires in late 2021/early 2022
- Completion percentage recovered within 2 months despite increased surveillance for incomplete data
  - Considered to be an effective intervention



## Estimated neurostimulation devices market size worldwide by product 2013-2024



# CONGRATS ON YOUR POSTER, BUT...HOW DOES IT IMPACT ME?

- MR Safety is a growing problem for all radiology (and some non-radiology) practices
- Number of patients with implants is growing
- Little data exists determining where typical MR safety workflows are insufficient
- Outdated or incorrect manuals were identified as a major source of incomplete data which could impact safety assessment and/or final scanning protocol modifications
- Developing a list of links to implant manual repositories is a simple and effective step to improve MR Safety data integrity and be safer with your patient!

Note(s): Worldwide; as of September 2016

Source(s): Statista estimates; Grand View Research; ID 731851



Need more MR Safety in your life?

Come to our MR Safety Session at RSNA 2023:

R3-RCP23: Case-based approach to scanning patients with implanted devices

Thursday, Nov. 30 9:30am

# THANK YOU

Cite this work: Sensakovic WF, et al. "Frequency and impact of using incomplete information when assessing patients with active implants for MR scanning" 2023 RSNA Annual Meeting, Chicago, IL.

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