MRI in Resource-Limited Settings

Samuel A. Einstein, Ph.D.
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Questions to be answered

• What is equity in medical imaging?
• How available is MR imaging in rural areas?
• How do pacemakers and other implants affect MR accessibility?
• How can physicists help?
What is equity in medical imaging?

A landmark report

• “Even when using the lower estimate, deaths due to medical errors exceed the number attributable to the 8th-leading cause of death. More people die in a given year as a result of medical errors than from motor vehicle accidents, breast cancer, or AIDS.”

The sequel

• “That all health care constituencies... commit to a national statement of purpose for the health care system as a whole and to a shared agenda of six aims for improvement that can raise the quality of care to unprecedented levels.”


The six aims

• Safe
• Effective
• Patient-centered
• Timely
• Efficient
• Equitable

• Equitable—providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.

The importance of healthcare equity

“And, most important, we must build a 21st century health care system that is more equitable and meets the needs of all Americans without regard to race, ethnicity, place of residence, or socioeconomic status, including the nearly 43 million people who currently lack health insurance.”

How available is MR imaging in rural areas?

The availability of MRI

Harvey L. Neiman Health Policy Institute, American College of Radiology
Geography matters

- ~20% of the US population (~60 million) resides in rural areas.
- Critical access hospitals (CAHs) are often the most important (if not the only) source of health care.
- As of 2014, less than half of CAHs offered MRI.
- In no state was MRI available at all CAHs.

What about ERs?

- 262 randomly selected EDs were telephoned.
- On-site MRI was available at 66% institutions and mobile MRI for 20%.
- Smaller, rural, and critical access hospitals had lower MRI availability.
Minnesota as an example

Minnesota as an example

Manhattan

https://www.acraccreditation.org/accredited-facility-search
Northern Wisconsin

https://www.acrcredititation.org/accredited-facility-search

How do CIEDs and other implants affect MR accessibility?
Most CIEDs are low risk in MRI

- Cardiovascular implantable electronic devices (CIEDs) are broadly classified as MR-conditional or non-MR conditional (aka 'legacy').

- The large body of research to date has demonstrated that both types of devices are low-risk from a physics/radiology perspective if proper procedures are followed.

- The Centers for Medicare & Medicaid Services (CMS) now reimburses for scanning both conditional and non-conditional devices.

- Emerging research demonstrates that scanning abandoned pacing leads is likely safer than extracting pacing leads though this is still not covered by CMS.

Patients w/ CIEDs need MRIs

- Patients with CIEDs often have co-morbidities and have a greater need for MRI access.

- 50-75% of pacemaker patients will need an MRI in their lifetime.
Are ‘legacy’ devices going away?

- No, non-MR conditional CIEDs are still being implanted.
- As of 2018, about 25% of implanted pacemakers were not MR-conditional.


How do CIEDs and other implants affect MR accessibility?
In the UK

49 in 50 people with a heart device aren’t offered an MRI scan when needed

Many think that patients with heart devices can’t undergo MRI, but they can

Find out more: MRImpacemaker.com
In the UK

![Graph showing MRI scans per hospital site]


In Italy

- Study looked at patients with MR-conditional devices implanted at 21 sites.
- Within one year, 6% of patients were referred for MRI.
- 17% and 71% of patients with pacemakers and ICDs, respectively, were denied.

In Italy


In Australia

- 35 tertiary referral public hospitals were surveyed.
- 86% offered MRI for MR-conditional CIEDs.
- 9% offered MRI for non-conditional CIEDs.
- The principal barrier was the absence of national guidelines, followed by lack of formal training and/or logistical device support.

How can physicists help?

More research

- We can’t fix the problem until we understand it.
- We need in-depth information regarding MR access in rural areas-especially for patients with implants.
- We need to know what barriers exist to equitable MR access.
- We need to know what policies break down these barriers.
Improve policies

- Review MR safety policies during annual evaluations of MR scanners.
- Improving the policies can both prevent injury and increase access.
- If you need to brush up on your MR safety knowledge: ISMRM Workshop on MR Safety October 21-23 at NYU.

CIED policies

- Implementation of a ‘one-stop’ service model can help.
- Remote programming of CIEDs may be a good option for smaller programs.
- Example SOPs and patient education can be found on MRImyPacemaker.com

Improve reimbursement

- Additional work related to safely scanning implants is not currently reimbursed.

- Off-label scanning may require hours of personnel effort (e.g. see TU-D1000-IePD-F6-5 Time Cost of Off-Label MR Scanning of Patients with Active Implants by Panda et al).

- We need CPT codes to compensate technologists, physicists, and physicians for performing this essential service.

Develop low-cost, portable MRI

- Initial cost and ongoing maintenance is a large barrier to MR service.

- Low-field, head-only systems are a potential solution for increasing MR access including for those with implanted devices.

- There are ethical issues related to the development of these systems.

Emerging ethical issues raised by highly portable MRI research in remote and resource-limited international settings

Francis X. Shen\textsuperscript{1,2,2}, Susan M. Wolf\textsuperscript{3,4}, Supriya Bhavnani\textsuperscript{5}, Sean Deoom\textsuperscript{6}, Jed T. Elston\textsuperscript{7}, Damien Fair\textsuperscript{8}, Michael Garwood\textsuperscript{9}, Michael S. Gee\textsuperscript{10}, Sairam Geethanath\textsuperscript{11}, Kendrick Kay\textsuperscript{12}, Kelvin O. Lim\textsuperscript{13}, Georgia Lockwood Egström\textsuperscript{14}, Monica Luciana\textsuperscript{15}, David Pelioquin\textsuperscript{16}, Karen Rommelfanger\textsuperscript{17}, Nicoline Schles\textsuperscript{18}, Khan Siddiqui\textsuperscript{19}, Efraín Torres\textsuperscript{20}, J. Thomas Vaughan\textsuperscript{21}
Time for a new program?

Thank you!