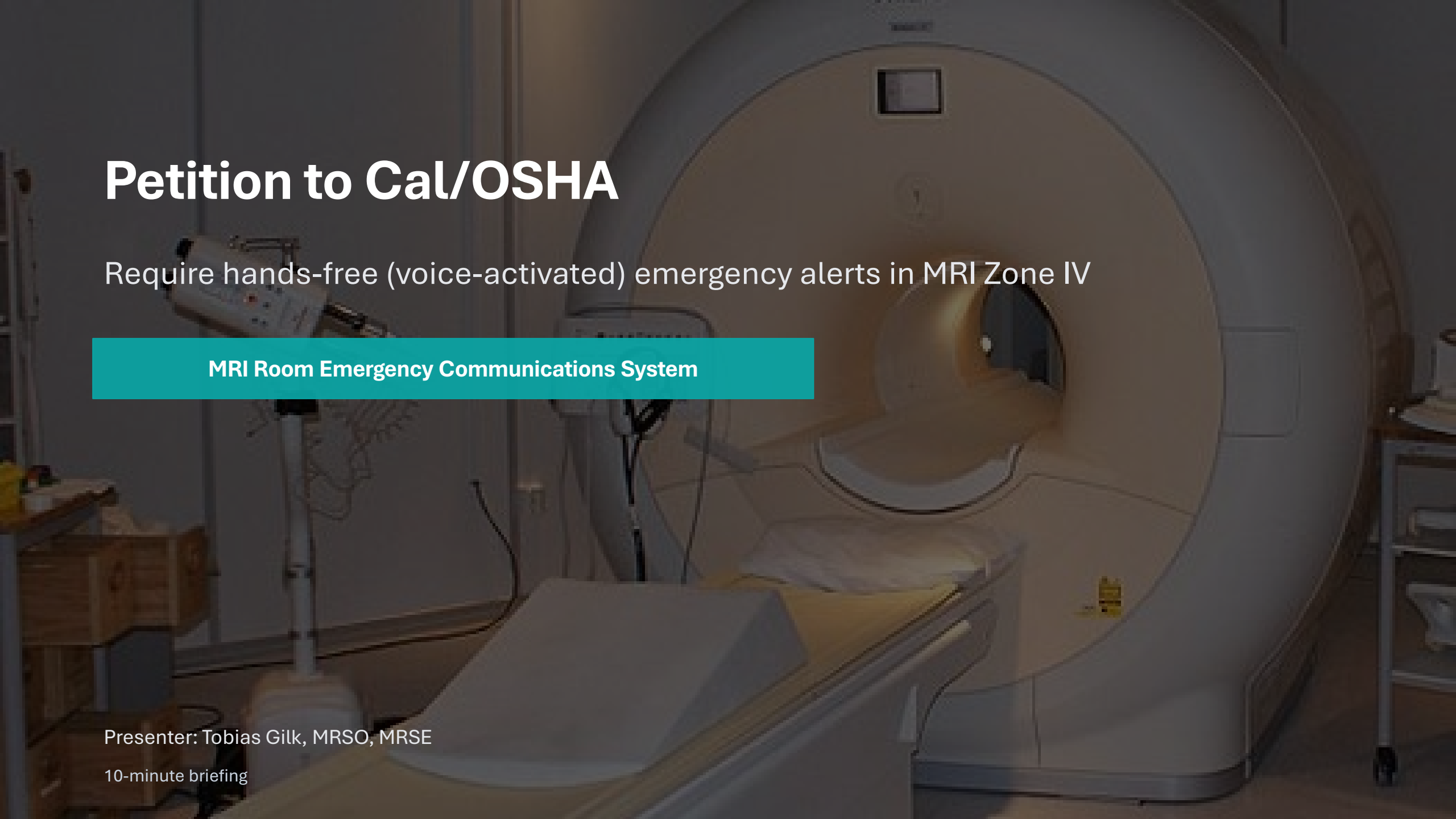


Petition to Cal/OSHA

Require hands-free (voice-activated) emergency alerts in MRI Zone IV

MRI Room Emergency Communications System

Presenter: Tobias Gilk, MRSO, MRSE

10-minute briefing

Context

Why this matters

The core problem

In MRI magnet rooms (Zone IV), patients and healthcare workers often cannot reliably summon help during emergencies.

These areas are often required to be restricted / access controlled.

Financial pressures & technological innovations encouraging reduced staffing within controlled access areas.

Response delays have led to severe harm of patients and healthcare workers.

Regulatory void

Minimum point-of-care MRI safety & staffing is not presently regulated nationally or at state levels. This request doesn't overlap / conflict with any other regulatory structure.

What a standard should require

- Ability to immediately call for assistance regardless of mobility, location, or audibility
- A reliable last-line safeguard when staffing or proximity fails
- Consistent minimum protection across facilities (not optional / ad hoc)

Problem

The hazard: communication failure in Zone IV

Why shouting / leaving the room fails

- MRI scanner rooms are often significantly soundproofed
- MRI scanner suites are often required to be access restricted
- Often requires staff exiting Zone IV (MRI scanner room) to request aid—unsafe or impossible in acute events
- Workers may be immobilized, cannot leave the patient, or cannot reach a manual device

Zone IV reality

- Heavy RF door
- Sound attenuation
- Restricted devices
- High consequence events

Bottom line

If you can’t reliably signal for help from inside Zone IV, you are depending on luck.

Evidence

Evidence: emergencies where calls for help failed

Case example (California): Kaiser Redwood City (2023)

Projectile/entrapment event: a metal hospital bed became magnetized and pinned a nurse against the scanner.

No in-room alert system existed; the responding technologist-aide ran from the suite to try and get help for the trapped / crushed nurse.

Cal/OSHA cited inadequate emergency communication and lack of functional alert systems.

Pattern, not a one-off

ECRI hazard reports describe MRI emergencies where calls for help went unheard—delaying response and contributing to preventable harm.

Reporting reality

A multicenter MRI safety study found only 38% of incidents were formally reported—even when events involved dangerous communication delays.

Gap

“Within earshot” is not an enforceable control

Guideline intent

- Two MRI-trained individuals “immediately available and within earshot” when a patient is in Zone IV
- Intended as the ready availability of emergency assistance

Operational reality

- Staffing shortages + off-hours imaging + remote scanning mean solo work is common
- MRI room construction and shielding makes “within earshot” functionally meaningless (sound transmission is blocked)
- No defined response-time or validation metric → hard to audit, enforce, or improve

Regulation

Regulatory gap: no MRI-specific minimum for emergency signaling

Today's oversight landscape

- No CDPH minimum MRI-specific workplace safety requirements (typical of nearly all states)
- No federal OSHA or Cal/OSHA modality-specific standard governing MRI safety communications
- ACR guidance is advisory (unenforced); accreditation standards are broad and non-prescriptive
- IEC equipment standards defer implementation details to operators

Net effect: emergency communication "relies on hope."

Hope someone is close enough to hear. Hope the door can be reached. Hope someone is available. Hope response arrives before injuries worsen.

Standard

Requested standard: minimum functional requirements

Proposed Cal/OSHA rulemaking should require:

✓ 1) Hands-free activation in Zone IV

Anyone inside the magnet room can trigger an emergency alert without leaving the room.

✓ 2) Manual backup activation

In-room push-button / panic-button option when voice is not possible or safe.

✓ 3) Audible + visual indicators

Alerts must reach nearby personnel even when sound is attenuated.

✓ 4) Ongoing monitoring & maintenance

Regular testing + recorded maintenance available for inspection.

✓ 5) Training for MRI personnel

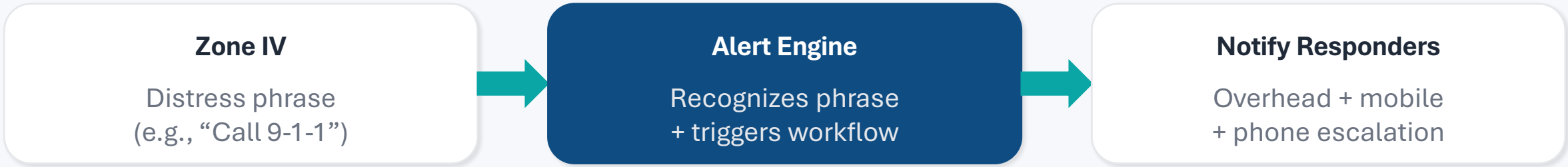
When/how to use the system; use is expected and appropriate in emergencies.

Solution

How a voice-activated alert closes the gap

Concept: convert an in-room distress phrase into multi-channel escalation

Hands-free → works even when immobilized, hands occupied, or shouting won't pass the RF door.



Bench demonstration result

Prototype dispatched overhead + smartphone alerts ~9 seconds after the trigger phrase, with no false activations observed in a 15-minute window and no detectable EMI.

Support

Expert support: why this should be a minimum safeguard

Three themes from SME interviews

1) Many sites have no in-room emergency alarm

“Most facilities do not have emergency alarms, and there are no standards.”
— Mike Stephens, MRI field engineer

2) Hands-free calling is a minimum criterion when staff are solo with patients

“The ability to call for help… should be viewed as a minimum criteria for staff working alone with patients in a controlled access area.”
— Tobias Gilk, MRSO/MRSE

3) This is a last line of defense (not a replacement for prevention)

“Once the patient and/or healthcare worker are inside the scanner room and the emergency erupts… those other tools offer no assistance.”
— *Tobias Gilk (analogy: portable fire extinguisher)*

“No other current solutions to communication emergencies in Zone IV.”
— Ryan Draeger, MRI applications specialist

Close

Practicality + the ask

Practical implementation

- Systems / Products exist today
- Minimal infrastructure changes; can integrate with paging / code systems
- Creates auditable tests + maintenance records (supports inspection readiness)

Cost vs. consequence

Experts describe implementation cost as “insignificant” compared with workplace injury, accident, litigation, and downtime impacts.

What we are asking the Board to do

- Initiate rulemaking for in-room emergency communication systems in MRI Zone IV
- Set minimum functional requirements (hands-free + backup + indicators + testing + training)
- Enable flexible compliance paths while standardizing the safety floor statewide

Next steps (suggested)

- Convene technical working group
- Define test/inspection protocol
- Align with facility code/paging
- Phase-in compliance (new installs → existing suites)

Approved Proposal No- 1715 and here is the wording-

Substantiation:- People can get stuck to the magnet and the MRI room is nearly soundproof, typically far from foot traffic, so no one would hear them when they are hurt and/or stuck to the MRI magnet. Also, the helium quench vent pipe could malfunction during a quench and the pressure could close the MRI room door and trap people in the room causing injury and/or death. Lastly, a patient could fall and trap the MRI operator or they could simply need trauma lifting help and there is no current requirement for a voice activate alert. The state of North Carolina is now requiring a push alert as well though this will not help in the above scenarios.

Benefit-Cost Implications: It will increase the patient, operator, and vendor safety. The cost will be negligible relative to the MRI suite value (typically 2-3 million dollars). 30 states now require a ferrous metal detector on new MRI scanner installations. These detectors can cost up to $ 20,000. An MRI scanner room voice-activated alert and the camera will provide a similar critical level of safety but be similar to an MRI safe fire extinguisher in cost, likely fall below the capital budgeting ceiling for most facilities.

De-identified accounts by MRI workers facing dangerous situations working alone.

I worked in an out patient facility where we were isolated by two badge access doors between zones 2-3 and a key code into zone 4. There was a front desk staff present but could not hear a call for help. They were beyond the badge accessed doors. A tech had a pt on the table who appeared to be unresponsive.... He actually turned out to be intoxicated. Tech had been having BP issues which became exacerbated by the circumstances. She had a medical event while trying to get help. She was able to crawl to her cell phone, call me (I was 15 min away). I called the building manager and got a manager to the department, called 911 and both patient and tech left in stretchers.

I know of a tech that was alone, setting up a patient on the table. Advanced the table into the scanner & had a medical episode. Collapsed on the floor. The patient eventually crawled out of the scanner only to find the tech laid out on the ground. The patient had to go find help.

Alone in the outpatient sector. Scanning a patient with a history of sz disorder. Sure enough, grandmal. Luckily this was on a GE undockable table as I had to remove the patient from the room alone holding their head and guiding the table out. No small challenge with the thrashing, protecting her head and airway. The thrashing was to violent to leave the patient for even a second. I busted through the control room door with the patients head in my arm to protect their head from the coil and my other arm holding the rail on the opposite side to try and contain the flailing limbs. As technologists we know the risk of scanning our vulnerable seizure patients. The day I was alone was just another awful reminder of how unsafe it is to work alone.

I had a very similar experience with a seizure pt and I was alone with no one in shouting distance. No changes came from that incident and therefore it happened again to my coworker while he was working alone. We now have a 2 tech policy in place at our site.

Once while working in a “shared” control room with CT I had a patient have a seizure like event while in the table. Yelled for help and still took several minutes and a couple of times running and banging on the glass before they heard me.

Second time scanning a patient who was under arrest with only one guard with me. Doing entire spine and the pt had been very cooperative. The guard asked to use the restroom which was right outside the control room . While he was away the pt pressed the call button I went in and slide him out of the scanner. He sees I am alone jumps off the table starts threatening me. About that time the guard walked back into the control room and the pt calmed down and began cooperating again.

have personally had injuries resulting in surgeries, lost wages, while working alone and/ or severely understaffed. Incidents of immobile patient laying for extended period of time on scan table while waiting for “lifting help” from another department. No rails on scan table, had to leave scan room to call for help several times, pt in severe pain. Very unsafe and poor pt care due to delay

I went to get a patient off the table for an exam that wasn’t for seizures. The patient started to show signs of something was happening (I am a tech, not a nurse) and told her to lay back down and she started seizing. I barely could hold her longless try to get the seatbelts to put on her. I was having a hard time trying to get her on her side. I was screaming bloody murder hoping CT that was down the hall would hear me but they had the door shut and listening to music (I have complained about this multiple times but it didn’t help)

I was attacked by a patient and ended up in the ICU afterwards. My shoulder was completed destroyed. I was scared to come back to this job, and somehow I did

Had an ER postictal for brain w/wo. Went to inject and no IV access so I was starting IV and advising my process as I always do. Pt went from zero to sixty screaming and bucking on the table while I had a cath in their arm from the attempted IV start (they weren't seizing). I had to figure out how to not poke myself while holding them on the table so they didn't throw themselves on the floor and get myself OUTSIDE the room to hit the staff assist button about 10 feet away. Great fun, they got sent back to ER with a brain without completed bc the pt was not at all cooperative. And I never did get a staff assist button IN THE ROOM nor in our remodel. Area is now even more isolated than before and behind 2

badge access only doors and I'm solo 12 hrs as well as my colleagues on overnights. No one can hear me scream if that's all I could do.

Patient was an IV drug user DTing. The ER called someone in for total spine w.wo looking for an abcess. Patient was put on the table and just started swinging. The tech was alone because the ER didnt care enough to stay with the problematic patient AND didnt tell the tech of her known behavior.

Work in a small hospital where MRI is completely isolated and in a building all on its own. There is only one employee in this building (MRI tech) with patients and those who walk in looking for directions. It's easy to get overwhelmed when working by myself. Had a ferrous incident that pinned another tech to the machine while trying to scan last patient of the day. She was lucky the patient had a family member that was able to push the quench button.

Working in clinic no one around pt having seizures screaming my head off no one came seizure lasted 5 minutes finally someone stuck their head in called code for physician to come. Pt went to er no follow up

Attacked by a patient while alone

I injured my knee while assisting a patient transferring from the mri table. I was working alone (as was the usual at this hospital). I could not walk and the patient was stuck mid transfer. I had to yell for help until someone heard me from another department.

Stuck on a mobile mri truck by myself being threatened by a patient. I was able to smooth talk the man to come with me to registration. I told management I was scared and didn't feel safe being on that truck by myself with no way of getting help. They did nothing.

I was bear hugged by a confused pt and he wouldn't let go. Luckily someone could hear me scream. I had another time i was trying to move a pt back to her cart but she was trying to crawl off the table.

A pregnant tech had a patient on table. Tech passed out and landed on top of patient. Patient had to yell for help for a very long time for they were discovered.

Meet the Minnies 2022 semifinal candidates

August 31, 2022 -- The following is the list of candidates for the 2022 edition of the Minnies, *AuntMinnie.com*'s campaign to recognize the best and brightest in medical imaging. This year's campaign includes over 200 candidates in 14 categories, ranging from Most Influential Radiology Researcher to Best Educational Mobile App.

The semifinalist list was compiled based on nominations from members of *AuntMinnie.com*. Winners will be selected by our expert panel in two rounds of voting. The finalists will be announced in late September, with the final winners announced in October.

VORTEX: Physics-driven data augmentations using consistency training for robust accelerated MRI reconstruction. Desai AD et al, *arXiv*, November 3, 2021. To learn more about this paper, click here.

Best New Radiology Device

(click on the links below to learn more about each device)

Aura 10 PET/CT specimen imaging, Xeos
Definium 656 HD x-ray system, GE Healthcare
EMVision portable brain scanner, EMVision
FDR Cross portable fluoroscopy/digital radiography system, Fujifilm Healthcare Americas
Imagio breast imaging optoacoustic ultrasound system, Seno Medical Instruments
IzoView breast CT scanner, Izotropic
Magnifico Open MRI scanner, Esaote
mKDR Xpress mobile x-ray, Konica Minolta Healthcare Americas
MobileDaRt Evolution MX8 Version V mobile x-ray system, Shimadzu Medical Systems
MR 7700 3-tesla MRI scanner, Philips
MRI Room Alert System, Sound Imaging
Naeotom Alpha photon-counting CT scanner, Siemens Healthineers
OmniTom Elite mobile CT scanner with photon-counting detectors, Samsung NeuroLogica
Radialis small-footprint PET system, Radialis
Rover mobile x-ray system, Micro-X
SoftVue 3D whole-breast ultrasound tomography system, Delphinus Medical Technologies
SpectralDR digital radiography detector, KA Imaging
Tron mobile CT/fluoroscopy system, Xoran
Valory digital radiography system, Agfa HealthCare
Vantage Fortian MRI scanner, Canon Medical Systems
Vivix-S F series digital radiography panel, Vieworks
X1 radiation therapy system, RefleXion Medical