

ACR

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SEPTEMBER 2022 | VOL. 77 | NO. 9

Bulletin



**INCIDENTAL
FINDINGS**

closing the loop

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RADIOLOGY



9 INCIDENTAL FINDINGS

The Closing the Recommendations Follow-Up Loop measure set aims to improve patient outcomes and provide additional evidence for the appropriate management of incidental findings.

ALSO INSIDE

- 13 Radiology Training for the Non-Radiologist Physician**
Aspiring radiologists should not be the only group of students receiving medical school-level training in radiology.
- 14 Better Care for Head and Neck Cancer Patients**
The chair of the ACR NI-RADS™ Committee discusses the importance of standardizing imaging surveillance and reporting.
- 16 Introducing Medical Students to Appropriateness Criteria**
When medical students could no longer conduct clinical rotations during the pandemic, one medical school created a radiology elective to educate students about the ACR Appropriateness Criteria®.
- 18 Educating on Equity**
A Radiology-TEACHES™ module is supporting physicians in their interactions with patients from diverse backgrounds.
- 19 An Essential Roadmap for AI in Radiology**
The 2022 Data Science Summit delved into the complex relationship between AI expectations and strategies for successful AI implementation.
- 20 Exploring Opportunistic Imaging**
Radiologists' presence at the intersection of many aspects of healthcare, including screening and incidental-findings management, provides the opportunity for increased engagement in population health management.

DEPARTMENTS

- 4 From the Chair of the Board of Chancellors**
The ACR Learning Network will advance the College's mission, amplifying the ACR as "the voice of our members, empowering them to serve patients and society by advancing the practice and science of radiological care."
- 5 Dispatches**
News from the ACR and beyond.
- 8 From the Chair of the Commission on Economics**
Now is an excellent opportunity to advocate for an Appropriate Use Criteria program of tomorrow.
- 21 Final Read**
What advances in the field of radiology do you find most exciting?



OUR MISSION: The *ACR Bulletin* supports the American College of Radiology's Core Purpose by covering topics relevant to the practice of radiology and by connecting the College with members, the wider specialty, and others. By empowering members to advance the practice, science, and professions of radiological care, the *Bulletin* aims to support high-quality patient-centered healthcare.

QUESTIONS? COMMENTS? Contact us at bulletin@acr.org.
Digital edition and archives of past issues are available at ACR.ORG/BULLETIN.



Network as a Noun, a Verb, and a Strategy

The ACR Learning Network highlights the College's strengths in Quality and Safety improvement and informatics, its ability to advocate, and its track record in impacting economics to benefit our patients and our profession.

The ACR Learning Network for Improving Diagnosis of Cancer was launched in September of 2021 (find out more at bit.ly/ACR_Learning_Network). The Learning Network focused on performance improvement in diagnostic success in four targeted areas over a 36-month-period under a \$3.1 million grant from the Gordon and Betty Moore Foundation.

In creating performance metrics and strategies to improve patient outcomes across multiple sites, the Learning Network formed four collaboratives spanning lung cancer screening, mammography positioning, prostate MR image quality, and recommendations for follow-up.

Network as a Noun

The Learning Network (the noun) will serve as the vehicle to network (the verb) with diverse stakeholders in achieving the stated goals. The bench of stakeholders is deep, which comes as no surprise at a time during which coalition-building has served the ACR well. As a top priority, patient representatives will join the Network in advisory roles. We are starting with one patient representative on an advisory committee but may have more going forward. Their contributions are integrated with input from clinical referrers, medical physicists, RTs, practice managers, and radiologists of diverse genders, races, and ethnicities, who serve in different types of practice — urban, rural, academic, independent private, corporate, etc.

Network as a Verb

While the arena for external networking has unlimited seating, the success of networking depends on standing up and acting — taking the field, strategizing, confronting opposition, and working together to win.

Last year's updated guidelines on who should get CT

for lung cancer screening nearly doubled the eligible population for the scans, but that won't necessarily translate into scans being performed due to healthcare disparities, according to a study in *Cancer Medicine* (read more at bit.ly/Disparities_CancerMed). The change in guidelines was intended to expand screening eligibility to include more Black patients, but also increased eligibility across all racial and ethnic groups. The relative increase in patients eligible for lung cancer screening was 81.4% compared to the 2013 guidelines. There remain concerns “that despite increasing the number of Black individuals who are eligible for LCS, the 2021 USPSTF recommendation highlights ongoing socioeconomic disparities that need to be addressed to ensure equitable access.”¹

However, the barriers presented by education levels, socioeconomic status, employment, and insurance status may negatively affect access, impacting the guidelines' implementation. The Learning Network vehicle transports us to active networking across disciplines and professions — crossing racial, ethnic, and geographical boundaries, with a focus on quality outcomes.

Network as a Strategy

Going beyond the simple saying “strength in numbers,” the Learning Network is aligned with the mission, vision, and objectives of the ACR's new Strategic Plan (learn more at acr.org/strategic-plan). The Strategic Plan's early initiatives identify the ACR as a convener of conversations, an organization of opportunity, and a hub of AI and emerging technology assessment and advocacy. The Learning Network's operations are founded in Quality and Safety, and highlight the College's strength in informatics, its ability to advocate, and its track record in impacting economics to benefit our patients and our profession.

The physician leaders of each of the four collaboratives are working within and across diverse practice models with the shared purpose of improving population health management. Leveraging a predictable multiplier effect, the Learning Network will clearly advance the ACR's mission — amplifying “the voice of our members, empowering them to serve patients and society by advancing the practice and science of radiological care.” ^B

ENDNOTE

1. Maki KG, Talluri R, Toumazis I, Shete S, Volk RJ. Impact of U.S. Preventive Services Task Force lung cancer screening update on drivers of disparities in screening eligibility. *Cancer Medicine*. July 24, 2022.

Accelerating Uptake of Lung Cancer Screening

The ACR and the American Cancer Society National Lung Cancer Roundtable are presenting their third annual joint webinar series: “Lung Cancer Screening 201: Accelerating Uptake of Lung Cancer Screening.”

This new seven-part series, taking place now through Nov. 16, will focus on the challenges and opportunities unique to established screening programs, showcasing methods and metrics centers can use for acceleration uptake and adherence. The September session will focus on patient optimization while the October session will zero in on how to create screening opportunities. The series caps off in November with a session on practice policy related to lung cancer screening.

Register for the series at bit.ly/NLCRT.



Save the Date for 2023 ACR-RBMA Practice Leadership Forum



In the face of today's unpredictability, radiology leaders need to be ready to quickly adapt.

This means it's more important than ever for radiologists to come together, to learn from one another, and to share ideas and lessons learned that will help prepare them for 2023 and beyond.

The 2023 ACR-RBMA Practice Leadership Forum, taking place Jan. 13–15 in Orlando, Fla., will offer attendees sessions dealing with today's most pressing practice challenges, including dealing with “the great resignation” and engagement in the era of remote/hybrid work, a powerhouse faculty, and most importantly, the opportunity for radiology leaders to re-engage and network with their colleagues.

Learn more and register at acr.org/PracticeLeadersForum.



JACR® Sees Increase in Latest Impact Factor Ranking

The impact factor for the *JACR*® saw a 13% increase in the new *2021 Journal Citation Report*. The impact factor is calculated by dividing the number of a journal's articles cited in scientific journals by the total number of citable articles published in the prior two years. The *JACR*'s impact factor — having increased yearly for the last 10 years — increased from 5.532 to 6.240.

“The *JACR* continues to exceed expectations,” said Ruth C. Carlos, MD, MS, FACP, editor-in-chief of the *JACR*. “I am grateful to our team of authors, reviewers, and readers for their support.”

The *JACR* is the official journal of the ACR, providing information about topics that affect the practice of diagnostic radiologists, interventional radiologists, medical physicists, nuclear medicine physicians, and radiation oncologists.

For more information about the *JACR* and its ranking, contact Lyndsee Cordes, ACR's director of periodicals, at lcordes@acr.org.



New and Revised PP&TS

The ACR Council considered a total of 51 resolutions during ACR 2022. There were 34 Practice Parameters and Technical Standards (PP&TS) presented for adoption (32 revised and 2 new). Of these documents, two were referred to be revised and presented at ACR 2023.

These new and revised PP&TS will be available on the ACR website as soon as all final approvals have been received, with the target date of Sept. 1, 2022. The updated PP&TS will be effective on Oct. 1, 2022.

For more information on the field reviews and to comment, visit acr.org/PP-TS.

PP&TS: Field Review Comments Needed

Field reviews for the 2023 ACR Practice Parameters and Technical Standards (PP&TS) have begun. The ACR periodically reviews its PP&TS to help advance the science of radiology and improve patient care. Comments on the 2023 PP&TS will be collected during five field reviews: Aug. 15–Sept. 2; Sept. 6–23; Sept. 26–Oct. 14; Oct. 17–Nov. 4; and Nov. 7–Dec. 2.

Learn more and comment at bit.ly/Field_Review.

As radiologists, radiation oncologists, nuclear medicine physicians, medical physicists, fellows, residents, and medical students, we play a central role in patient care — and we have the opportunity to make a meaningful impact on quality and access to care.

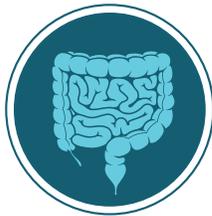
AMY K. PATEL, MD, CHAIR OF THE ACR RAN



Volunteers Needed for Member Testimonials

As a member-led, member-driven organization, you are the heart of the College. What do you love about your organization? What's your favorite benefit? We want to hear your voice.

We are filming professionally directed video testimonials. If you'd like to be featured on acr.org, social media, and print ads, please submit your name and information at bit.ly/membership-video-rsvp.



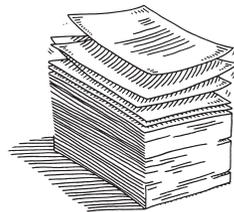
CMS Denies Request to Reconsider CTC Cancer Screening Coverage

In an announcement on June 29, the ACR revealed that the CMS denied the College its request to reconsider their National Coverage Determination involving coverage of CT colonography (CTC) exams to screen for colorectal cancer. The reasoning behind this is due to “insufficient” evidence that supports reconsideration of the non-coverage decision made back in May of 2009.

The ACR refuted this claim, stating, “The ACR and the patient advocacy groups contend ample clinical evidence was provided to support coverage of this valuable preventive screening service.” The evidence submitted by the ACR and other organizations included recommendations provided by the U.S. Preventive Services Task Force.

Read the full ACR statement at bit.ly/ACR_Statement.

NEWS FROM THE SBI



Call for Abstracts: 2023 SBI Breast Imaging Symposium

The Society of Breast Imaging (SBI) invites breast imagers to submit original abstracts for presentation at the 2023 SBI Breast Imaging Symposium, taking place May 4–7, 2023, at the Gaylord National Resort & Convention Center in National Harbor, Md. Abstracts presented at the symposium will give authors an opportunity to share their research with other experts in the field.

Submit your abstract by Friday, Oct. 14, 2022, at 11:59 p.m. ET. For instructions, visit bit.ly/SBI2023Abstracts.

JOURNAL OF BREAST IMAGING Seeks New Editor-in-Chief

The Society of Breast Imaging (SBI) is currently accepting applications for the next editor-in-chief (EIC) of the *Journal of Breast Imaging*, the official journal of the SBI. The deadline to apply is Wednesday, Sept. 7, 2022, at 8:00 p.m. ET.

The EIC will set the editorial direction and has final say for the selection and quality of all published content. In addition to being responsible for all publication decisions, the EIC will also structure and oversee the performance of the editorial board.

To learn more about responsibilities, qualifications, and requirements of the position, please visit bit.ly/JBI-Editor.



AMA Adds Radiologists to Board of Trustees

On June 14, the AMA announced the election of Alexander Ding, MD, MS, MBA, of Louisville, Ky., and Scott Ferguson, MD, of West Memphis, Ark., to its Board of Trustees by their peers.

Ferguson was re-elected to the Board and has a long history with the AMA and its Radiology Section Council. He previously served as a state delegate to the AMA from Arkansas. He also served for eight years as chair of the AMA Council on Legislation.

Ding formerly served with the U.S. Navy and was managing partner at California Advanced Imaging. He currently serves as a clinical assistant professor at the University of Louisville and physician executive-in-residence in the Office of the Chief Medical Officer at Humana.

Additionally, Kevin C. Reilly, MD, was reelected as chair of the AMA Council on Constitution & Bylaws. Sheila Rege, MD, was reelected as council member on the AMA Council on Medical Service.

Read more at bit.ly/AMA_Board.

Assess the Radiology Job Market

With member participation, the ACR will gather valuable insight on the current radiology job market through a survey. This data will be featured as a new member benefit in the ACR Career Center. Using an interactive data dashboard, members will be able to filter by subspecialty and location to view current trends in compensation, benefits, quality of life, job selection, and career fulfillment. The data validity increases with your participation — many participants are needed to anonymously provide feedback. Once published, the dashboard will provide regional data to assist with employment offers and negotiations, whether an employer or job seeker. The dashboard will be published to acr.org/CareerCenter later this year after your submissions are received.

Contribute your insight today at acr.org/RadiologyJobMarket.



The Radiology Health Equity Coalition continues to encourage the profession to not only recognize the myriad challenges but also to actively seek out the opportunities, big and small, that present themselves in our daily practice.

— BRENT J. WAGNER, MD, MBA, RADIOLOGY HEALTH EQUITY COALITION MOBILIZATION TEAM REPRESENTATIVE FOR THE ABR



NEWS FROM RLI



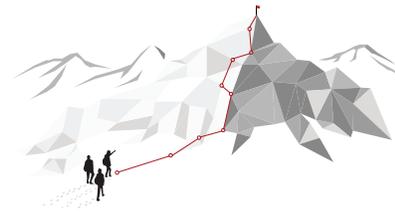
Land the Right Job with the RLI Kickstart Your Career Workshop

The virtual Kickstart Your Career workshop, offered by the Radiology Leadership Institute® (RLI), prepares residents for the transition from residency into practice. Through a self-paced, pre-recorded lecture, faculty share practical tips on how to successfully interview, review a job contract, and excel in a first job. Participants then practice skills in real-world scenarios with guidance from experts in radiology through an interactive live webinar.

“The talks were focused on equipping rising radiology professionals with the right tools to attack their dream positions. The breadth of the advice was incredible, and the impact it made on me was substantial,” says Olga Laur, MD, MHS, who participated in the workshop as a radiology resident at Brigham & Women’s Hospital.

Learn more and register at bit.ly/RLIWorkshop.

Additionally, those who attend may sign up for an exclusive one-year mentorship program for personalized guidance as they prepare to transition out of residency and into the workforce.



Embark on Your Leadership Journey at the 2022 RLI Summit

The Radiology Leadership Institute® (RLI) Summit is the only leadership training program that’s designed to give radiologists the essential business skills they need to succeed. At the RLI Summit, subject matter experts apply a radiology lens to the latest business models and tools to help attendees learn how to improve patient care and the practice of radiology. The sessions are created to give radiologists a deeper understanding of some of the biggest issues facing the specialty and offer insights and solutions to transform challenges into opportunities.

At the RLI Summit, taking place on Babson College’s campus in Wellesley, Mass., you’ll learn how to:

- Spark leader self-awareness
- Build collaborative teams
- Advance relational leadership
- Develop high-quality connections

Learn more and register at acr.org/RLISummit.



A Change in Advocacy for the AUC

The College believes now is an excellent opportunity to advocate for an Appropriate Use Criteria program of tomorrow.

“The greatest danger in times of turbulence is not the turbulence — it is to act with yesterday’s logic.”

— Peter Drucker

This quote rings true for government-backed reform and regulation attempting to effect change in the era of technological disruption. The slow and contentious nature of the political process uses yesterday’s logic in times of rapid change brought forward by technological innovation.

So goes the story for the long-anticipated Appropriate Use Criteria (AUC) for advanced imaging, supported by the imaging community and the ACR. In the ideal world, imaging studies would be most appropriate for the clinical scenario, and the indication for such a study would be provided to the radiologist. Unfortunately, in modern healthcare neither of these consistently occurs. A myriad reasons exist for these deficiencies; however, one major barrier is a lack of knowledge by the ordering clinician on which study is best. The College has successfully embarked on a multi-decade campaign to provide easily accessible AUC (known as the ACR Appropriateness Criteria®) to ordering clinicians. These criteria allow a clinician to access expert opinion electronically on the best imaging study cataloged by clinical scenarios. The results of this query include the most appropriate exam type, if any, based on how multi-specialty experts rate each advanced imaging modality’s appropriateness. When followed, these criteria have the potential to reduce unnecessary imaging, streamline care, reduce costs, and electronically capture the indication for an advanced imaging study — making it available to the interpreting radiologist.

Congress, CMS, and most of the clinical community also supported using these AUC to the extent that they became part of federal law in the Protecting Access to Medicare Act of 2014. The law and subsequent regulations are not perfect, and in fact now suffer from

technological disruption of yesterday’s logic. As the program currently stands, there is significant resistance to its implementation. The goal was to improve ordering exam appropriateness — obviating the need for other similar and arguably more arduous mechanisms, such as the radiology benefit manager’s prior authorization process. Unfortunately, the program is currently structured to require point-of-service recording of an appropriateness score for an advanced imaging study order. This adherence to obtaining a score would then be contemporaneously appended to every applicable CMS claim by the furnishing provider. The need to record and report a score for every claim submitted required an ordering clinician to interact with pop-up prompts from the AUC software for every advanced imaging study requested. This was an unwelcome disruption and frequent point of contention to the ordering-clinician community.

Technology, in the form of data registries, is beginning to define tomorrow’s path forward. Data registries have been used by CMS for outcome reporting in cardiac surgery since the early 1990s. Registry reporting exponentially grew under the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA), which allowed most of medicine to report quality measures to CMS for the purpose of value-based payments. Registries allow for behind-the-scenes point-of-service data capture, data aggregation, performance benchmarking, and external reporting at intervals longer than a single event — making them ideal for data aggregation and individual trend tracking without the disruption of pop-ups inherent in the current design. They also serve as an educational tool, providing timely feedback to a referring clinician on performance for a specific topic set at intervals deemed acceptable by the using clinician. Most of the current software used to provide appropriateness feedback on an advanced imaging study can collect data in a registry format and can disable the point-of-service feedback (if requested). The College believes using these types of registries is a better path forward for the AUC program. Registries and retrospective feedback reports satisfy the College’s intent to foster learning opportunities for the ordering providers and improve overall imaging appropriateness — while still obviating the need for pre-certification. Operationally, using retrospective review would remove the furnishing provider from the liability of appending a CMS claim, with the adherence of the ordering provider consulting the AUC. With the July announcement that CMS will be delaying the penalty phase of the current AUC program “until further notice” beyond Jan. 1, 2023, the College believes this is an excellent opportunity to explore advocating for an AUC program of tomorrow, made possible by evolving technology. We just need Congress to listen. **B**

INCIDENTAL FINDINGS

ACR measures are helping to close the recommendations follow-up loop on actionable incidental findings.



“When radiologists make follow-up recommendations and somehow communication about these recommendations falls through the cracks and the follow-up does not happen — it is rightfully most concerning,” says Nadja Kadom, MD, director of pediatric neuroradiology at Emory University and at Children’s Healthcare of Atlanta.

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“We now need practices to use the measures for specification refinement. We strongly encourage radiology practices interested in using the measures to participate as an early adopter to contact us.”

Samantha Shugarman



“The measure set we developed can serve as a framework for setting up an effective tracking program to ensure the closure of this follow-up loop.”

Nadja Kadom, MD

“For example, if there’s a small lung nodule that we pick up incidentally on a study, we might recommend follow-up,” Kadom says. “If the follow-up is not done, the lesion may grow. Now instead of an early-stage cancer, we may discover a cancer at a later stage. This, of course, may change how well we can treat the cancer and patient outcomes may be much worse.”

An Eye on Recommendations

In 2019, the ACR was awarded a grant from the Gordon and Betty Moore Foundation under its Diagnostic Excellence Initiative. The grant funded the development of a clinical quality measure set to increase the number of patients who appropriately receive radiologist-recommended follow-up care for actionable incidental findings (AIFs). A 12-member technical-expert panel representing a wide range of stakeholders contributed many hours of reflection, deliberation, and input to develop the quality measures to improve patient care and outcomes.

A recent paper published in the *JACR*[®] focuses on how care gaps occur when radiology follow-up recommendations are poorly communicated or not completed — resulting in a missed or delayed diagnosis that can potentially lead to worse patient outcomes.¹ The key takeaway here is that there needs to be a process in place, says Kadom, lead author of the paper. “This won’t happen on its own,” she notes. “Somebody has to keep an eye on these recommendations and make sure they are addressed.”

FOLLOW-UP MEASURES

To bridge this gap, a suite of nine measures were developed — three of which are designed as use cases focused on closing the follow-up loop on non-emergent AIFs to include addressing pulmonary nodule AIFs, abdominal aortic aneurysm, and a general measure for closing the loop on any AIF. The other six measures address communication, recommendation specificity and appropriateness, and AIF tracking systems ([learn more at bit.ly/Closing_the_Loop](https://bit.ly/Closing_the_Loop)).

“This ACR measure set identifies specific components of an AIF tracking program that are likely to lead to success in increasing patients receiving recommended follow-up,” says Judy Burleson, MHSA, vice president of quality management programs for ACR. “The measure set encourages monitoring of recommendation follow-up completion, implementation of tracking systems to support the completion, effective communication practices to referring physicians and patients, and outcome data collection.”

Some measures in their current form may seem cumbersome — such as the inclusion in the radiology report of an evidence-based source for the recommendation — but the technical expert panel agreed such measures are important to enable best practices, says Burleson. “Next steps will focus on increasing awareness in the radiology community about the importance of the measure set for patients and practices,” she says.

Measures for Prime Time

Initial measure testing was a critical next step prior to deployment for use in routine quality improvement work. A handful of forward-thinking radiology practices participated in the recently completed proof-of-concept testing for the Closing the Recommendations Follow-Up Loop measure set. The next phase in measure refinement is for early adopters to begin using measures and submitting data to the ACR quality registry. Active recruitment for approximately 20 early-adopter practices (with at least five radiologists) is underway. The early-adopter sites will be awarded a nominal financial incentive (on a first-come, first-served basis), and ACR staff will engage participants in an educational web

meeting to learn about the data collection process, feasibility, and, importantly, the validity for measuring the quality of patient care. Practices that sign on as early measure adopters will receive ACR staff support regarding data collection or submission issues. Training for the first group of early-adopter practices will occur in the early fall; however, practices can sign up on a rolling basis.

Based upon the results and experiences of the early adopters, the measures may be revised before they are rolled out for use more broadly (for example, for instituting a tracking program and use in local improvement efforts).

“We now need practices to use the measures for specification refinement,” says Samantha Shugarman, director of quality programs for the ACR. “We strongly encourage radiology practices interested in using the measures to participate as an early adopter to contact us (see sidebar on page 12). Specifically, this next phase will inform us about whether the measures must be revised to better integrate into the clinical workflow. We want to confirm the measure’s scalability, and in the end, we want the larger radiology community to use these measures so that patients receive needed follow-up care.”

Measure Set Takeaways

“There are a few messages I would like to get out there about the methods for measuring success in Closing the Recommendations Follow-Up Loop — the measures serve as a toolkit for measuring the success of individual steps in the process so that the processes can be improved,” says David J. Seidenwurm, MD, FACR, neuroradiologist at Sutter Medical Group, *JACR* paper coauthor, and chair of the measure technical expert panel. “The next point is that we hope these measures will help, obviously, to improve follow-up of incidental findings — providing a framework for engaging with hospital and practice administration to develop the resources and to actually make improvements. An additional goal would be to facilitate data gathering to determine the benefits and potential harms of incidental findings follow-up so that we can provide tools for refining the recommendations themselves.”

Control and Technology

“This is a big leap forward for radiologists to do their part in closing a complex loop of follow-up recommendations of incidental findings — specifically the reporting and being part of the process to ensure the patient receives recommended follow-up care. That’s in our control,” says Gregory N. Nicola, MD, FACR, chair of ACR’s Commission on Economics. “The name of the game is ensuring patients get appropriate follow-up in time so that the outcome is better for the patient.”

When paired with ongoing developments and improvements in health information technology, these measures may efficiently and effectively improve patient outcomes and provide additional evidence for the appropriate management of incidental findings, Nicola says.

Pride and Precision

“Why did we get involved in this initiative and decide to test the measures? We thought it was an important quality-improvement effort for the community,” says Richard J. Friedland, MD, FACR, president of Hudson Valley Radiologists, PC. His group has been an alpha tester and big proponent of the measures.

“We practice in relative isolation — an hour and a half from New York City and an hour and a half from Albany,” says Friedland. “Our medical center is the largest hospital in the area between those two points.”

“We get a lot of feedback from our patients,” Friedland says. “Even though



"The measures serve as a toolkit for measuring the success of individual steps in the process so that the processes can be improved."

David J. Seidenwurm, MD, FACR

TRACKING ACTIONABLE INCIDENTAL FINDINGS

To improve patient outcomes, radiologists at the University of Kansas Health System have implemented a system-wide initiative to track incidental findings. The system uses keyword searches that nurse navigators then use to close care gaps and coordinate timely follow-up care. The program has helped 70 patients avoid missed cancer diagnoses over a three-year period. Radiologists are encouraging other health systems to implement similar programs to increase their effect on patient outcomes.

Read the Imaging 3.0® case study at bit.ly/TrackingFindings. You can also follow these steps to develop an actionable incidental findings tracking program, and tell us how you did on Twitter with the hashtag [#Imaging3](https://twitter.com/Imaging3):

- ▶ Petition health system administration for staffing and technology resources to implement a tracking program.
- ▶ Communicate program methodologies to radiologists regarding follow-up recommendations and dictation requirements.
- ▶ Engage primary care and referring physicians to optimize communications about patient follow-up and the completion of exams.



“When we started to look at the problem, we figured out that this was an important role for radiologists.”

Richard J. Friedland, MD, FACR

CLOSING THE RECOMMENDATIONS FOLLOW-UP LOOP ON AIFS

The College is currently recruiting more practices to participate in measure testing and encourages members to access the resources below to learn more. Moving forward, the College will seek input on continuously updated versions of the measure set to enhance its feasibility in practice and its use as a quality-improvement tool.

- ▶ For questions beyond the scope of the JACR® paper, email measure.development@acr.org.
- ▶ Visit the College's Incidental Findings page at bit.ly/ACRIncidentalFindings
- ▶ Learn more about how the measures are being developed and tested at bit.ly/Closing_the_Loop.
- ▶ Sign up to test the measures at bit.ly/Measure_Test.

we are radiologists, we know the community. A patient came into the ER, for instance, due to an obstructing kidney stone — but a pulmonary nodule was also mentioned in the report. Four years later, they returned with a pulmonary mass. You see their cancer. You go back to the original exam and look at the images and there it was, mentioned in the original report and you realize how horrible the situation has become.”

“Having that kind of feedback and seeing a chronic repetitious lack of follow-up on incidental findings was enough to make us realize that something has got to be done,” Friedland says. “When we started to look at the problem, we figured out that this was an important role for radiologists.”

“In many ways it took us down the proverbial radiologic rabbit hole,” Friedland says. “We even began to scrutinize our own reports and developed a report card for our radiologists based on level of adherence to guidelines. I thought that when we put that in place, it would be quite unpopular,” Friedland recalls. “Just the opposite. Nobody wanted to be the only doctor in the group that did not follow the guidelines.”

Process in Place

“I hope that people will realize that this is a problem worth addressing,” Kadom says. “The measure set we developed can serve as a framework for setting up an effective tracking program to ensure the closure of this follow-up loop.”

Kadom adds, “Often when we send reports to the person who ordered the study, she or he may not be the primary care physician (PCP), which means whoever gets the study back may not be equipped to follow up on incidental findings. This is particularly true for patients in the emergency department, but also for outpatients who are referred for imaging by a sub-specialist rather than directly by their PCP.”

There are various system gaps, Kadom says. “We need to define those gaps and intervene. For instance, healthcare inequity is a concerning barrier to closing the loop. Not all patients can access their reports electronically, for example, or understand the findings and implications. So those patients are uninformed,” she says. “I’ve also seen firsthand in my work at safety-net hospitals that many patients don’t have PCPs. For example, if a patient is homeless and doesn’t have a PCP, how would they know about an incidental finding that needed follow-up?” Other inequities we know about relate to where the patient lives, their insurance status, literacy level, race, age and many more.

“The concept of where the patient gets lost for follow-up is much more complex than a radiologist not putting a finding in a report,” Nicola says. “Sometimes a radiologist can put it in the report, but the note is not clear. And sometimes a radiologist can put it in the report, and it is clear, but the PCP chooses not to followup on it — or misses it. Then there are the times that a patient just chooses not to follow up.”

“Still, someone has to take ownership,” Kadom says. “I believe radiologists can take that ownership. When we discover a cancer at a late stage, it may not be survivable. Treatment becomes more difficult, and outcomes are worse. Picking up on incidental findings means an early-stage cancer may be cured — or have a high percentage of long-term survival. There is a process now that can make this happen.” **B**

By Chad Hudnall, senior writer, ACR Press

ENDNOTE

1. Kadom N, Venkatesh AK, Shugarman SA, Burleson JH, Moore CL, Seidenwurm D. Novel quality measure set: Closing the completion loop on radiology follow-up recommendations for noncritical actionable incidental findings. *J Am Coll Radiol*. 2022 Jul;19(7):881–890.

Radiology Training for the Non-Radiologist Physician

As radiologists demystify the reading room, more medical students will gain a bird's-eye view of how the field may help them care for their patients in the most effective way possible.

The foundation on which resident physicians build their clinical acumen is their medical school education. Whether it is grasping the mechanisms behind varying pathologies or understanding the complexities of anatomy and physiology, the knowledge a medical student acquires during medical school is the springboard from which budding physicians launch. The combination of the pre-clinical and clinical years of medical school empowers students to decide which specialty is best suited for them, while simultaneously gaining an understanding of what other fields of medicine can offer toward patient care. Through completing the core clerkships, the aspiring pediatrician learns to appreciate the surgical consultation, and the evolving internist begins to understand when to consult an infectious disease expert. Understanding the larger clinical ecosystem that you are part of as a physician is a byproduct of rotating through a diverse set of specialties in medical school.

When it comes to radiology, though, there is sparse exposure for medical students during the pre-clinical years and most will not rotate through the reading room during their clerkships. The disadvantage of this pedagogical approach is that the reading room remains a black box for most interns.

Building Trust

Providing care as a siloed domain practitioner may be a symptom of the larger educational and healthcare ecosystem, as opposed to a personal preference, and can have direct implications on patient care. Trust is built with colleagues through shared experiences — the surgeon and hospitalist working together to devise a strategy that specifically serves the needs of their shared patients instead of working alone. Over time, trust is gained, a camaraderie is built, and patient care is maximized. When a non-radiologist understands the effect of imaging on patient care, they are more likely to work side by side with a radiologist throughout their careers. The field of radiology can shift from the unknown of the reading room to a counseling partner directly impacting patient outcomes.

Cost Containment

A formidable obstacle to controlling healthcare spending in the United States is the cost of imaging embedded throughout the system. As a whole, 10% of healthcare spending is attributed to diagnostic imaging services. Although it consists of only one

dimension of a patient's hospital charges, it certainly impacts total healthcare expenditures. When radiologists are invited to work intimately with other specialists, it is more likely that the most appropriate imaging tests will be ordered. Open lines of communication, consultation, and trust between the reading room and other specialties may help limit inefficiencies and improve downstream patient care. Building a foundation during medical school on the importance and capabilities of radiologists plants the seed for accelerated communication and collaboration between our field and other specialties, which will help reduce patient costs in the long term.

Patient Outcomes

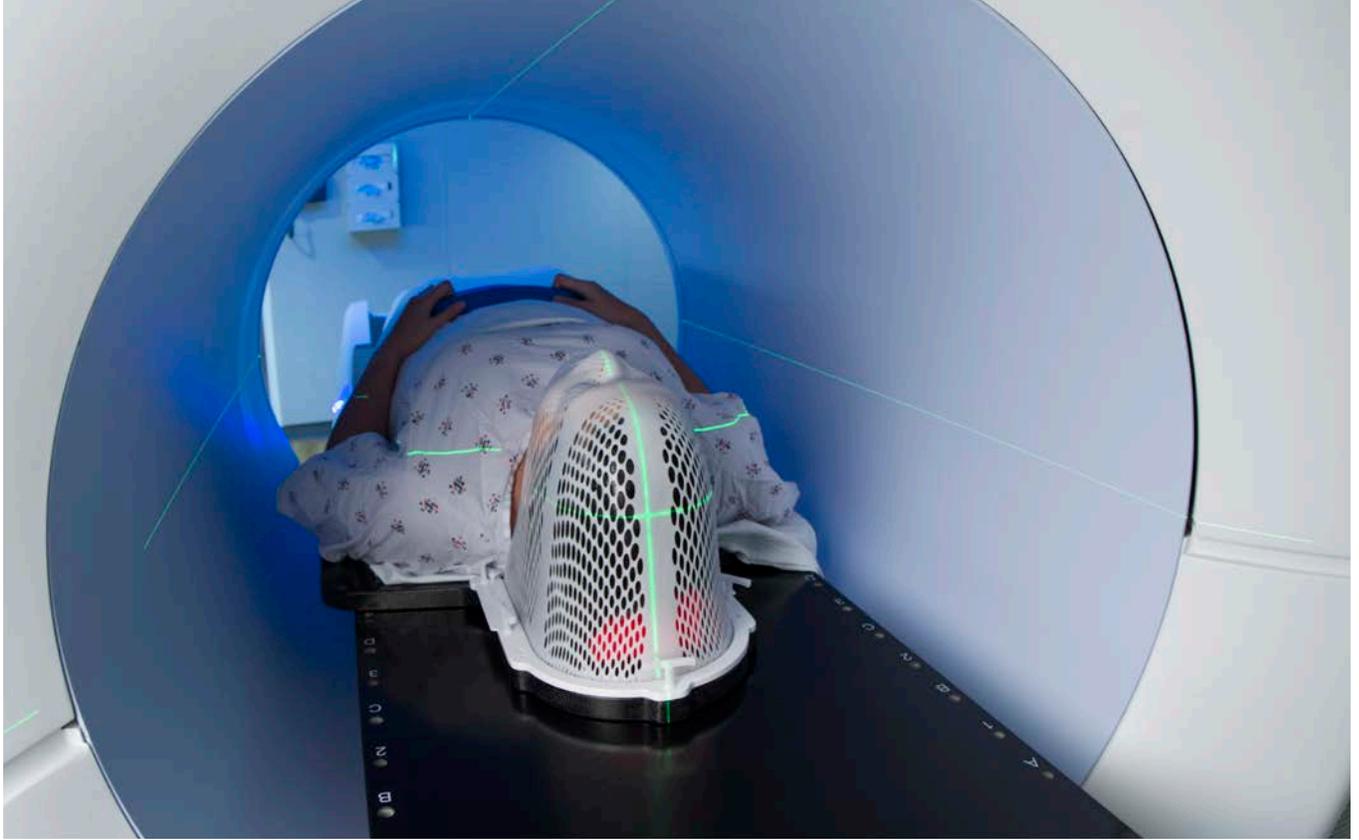
Improving patient outcomes, which is intimately tied to cost management, is perhaps the most important goal in all of medicine. As a community, we strive to focus on research and innovation in order to improve the lives of our patients. Affording patients with the right care at the right time hinges on offering an accurate diagnosis in a timely manner that is well communicated to the entire healthcare team. Introducing more advanced imaging techniques to guide therapies and help formulate appropriate clinical decisions is crucial to excellent medical care.

The advantage of involving the reading room in acute patient care is highlighted by current innovations in the field of treating strokes and pulmonary embolisms. The technology sector has developed mobile software applications for interdisciplinary teams to easily assess patients with a pulmonary embolism (PE) or stroke. For instance, a PE Response Team can readily view CT angiograms of patients suspected for PE, while also analyzing the patient's labs, vitals, right ventricle/left ventricle ratio, and clinical history.^{1,2} The ED physician or interventional cardiologist can then review the images with the radiologist and communicate their clinical suggestions directly on the platform. These innovations have led to increased advanced interventions for patients with PE or stroke as well as shorter inpatient lengths of stay, decreased morbidity, and decreased medical costs. At the heart of these programs are radiologists offering immediate assistance as to the interpretation of the relevant imaging.

The future radiologist will be exposed to almost every other specialty throughout medical school and their intern year, providing them with a general overview of the goals, procedures, and capabilities of their counterparts. It is our hope that as we begin to demystify the reading room, more medical students, particularly those not entering the field of radiology, gain a bird's-eye view of how our field may help them care for their patients in the most effective way possible. **B**

Ayden Jacob, MSc, is a member of the ACR Medical Student Subcommittee Health Innovation & Technology Team. Jacob would like to acknowledge the contributions of Gregg Khodorov, MD, MBA, Varun Danda, BS, and Ronak Ahir, BS, in the development of this column.

ENDNOTES available in the digital edition at acr.org/bulletin.



Better Care for Head and Neck Cancer Patients

The chair of the ACR NI-RADS™ Committee discusses the importance of standardizing imaging surveillance and reporting and how radiologists can improve care for head and neck cancer patients.

Neck masses, especially in the setting of previous treatment for head and neck cancer, can be very complex to interpret. In the past, there has been no standardization of optimal upfront imaging, surveillance algorithms, or management recommendations. In response, the ACR formed a committee with two goals:

1. Produce a lexicon to describe neck masses on CT, PET, and MRI.
2. Based on this lexicon, develop a standardized risk stratification system to inform practitioners about which neck masses warrant biopsy.

The result was the ACR Neck Imaging Reporting & Data System (NI-RADS™), which is aimed at improvement in these

aspects. The *Bulletin* spoke with Amy F. Juliano, MD, chair of the ACR NI-RADS Committee and a head and neck radiologist in the department of radiology at Massachusetts Eye and Ear/Harvard Medical School, to learn more about the importance of standardizing imaging surveillance and reporting and how radiologists can use the ACR NI-RADS to improve care for head and neck cancer patients.

Neck masses, especially in the setting of previous treatment for head and neck cancer, can be very complex to interpret. Can you give us some context for the challenges and what led to the development of NI-RADS?

Imaging surveillance after treatment for head and neck cancer is challenging because of the complexity and varied types of resection and reconstruction surgeries, in addition to post-treatment changes from radiation and chemotherapy. Tumors can be at various anatomic sites, each associated with different risk factors, staged differently, and carrying different prognostic and treatment implications. Post-treatment surveillance head and neck imaging studies are even harder to interpret. The picture is often complicated further given the distorted post-treatment appearance, varying surgical techniques and types of flaps that can be used — and with radiation and chemotherapy often complicating the picture further.

For those unfamiliar with head and neck imaging — and even for those who are — reporting on these scans can be challenging and time-consuming. What's more, the reporting can vary widely — whether in terms of the language used, impression rendered (e.g., Is there recurrence or not? What is the degree of suspicion?), and management recommended. All of this can complicate the overall clarity of the report, which ultimately determines user friendliness to the patient, referring clinicians, and other radiologists interpreting subsequent surveillance scans.

What is NI-RADS and why is it an indispensable part of quality and safety?

NI-RADS offers a widely applicable, understandable, and validated template for the management of neck masses on the basis of CT, PET, and MRI features. The end goal is to increase the quality and utility of our radiology reports, increase consistency, decrease inter-observer report variability, and provide discrete imaging conclusions that are clinically useful, consistent, and actionable.

The NI-RADS template guides standardized reporting on the basis of this lexicon with defined levels of suspicion and management recommendations. It also helps radiologists provide guidance regarding the management of patients after treatment for head and neck cancer.

What are the benefits of using NI-RADS for reporting head and neck cancer?

NI-RADS helps radiologists differentiate benign from malignant findings, offers an algorithm to stratify risk, and enables clear and concise communication to referring clinicians to better guide clinical management (e.g., routine surveillance vs. short-term follow-up vs. biopsy). The template is simple, clear, and easy to adopt clinically for everyday use.

Among those who have implemented NI-RADS, the feedback has been great. The post-treatment neck is often a source of anxiety for diagnostic radiologists. Radiologists and trainees using NI-RADS often find that reading these scans is much less intimidating. At a most basic level, the NI-RADS template provides structure for our thought processes, tells us what we should be looking for and how to decide whether what we see is concerning or not, and helps put thoughts into words on our reports when it comes time to dictate.

Beyond that, a standardized template also produces reports that facilitate future data mining, which can be used for research and refinement in diagnostic accuracy. This enables retrospective data mining and utilization of AI. We can go back and look at old reports and, armed with any available histologic correlation or knowledge of long-term outcome, we can gauge accuracy of our imaging interpretation, pinpoint where and how discrepancies occur, and make improvements to provide better patient care.

What is the radiologist's role in enhancing care for head and neck cancer patients?

We can offer guidance for the best imaging modality to address pertinent clinical questions, produce accurate and consistent interpretation, and perform image-guided biopsies. Radiologists play an integral role in reading room consults, tumor boards and interdisciplinary clinics/conferences. Some organizations even embed radiologists directly within the head and neck surgery clinic area, where radiologists have live interactions and discussions with the surgeons and oncologists — and at times, patients — during the clinic visit/imaging episode.

During these interactions, the conversation is clearer and more concise when the NI-RADS template and mindset is used. Everyone can more easily get on the same page when using consistent language, and there can be a more organized and quantum assessment of suspicion for tumor recurrence. The report template leads to two discrete numbers that assign risk/level of suspicion for tumor recurrence for the primary site and neck/nodes. The NI-RADS numbers link to management guidelines, so it is clear to clinicians what our recommendations are based on imaging findings.



Amy F. Juliano, MD

At a most basic level, the NI-RADS template provides structure for our thought processes, tells us what we should be looking for and how to decide whether what we see is concerning or not, and helps put thoughts into words on our reports when it comes time to dictate.

What's next for NI-RADS and what excites you about the future?

I'm excited about the new NI-RADS table for MRI. It just got rolled out and not too many people know about it yet. We're also looking into conducting research to answer critical questions like these:

- Do radiologists agree with each other in interpretation using NI-RADS?
- Do the assigned NI-RADS category numbers match the findings descriptors we use?
- How can we add AI to the mix to assess accuracy and improve?
- How can practices can get started with NI-RADS?

Visit the NI-RADS page on the ACR website at bit.ly/ACR_NIRADS where you can find easy-to-use templates as well as training modules and webinars. Watch for NI-RADS lectures and workshops at various society meetings. We are always looking for more people from various practice settings, areas of expertise, and geographical locations to get involved. The more perspectives and ideas we have, the better we can improve what we already have — and be inspired about future directions that can best serve our patients and clinical colleagues. **B**

Interview by Linda Sowers, freelance writer, ACR Press

Introducing Medical Students to Appropriateness Criteria



A medical school offers an online self-directed ACR Appropriateness Criteria® course to connect students with a valuable imaging resource.

When COVID-19 sent the nation into lockdown, Tyler Pease was completing his third year at Rutgers Robert Wood Johnson Medical School (RWJMS). As universities across the country pivoted to online learning, it soon became clear that regular clinical rotations — during which medical students often receive the greatest exposure to radiology — would be unavailable to most medical students. “My peers and I were wondering what was going to happen with our education,” Pease says. “We weren’t sure how we would complete our clinical requirements.”

In March of 2020, Judith K. Amorosa, MD, FACR, vice chair for faculty development and academic affairs at RWJMS and radiologist partner with University Radiology, received an urgent email from the dean’s office requesting ideas to address the necessary changes in educational instruction. After thinking about how radiology could rise to the challenge, she conceived a proposal to virtually introduce medical students to radiology and appropriate imaging -ordering practices.

Drawing from her experience developing a hybrid class for students who were interested in radiology but unable to attend lectures, Amorosa created a self-directed radiology course to educate medical students about the ACR Appropriateness Criteria® (AC). ACR developed the AC to help referring physicians make appropriate image ordering decisions. This elective has allowed students to focus on the AC most relevant to their own subspecialty interests and receive credit for clinical hours during the pandemic.

Addressing a Need

The idea for the elective grew from a previous program that predated COVID-19. “I received many calls from medical students asking me about radiology,” says Amorosa. “Many medical students couldn’t take the courses we offered because their schedules were too demanding. Instead, they would send scribes to take notes on lectures so that they could learn the material on their own. This gave me the idea to create a hybrid course that encouraged independent and self-directed learning.”

The original program, named Radiology on the Interview Trail, combined clinical experience with online instruction to educate busy medical students about imaging methodologies and basic radiology procedures. “It worked well because students were able to take advantage of radiology resources while also navigating specialty interviews and other demands on their time,” Amorosa says.

When the dean’s message went out about ways to pivot to virtual learning, Amorosa saw this existing virtual program as an opportunity to expand on an already successful course model. She immediately knew she wanted to incorporate the AC to help expand its use. She also added the AC project to Radiology on the Interview Trail, exposing more than 80 additional students to the AC guidelines.

“I realized shortly after starting my first job as a radiologist that referring doctors often do not know which imaging modality is best for a clinical condition,” Amorosa says. “I still feel from my daily experience with many practitioners that they are not using the AC as much as they should, so when the call came to do something to teach medical students — our future practitioners — online, the AC came to mind.”

Leveraging the Guidelines

As Amorosa recognized, even though the ACR introduced the AC in 1993 to help minimize inappropriate image ordering, many ordering providers still do not rely on or even know about the resource. In 2009, she was part of a team that led a study to determine how often physicians use the AC. Of the 126 physicians surveyed, only three reported using the AC when ordering image studies.¹

Amorosa, who has served on panels to develop the chest thoracic AC, has seen firsthand how much time, effort, and care go into developing the guidelines. She knows how valuable this resource could be for medical students and the radiologists who work with them.

Developing the Course

In March of 2020, Amorosa presented the proposed elective to the curriculum committee, which is chaired by Meigra M. Chin, MD, associate professor and assistant program director of emergency medicine at RWJMS. After several conversations about the course structure and how its objectives would provide effective substitutes for clinical hours, the committee approved it for the 2020 spring and summer terms.

“It was clear that students were going to need opportunities to progress in their education in this time without patient contact,” Chin says. “The committee was completely supportive of Dr. Amorosa’s elective course because we all recognize that radiology is an area in which students do not always receive guided and specific education.”

In less than a week, 20 students enrolled in the new Remote Radiology elective for April and May 2020. “It was a desperate time,” says Amorosa, “but there was great enthusiasm for the course, and I was encouraged to move forward.”

Implementing the Course

Amorosa partnered with Jasmine Allen, radiology course coordinator at RWJMS who coordinates the residency and medical student rotation program, to organize the course and maintain its content. Allen also helped roll out the course through the school’s learning management system and track student success throughout the course.

During the course, students worked directly with Amorosa to learn about the AC. She asked students to develop presentations around the AC topics that aligned with their specialty areas. For Pease, this meant studying the AC that corresponded with orthopedics.

After a virtual kickoff meeting to introduce the course, Amorosa met with students individually through email, phone, and video conferencing to help them find appropriate resources and develop their presentations. She asked students to produce three presentations per week, but this number varied based on individual student needs and topics. For instance, Pease ultimately completed four presentations on the acutely limping child, scoliosis child, back pain child, and developmental dysplasia of the hip.

Students were required to include in-depth clinical and lab data along with appropriate imaging in their presentations. The research forced the students to become immersed in the AC for true learning, Amorosa notes. “Recognizing the students’ interests and future plans is key,” she adds. “Aligning AC guideline topics with their future careers brings them closer to this resource at their fingertips.”

To meet the course requirements, Pease knew that he would need a better understanding of MRI visualization techniques for his first presentation, which focused on the acutely limping child. “I sought out a number of lectures on YouTube about the physics of MRI,” he explains. “I wanted to understand MRI on a fundamental level. This opportunity to engage more with these techniques enhanced my understanding of what MRI is and how it works. I hadn’t been taught that in any of my pre-clinical experiences.”

Presenting the Research

For each presentation, students delivered scripts and decks of 30-45 slides. No formal reports were required, but some students choose to present their materials to Amorosa and a consulting specialist, as well as their peers. Currently, the radiology department is in the process of uploading the learning materials they created to the department’s website.

Pease presented his final research as case studies. For example, in his presentation, he introduced a hypothetical four-year-old whose parents were concerned about him limping and favoring his right foot. Pease also developed additional context that the

child had spent the morning with his maternal aunt, who is the mother of two similarly aged children. This helped Pease explore multiple possible reasons for the limp.

Pease discussed potential diagnoses for limping children based on different possible sub-scenarios, such as whether the child could identify the pain source. Using the AC for the acutely limping child, he discussed the advantages and disadvantages to different imaging techniques, such as MRI, ultrasound, and three-phase bone scan.

He also reviewed other important considerations for image ordering, such as radiation exposure, patient immobilization, and sedation, as well as parent and patient preparedness, and age-appropriate imaging selection. His presentation included appropriate images and citations for each option.

“Recognizing the students’ interests and future plans is key aligning AC guideline topics with their future careers brings them closer to this resource at their fingertips.”

JUDITH K. AMOROSA, MD, FACR

Soliciting Student Feedback

Throughout the process, Amorosa encouraged her students to keep process and research journals. She asked the students to provide feedback to help improve the curriculum in the future.

Of the 20 students who participated in the Remote Radiology course and the students who evaluated their project experience with the AC in Radiology on the Interview Trail, 90% said they learned and found the experience “very useful/useful” for their future career.

In the survey, another Remote Radiology student noted, “By creating the topic slides, I had to dive into the material. The process of creating the cases myself allowed me to deeply engage with the material and review a variety of different pathophysiologies. I found the process educational and learned valuable information that will greatly benefit me in clinical practice.”

Looking Ahead

Based on positive feedback like this, the curriculum has been regularly offered as an elective since April of 2020.

“I would like to see some portion of this particular elective become a requirement for the fourth-year experience,” Chin says. “I think the AC is something medical students need to be educated about. Helping them determine the best and safest study for patients is something they should be prepared to do, and this course can help position them to make rational decisions when necessary.” **B**

By Chelsea Krieg, freelance writer, ACR Press

ENDNOTE

1. Bautista AB, Burgos A, Nickel BJ, et al. Do clinicians use the American College of Radiology Appropriateness Criteria in the management of their patients? *AM J Roentgenol.* 2009; 192(6): 1581–1585.

Educating on Equity

A new Radiology-TEACHES™ module aims to educate medical students about existing healthcare disparities and how to address them.

When Marta N. Flory, MD, a clinical assistant professor of radiology at Stanford University, recognized the scope of racial inequities in healthcare, she realized that she needed to start from the ground up to address the problem. To support physicians in interacting with patients from diverse backgrounds, Flory, along with contributors Heike E. Daldrup-Link, MD, PhD, and Iris C. Gibbs, MD, FACR, created a new education module, “Life in Black and White: Race in Radiology, Healthcare, and Health Outcomes,” as part of the Radiology-TEACHES™ health equity series. Radiology-TEACHES is an online portal that uses case vignettes integrated with the ACR Select® clinical decision support to simulate the process of ordering imaging studies. Flory spoke to the *Bulletin* about how the module came to be and why health equity must be a core focus of radiology practices.

How did the module come about?

The wave of racial violence and strife in our society during 2020, in conjunction with the COVID-19 pandemic, ignited a lot of distress for people. I felt an urgent need to connect with colleagues about these important issues of systemic racism and health inequity, and that it was time to have such conversations on a professional level. Radiology-TEACHES offered me the opportunity to expand this

RADIOLOGY™ TEACHES

Learning About Health Equity

You can access “Life in Black and White: Race in Radiology, Healthcare, and Health Outcomes,” at bit.ly/RadTeaches_Equity.

Other modules in the Radiology-TEACHES health equity series include:

- ▶ Health Equity Considerations Through the Lens of Lung Cancer Screening
- ▶ Breast Cancer Screening and Breast Pathology in Transgender Patients
- ▶ Stereotyping Fosters Health Disparities
- ▶ Breast Cancer Risk Assessment – An opportunity to address racial disparity in breast cancer
- ▶ Social Determinants in Abdominal Trauma Cases

conversation on a national level through an educational module, where participants could go through the course and engage with the material at their own pace. Since I believe this material is enriched through conversations with peers and colleagues, I created a small-group facilitator guide to go along with the module to facilitate discussion and engagement in an intimate format. From my perspective, the module is the beginning of an ongoing conversation and process of examination of racial inequity in healthcare systems. The goal is to make thinking about and addressing health equity a habit, not a box that you check off your list of things to study or do. I would love to see health-equity education integrated into all radiology training programs.



Marta N. Flory, MD

I think the module gives people the language that they need to understand the conversations around healthcare disparities — hopefully in an engaging way.

How did you decide on the module's topics?

Before diving into the very complex challenges of healthcare inequity and systemic racism, I first thought it was important to examine some basic assumptions about self and privilege and establish a common understanding and language that students can use as they move through the module. We start with “Identity and Privilege,” considering what makes us who we are and influences how we act as individuals, and move to “Microaggressions and Tone Policing,” as these concepts are the most microscopic, things that we control in our everyday interactions as individuals. When we understand our own privilege and systemic racism as a concept, then we can think about how it plays into our interactions with people in general, including our patients and colleagues. Then we zoom out to view equity on a more macro scale. We look at racism in healthcare, with the section on “Health Outcome Disparities,” and learn about what we can do about these problems. Finally, we learn how to address these problems through “Allyship” and co-collaboration.

How does the module support the ACR's efforts around healthcare disparities?

I think the module gives people the language that they need to understand the conversations around healthcare disparities — hopefully in an engaging way. This module shows students how healthcare disparities exist in our everyday lives. Inequity is not something that's external or outside of us, but a part of our reality. It has probably come into play in our experiences and medical training.

continued on page 22

An Essential Roadmap for AI in Radiology



The 2022 Data Science Summit delved into the complex relationship between AI expectations and strategies for successful AI implementation.

At the first in-person ACR Data Science Summit since 2019, Paul J. Chang, MD, professor and vice chair of radiology informatics at the University of Chicago Hospital, delivered a keynote that provided an essential roadmap for the current state of AI in radiology and where it's headed.

Chang suggested radiomics, using AI algorithms to extract features from images that would be invisible to the naked eye, as the tool radiology needs to improve the quality of our output — to be more contributory, to be more collaborative, and to go beyond the message-in-a-bottle-style reports to provide more relevant, actionable information to referring providers. In his keynote, he said that by implementing a system supporting radiomics, what he referred to as a human-machine collaborative model, we could not only improve efficiency, but also report quality.

The Gartner Hype Cycle

Capitated shared risk models demand that radiologists do more with fewer resources. That demand has created an impetus for new technology to increase productivity and efficiency. The Gartner Hype Cycle explains how technology evolves over time. A “technology trigger” causes a rapid increase in technology visibility, ultimately reaching a “peak of inflated expectations,” then declining in visibility to the “trough of disillusionment,” followed by increasing at a more moderate rate on the “slope of enlightenment,” before finally reaching the “plateau of productivity.”

Five years ago, many said radiology would soon to be replaced by AI. Counter to these predictions, however, clinical deployment of AI is still in its early stages. We are currently in the “trough of disillusionment,” in part due to lack of enterprise strategic perspective and lack of institutional AI governance. A 2020 ACR Data Science Institute® AI Survey published in the *JACR*® in 2021 noted that:

- Only 30% of radiologists use AI clinically in current practice.
- Over 70% of respondents have no plans to pay for AI.
- 80% of those not using AI see “no benefit.”¹

In fact, contrary to our roots in technology adoption, radiologists are late consumers of AI relative to other business verticals.

The Trough of Disillusionment

There are four major reasons why we're in the trough:

1. Trust in AI performance and generalizability is lacking. Validation of AI systems has been challenging given that “deep” in “deep learning” also means “obscure.” Validation methods have been considered statistically “lightweight,” and we cannot always be confident these models can be “generalized.” Furthermore, most image-based diagnostic radiology algorithms experience diminished performance in the real world.
2. Use cases are considered “nice to have” but not “must haves.” When AI applications in radiology are driven by data availability and not by use cases, it creates a catch-22: Most institutions will not invest in the needed IT infrastructure without a “killer use case,” but the “killer use case” cannot be created without the needed IT infrastructure. Unfortunately, suboptimal IT infrastructure is a constraint in the real-world adoption of AI at the levels of development, validation, implementation, support, and governance. We will need to select use cases that consider C-suite priorities of return on investment, total cost of ownership, and regulatory requirements.
3. Often existing workflow cannot optimally leverage AI. Machines and humans are meeting “at the edges” and working separately instead of together, which severely underleverages AI potential. The models we have do not support the needed AI lifecycle requirements, such as continuous learning and robust quality assurance needs like mitigation of AI drift.
4. Most institutions lack the capability to support and manage AI in a scalable and sustainable manner. Enterprise AI governance is not yet implemented at most institutions.

The Slope of Enlightenment

The “slope of enlightenment” can be accessed by building infrastructure allowing AI to function optimally. Radiology IT infrastructure and integration are operating on a much less sophisticated level than most other enterprise integration models. Most other models use service-oriented architecture

continued on page 22

Exploring Opportunistic Imaging

Radiologists' presence at the intersection of many aspects of healthcare, including screening and incidental-findings management, provides the opportunity for increased engagement in PHM.

Population health management (PHM) in radiology is gaining attention as a holistic method to improve health outcomes of patient groups through coordinated financial and care models.¹ “Radiologists’ presence at the intersection of many aspects of healthcare, including screening, diagnostic imaging, and image-guided therapies, provides the opportunity for increased engagement in PHM. Furthermore, innovations in AI and imaging informatics will serve as critical tools to improve value in healthcare through evidence-based and equitable approaches,” says Jessica H. Porembka, MD, associate professor of radiology at UT Southwestern Medical Center, vice chair of strategy and quality, and medical director of Parkland Breast Imaging and Quality Assurance.¹ Porembka recently spoke with the *ACR Bulletin* to discuss proactive imaging, including incidental findings management, and opportunistic imaging.

What is incidental findings management?

Incidental findings are findings seen on imaging that are unrelated to the goal of the study. So, for example, breast mass seen on a chest CT performed to evaluate for pulmonary embolism would be an incidental finding. These findings have become increasingly important – as imaging volumes go up, so do incidental findings – and I think the main question that we’re faced with is what to do with them.

Incidental-findings management encompasses two different parts: part one is the radiologist’s recommendation on what to do with the finding and determining its significance. The ACR Incidental Findings Committee has done a lot of work to provide guidance for a range of findings through white papers

on several key areas, like the liver, pancreas, and kidneys (learn more at bit.ly/ACRIncidentalFindings). Part two concerns radiology taking greater accountability for ensuring that the recommendation is seen and, if needed, followed.

Radiology practices are developing tracking and navigation systems to do this, like the Result and Alert Development of Automated Resolution (RADAR) system, developed at Brigham and Women’s Hospital.² They created a closed-loop communication system where radiologists can manually generate a follow-up recommendation for a certain finding that goes to the ordering primary care provider (PCP). There’s a link embedded in the notification that the PCP can click on and can either agree, disagree, select that the follow-up is not necessary, modify the recommendation, or transfer to another provider.



Opportunistic imaging is distinctly different from incidental-findings management.

Jessica H. Porembka, MD

Now the radiologist and the PCP have effectively created a shared follow-up care plan for that patient, and the scheduling team can then use this to get a signed order for a follow-up study, contact the patient, and schedule them for the study, while also obtaining pre-authorization. I think this is a great example of care coordination for incidental-findings management.

What is opportunistic imaging?

Opportunistic imaging is distinctly different from incidental-findings management. Opportunistic imaging uses imaging that has already been performed to purposefully identify certain findings or conditions that are not being sought out by the ordering provider, usually accomplished by applying imaging technology or AI algorithms to the imaging.³ One example that comes to mind is determining bone density on an abdominal CT to assess for osteoporosis. The ordering provider may have ordered the CT to look for a reason for the patient’s abdominal pain, but the radiologist can also look for a chronic or undiagnosed condition like osteoporosis, that, if treated, may prevent a future fracture.

How does AI play into both forms of imaging?

AI is so important when we think about how to leverage technology to help with these tasks. It should be viewed as a resource that can help radiologists work smarter and more efficiently, not to take away work. For the example of AI and incidental-findings management, AI could use natural language processing to

continued on page 22

Bulletin PODCAST: Proactive Imaging



Listen to a *Bulletin* podcast episode at acr.org/bulletin-podcast featuring Jessica H. Porembka, MD, who discusses proactive imaging, including incidental findings management, and a new technique called “opportunistic imaging.”

What advances in the field of radiology do you find most exciting?



“I’m most excited about advances in our field that will enhance collaboration — between doctors and medical software, between our colleagues and referring specialists, and between different parts of our larger radiology ecosystem, such as industry, startups, and clinical practices of all types.

AI is on everyone’s radar, but what excites me most, as a busy physician, is how AI can help our daily workflow, whether by streamlining repetitive tasks, such as by automating certain imaging annotation or by auto-generation of report impressions. These non-interpretive AI solutions are a boon to many radiologists who value the analytical aspect of our specialty and have become weighed down by rote tasks that software can assist with.

Collaborations with industry partners and startups have tremendous potential for even greater innovation and faster development of ideas from bench to clinic. With larger groups and greater economies of scale, more practices are embracing the possibility of leveraging the assets, ideas, and data of different partners in our ecosystem. In a similar vein, how can we build more relationships between academic, private, employed, and other practice types?

Finally, radiology and health IT advances can bridge providers and data from different institutions. For example, at our practice we have pioneered a way to access a patient’s comprehensive imaging record and in doing so provide a holistic assessment of a patient’s incidental imaging finding(s) and associated significance. These types of solutions are powerful ways to make patient care more accurate and affordable while bringing us all closer together as part of the patient’s one healthcare journey.”

— Scott F. Cameron, MD, radiologist at Atrius Health, Boston, Mass., and vice president of the Massachusetts Radiological Society

EDUCATING ON EQUITY

continued from page 18

How can radiologists work to change racist systems and assist people in healthcare?

I believe it starts on an individual level, spreading the word locally and creating a culture of equity and inclusion in your own practice and at your own institution. Challenge people to think: What is your privilege? How might you leverage it to promote health equity at your institution or beyond?

While being humble, I recognize my own privilege as a White, academic radiologist, training generations of radiologists and with a small impact on radiology research and evidence-based medical care. I talk to my colleagues, sonographers, RTs, and patients about health equity and systemic racism, including habits of behavior such as micro-aggressions and tone policing. I believe that we can have a small but important impact when we think

about health equity as we work with patients and colleagues in the reading room every day.

Ultimately, a systemic solution is needed for a systemic problem. I don't know what that solution is yet, but I'm committed to supporting my colleagues and patients of color and to working toward a solution.

Why should radiologists get involved in advancing health equity?

Ultimately, it's the best thing for patient care and it will lead to better patient outcomes. From a financial standpoint, the more you're able to reach and care for a diverse patient population, the larger your referral base will be. But most importantly, it's just the right thing to do. **B**

Interview by Taylor Brokesh, publications intern, ACR Press

ROADMAP FOR AI

continued from page 19

(SOA), a style of software design that provides services through a communication protocol over a network.

Connecting an application to data or functionality from another system necessitates complex, point-to-point integration. Without the middle business logic layer of SOA, current infrastructure depends on the radiologist to integrate disparate sets of information, such as from PACS and the EMR. This places a huge burden on all involved in the process: the radiologist, IT developers, and IT system maintenance.

To build workflow integration, AI cannot continue to be a "peripheral" system to existing legacy IT systems. Existing systems must support AI life-cycle requirements, like continuous learning and drift mitigation strategies. Image management and PACS need to be re-defined and disrupted to achieve intelligent optimized workflow orchestration.

Simply put, radiology practices and academic centers are now required to compete in an environment where the goals are measurable. Improvements in efficiency, productivity, quality, and safety need to come quickly. **B**

By Valeria Makeeva, MD, informatics and neuroradiology fellow at the University of Alabama at Birmingham

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OPPORTUNISTIC IMAGING

continued from page 20

extract information from the radiologist's report without the radiologist having to create the critical result notification. That extraction could flow into the in-basket alert system and then flow into a system, like the RADAR system, that allows for creation of a shared care plan. AI also plays an important role in opportunistic imaging since a lot of it is happening through imaging technology or AI algorithms to process those images.

How can radiologists introduce incidental findings management or opportunistic imaging to their departments?

There are journal articles and papers on incidental-findings management and opportunistic imaging that can help lay the groundwork. Beyond that, I think the ACR will be shining a spotlight on opportunistic imaging and the management of incidental findings, so I think staying involved in the ACR will definitely help those who are interested. **B**

Interview by Chris Hobson, senior communications manager, ACR Press, and Taylor Brokesh, publications intern, ACR Press

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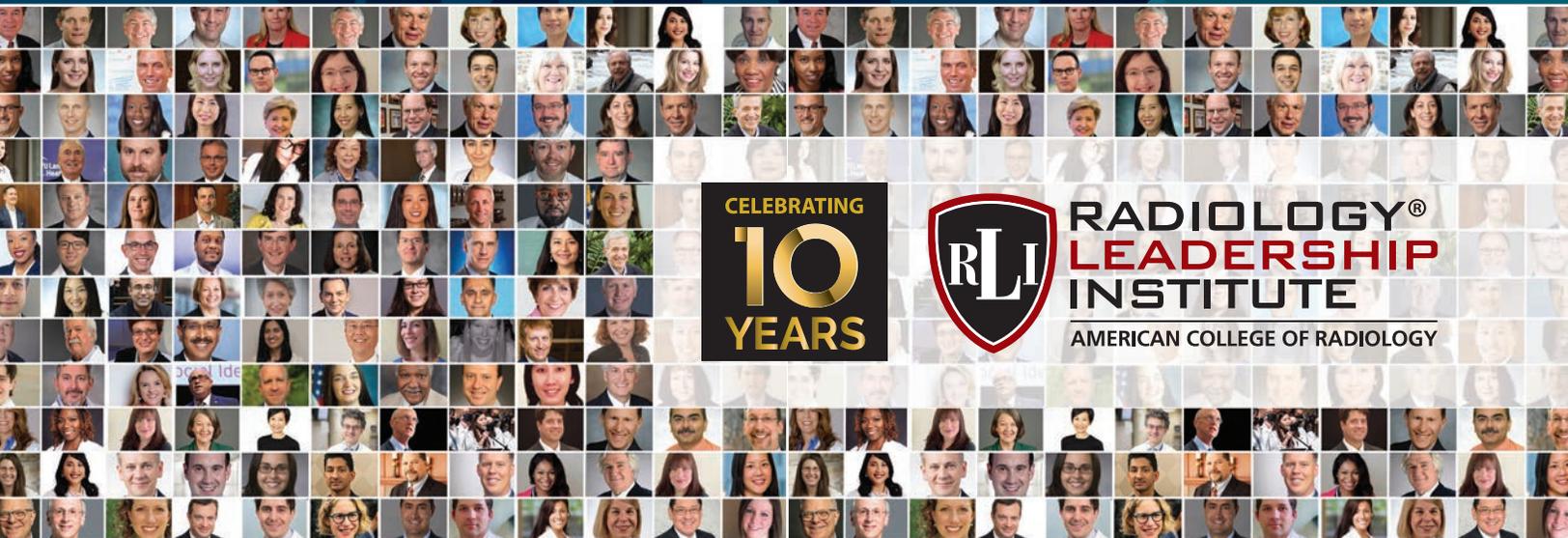
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