Health Policy
Radiology originated from the work of physicists in the late 19th century, most notable Wilhelm Roentgen's 1895 publication "A New Kind of Ray". In the early 20th century, roentgenologists were challenged to differentiate themselves from non-physicians. The survival of roentgenology is owed to the efforts of an inter-society committee and AMA that fought to define the specialty as more than a photography service for hospitals. The professional identity of radiology is similar to that of pathology, assuming the role of diagnostician, closely tied to technology and distinct from common divisions found with other specialties. This identity is ever-changing and challenged by less direct interaction with referring physicians and the identity fragmentation of subspecialization.

TABLE OF CONTENTS/OUTLINE

The beginnings
The debated first radiograph
Early public and medical reactions to X-rays
The rise of the roentgenographer and professional societies
Survival and identities crises
Hospital service or medical professional
More than a photographer (Past and Present)
The AMA and economic territory
Establishing boundaries and values
Broad-thinking, specific answers, low public visibility
Radiology rounds v. Teleradiology
Owning a modality: CT v. Echo
IR: procedural radiologist or radiologic surgeon?
Clinical Decision Support and Appropriate Use Criteria: Complying with PAMA while Improving Usefulness of Imaging

All Day Room: HP Community, Learning Center

Participants
Matthew Barkovich, MD, San Francisco, CA (Presenter) Nothing to Disclose
Marc D. Kohli, MD, San Francisco, CA (Abstract Co-Author) Nothing to Disclose
William P. Dillon, MD, San Francisco, CA (Abstract Co-Author) Nothing to Disclose
Rebecca Smith-Bindman, MD, San Francisco, CA (Abstract Co-Author) Nothing to Disclose
John Mongan, MD, PhD, San Francisco, CA (Abstract Co-Author) Spouse, Employee, Thermo Fisher Scientific Inc

TEACHING POINTS
The Purpose of this exhibit is to:
1. Explain the new legislative requirement that ordering providers consult Appropriate Use Criteria (AUC) when ordering advanced imaging services (CT, MRI, Nuclear Medicine, PET).
2. Introduce the reader to Clinical Decision Support (CDS).
3. Overview the current requirements for Appropriate Use Criteria.
4. Discuss the processes for becoming a qualified Provider Led Entity (qPLE), able to issue AUC.

TABLE OF CONTENTS/OUTLINE
- Protecting Access to Medicare Act (PAMA) of 2014
  - Primary purpose was to prevent planned reduction in Medicare reimbursement rates but also included provisions to reduce perceived over-utilized services such as advanced imaging.
  - Requires consultation of AUC at the time of ordering advanced imaging services.
- Implementation timeline
- Clinical Decision Support mechanism (CDS)
  - Statutory requirements
- Interaction with EHR
- Appropriate Use Criteria
  - Statutory requirements
  - Improving imaging efficacy
  - Linking indication with outcomes
- Qualified Provider Led Entity
  - Statutory requirements
  - Forming qPLE
  - Role of qPLE
- Future directions and implementation
PET/CT Site Credentialing Experience in NCTN Multicenter Trials

All Day Room: HP Community, Learning Center

Participants
David Poon, BS, Columbus, OH (Presenter) Nothing to Disclose
Preethi Subramanian, MS, BEng, Columbus, OH (Abstract Co-Author) Nothing to Disclose
Richard Jacko, BS, Columbus, OH (Abstract Co-Author) Nothing to Disclose
Nathan C. Hall, MD, PhD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Jun Zhang, PhD, Columbus, OH (Abstract Co-Author) Nothing to Disclose
Michael V. Knopp, MD, PhD, Columbus, OH (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
This educational exhibit aims to a) introduce the credentialing workflow implemented by IROC Ohio for credentialing of sites for trials under NCI and NCTN; 2) to identify clinical trials appropriate for credentialing; 3) to relate our experiences and challenges with site credentialing and 4) discuss benefits and future concepts for our credentialing processes.

TABLE OF CONTENTS/OUTLINE
1. Imaging and Radiation Oncology Core for the NCI NCTN1.1. What is IROC?1.2. Services2. Which types of clinical trials require site credentialing?2.1. Imaging as a primary goal2.2. Real-time Central Review2.3. PET Quantification as a key endpoint3. PET/CT site credentialing3.1. Basic workflow (figure 1)3.2. Simplified processes for previously credentialed sites.4. Challenges we observe in site credentialing4.1. Communication4.2. Major non-compliance problems (figures 2-5)4.3. Push-back of protocol requirements5. Experience, benefit and future concepts for site credentialing5.1. Participation of a single site in multiple trials, current concepts5.2. Benefits5.2.1. Trial scanner compliancy5.2.2. Dialogue with PET/CT institutions5.3. On-site vs virtual site visit5.4. SOP documentation5.5. Further IROC profile development
The Acute Abdomen Small Group On-Call Simulation: A Flipped Classroom Approach To Teaching Radiology

All Day Room: HP Community, Learning Center

Participants
Peter D. Poullos, MD, Stanford, CA (Presenter) Nothing to Disclose
Juergen K. Willmann, MD, Stanford, CA (Abstract Co-Author) Research Consultant, Bracco Group; Research Grant, Siemens AG; Research Grant, Bracco Group; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company; Advisory Board, Lantheus Medical Imaging, Inc; Advisory Board, Bracco Group

TEACHING POINTS
1. The flipped classroom is a more effective and engaging learning model where students cover material on their own before class, and class time is transformed into a more valuable dynamic, immersive and interactive workshop.
2. Online tools are available to design image-rich interactive modules which can contain short video lectures, written materials, interactive data sets, and self-assessment questions. Learners complete these prior to their scheduled small group "lectures."
3. During the face-to-face class time, one can create an on-call experience, tailored to the level and specialty of the learner. Role-play can be used to simulate workflow in a busy emergency department, including receiving virtual orders, triaging and protocolling exams, exam interpretation, and result communication.

TABLE OF CONTENTS/OUTLINE
1. Online classroom construction Platform choice Materials production Interactive tools
2. Case collection and display Methods Platform choice Display tools
3. On-call simulation Scripting Role-playing Case review
4. Lessons learned and future plans
Hospital Compare: Why Should We Care?

All Day Room: HP Community, Learning Center

Awards
Certificate of Merit

Participants
Linda H. Du, DO, MPH, New York, NY (Presenter) Nothing to Disclose
Bo Li, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
Nolan J. Kagetsu, MD, New York, NY (Abstract Co-Author) Spouse, Employee, Pfizer Inc

TEACHING POINTS
To address how radiology can prepare for a value-based payment model. To review how the CMS programs, Hospital and Physician Compare will be an important component of quality assessment and reimbursement. To emphasize the importance of radiologists collaborating with other healthcare components to improve overall quality and avoid penalties.

TABLE OF CONTENTS/OUTLINE
Background
Current health care costs and practices in radiology
US Department of Health’s proposal of a “volume to value” payment plan in 2015 MIPS/MACRA
Transparent health care experiences for patients
Hospital Compare 6 radiology metrics
Patient experience component
PQRS 324 originating from OB-13
Collaboration with health care components to improve metrics
Primary care physicians - MRI spines
Cardiologists - cardiac stress tests
ED department - double CT scans
Auxiliary staff - scheduling examinations
Physician Compare
Information that is accessible for patients
Medicare participation
Maintenance of certification 2014 and beyond
Conclusion
Understanding the importance of Hospital Compare and collaboration with other aspects of healthcare are vital in improving quality healthcare and avoiding penalties as "volume to value" becomes the prevailing structure of payment.
The purpose of this exhibit is: To define "population health" To define "population health management" and understand how it differs from population health To introduce relevant intersections between radiology, population health, and population management, including research questions, intervention opportunities, and metrics.

TABLE OF CONTENTS/OUTLINE

- Introduction
- Population health
  - Definition
  - Pillars: (1) Populations, (2) Determinants, (3) Outcomes
- Population health management
  - Definition
  - Difference from population health
- Radiology intersections
  - With population health
    - Examples of research initiatives
    - Metrics
  - With population health management
    - Domains
    - Examples of management interventions
    - Metrics
- Conclusions and future considerations
Recipe for a Successful Hybrid Academic-community Radiology Practice: Canadian Experience

All Day Room: HP Community, Learning Center

Participants
Michael N. Patlas, MD, FRCPC, Hamilton, ON (Presenter) Nothing to Disclose
Ania Z. Kielar, MD, Ottawa, ON (Abstract Co-Author) Nothing to Disclose
Nataly Farshait, MS, Toronto, ON (Abstract Co-Author) Nothing to Disclose
Douglas S. Katz, MD, Mineola, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To discuss the challenges of running successful hybrid academic-community practice. To highlight the unique advantages of academic subspecialty radiology group in providing quality service for the community. To propose solutions for the successful integration of a joint academic and community practice.

TABLE OF CONTENTS/OUTLINE
There is increasingly blurring distinction between academic and community radiology practices. However, the duality brings multiple challenges to the management of a hybrid practice (HP). Different skill sets are required for the coverage of the academic and community departments. Academic subspecialty trained radiologists may require retraining to cover a wider spectrum of modalities expected from the community imager. Similarly, community-based generalists can struggle to find a proper niche in a tertiary center. HP is challenged to maintain good working relationships with the leadership of the medical school and teaching hospitals, and to strive to avoid the perception of the conflict of interest. An additional balancing act is required for the training/supervision of radiology residents during community rotations. This exhibit will reflect on authors’ leadership experience in a large academic-community HP. The presentation reviews common challenges in the management of the combined practice and proposes practical solutions.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Douglas S. Katz, MD - 2013 Honored Educator
Douglas S. Katz, MD - 2015 Honored Educator
TEACHING POINTS

Design and implementation of a safe and effective morbidity and mortality (M&M) conference takes thoughtful strategic planning. We share our successes and mistakes so that others can learn from them. M&M participation is not only important for faculty, but also for residents and fellows. Participation enhances skill in multiple ACGME core competencies, including medical knowledge, professionalism, interpersonal and communication skills, systems-based practice, and practice-based learning and improvement. Enhancing these core competencies requires creativity to make the most out of every case. We demonstrate how to drive discussion to maximize learning.

TABLE OF CONTENTS/OUTLINE

What are your goals for starting an M&M conference, and how do you design for maximum impact? How do we find “mistakes” without a witch hunt? How do we provide feedback in a constructive way? How do we present and discuss errors in a nonjudgmental manner? Cases will be used to illustrate our major points, and they will be presented in a quiz format. The key list of cases includes: Normal pancreatic transplant anatomy mistaken for pancreatic necrosis Femoral hernia called inguinal hernia Hepatic abscess mistaken for tumor VP shunt catheter thought to be in the retroperitoneum Multifocal hepatocellular carcinoma in a cirrhotic liver not seen on ultrasound

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David B. Larson, MD, MBA - 2014 Honored Educator
A Cross-Functional Team Approach to Performance Improvement: The Radiology Operational Excellence Initiative

All Day Room: HP Community, Learning Center

Participants
Christopher G. Roth, MD, Philadelphia, PA (Presenter) Nothing to Disclose
Sandeep P. Deshmukh, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Ian Hayden, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Jordan Gold, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Shane Flickinger, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Vijay M. Rao, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

1. The learner will become familiarized with the 5-step Kaizen team approach to problem-solving by implementing brainstorming and filtering techniques.
2. The learner will appreciate the utility of quality improvement tools in planning the approach to improvement projects.
3. The learner will better understand the need and value of the cross-functional team approach to performance improvement projects in healthcare, specifically, radiology settings.

TABLE OF CONTENTS/OUTLINE

Background
Historic approach to quality in healthcare and radiology
Current healthcare environment and the change mandate
Unique challenges to performance improvement in radiology
Change readiness assessment
Change leadership
8 change leadership pitfalls and leadership process
Threat versus opportunity matrix
Systems and structures change assessment
Stakeholder analysis
Communication plan
The 5-step Kaizen problem-solving approach
Brainstorm issues and barriers
Filter and prioritize issues and barriers
Brainstorm potential solutions
Filter and prioritize potential solutions
Develop and implement action plan
Operationalizing to operational excellence
Establishing cross-functional teams
Launching and sustaining improvement projects
Performance Improvement through Engaging Physician Champions in Continuous Improvement Cycles

All Day Room: HP Community, Learning Center

Participants
Christopher G. Roth, MD, Philadelphia, PA (Presenter) Nothing to Disclose
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Jordan Gold, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Vijay M. Rao, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. The learner will understand the need to transition from the historic static approach to quality--quality assurance--to the modern dynamic and proactive approach to performance improvement.
2. The learner will assimilate the basic approach to performance improvement--the plan-do-study-act (PDSA) cycle--through clinical examples and its utility in enhancing clinical practice and patient care.
3. The learner will appreciate the value of data, benchmarking and visual displays in performance improvement.

TABLE OF CONTENTS/OUTLINE
Background
Historic approach to quality in healthcare and quality assurance The climate of change in healthcare Quality assurance versus quality or performance improvement Quality management in hospital settings Transition from static credentialing to active performance measures Role of the physician
Performance Improvement in a radiology department Departmental measures The divisional clinical subspecialty approach and physician engagement Balanced scorecards and improvement projects The PDSA cycle Data, benchmarking and visual display
Conclusion Better alignment with hospital/health system goals Better value and patient care
Awards
Certificate of Merit

Participants
Sarah B. Thomas, DO, Pittsburgh, PA (Presenter) Nothing to Disclose
Matthew S. Hartman, MD, Pittsburgh, PA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Create meaningful and targeted radiology field trip experiences for medical students to enhance their education and evolve their role on service. While not a complete list, we have identified 10 key experiences for every medical student to see before graduation. Each field trip has questions/objectives associated with the topic which each student will answer at the completion of the field trip.

TABLE OF CONTENTS/OUTLINE
The traditional medical student rotation. Purpose of the field trips. Field trip designs and how we implemented the learning experiences, objectives and questions. MRI/ Musculoskeletal Ultrasound/ CT Procedure Fluoroscopy CT- Contrast timing, imaging, and contrast reactions Neuroradiology Mammography Interventional Radiology Nuclear Medicine and PET CT- Preliminary Feedback

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Matthew S. Hartman, MD - 2016 Honored Educator
Letting the Breeze In and Keeping the Bugs Out: The Science and Practice of Image Based Screening and a Proposal for a New Radiology Subspecialty

All Day Room: HP Community, Learning Center

Awards
Certificate of Merit

Participants
Hannah Milch, MD, Bronx, NY (Presenter) Nothing to Disclose
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Jeffrey M. Levsky, MD, PhD, Bronx, NY (Abstract Co-Author) Nothing to Disclose
Nogah Haramati, MD, Bronx, NY (Abstract Co-Author) Investor, Kryon Systems Ltd Investor, OrthoSpace Ltd Investor, BioProtect Ltd Board Member, Kryon Systems Ltd Board Member, OrthoSpace Ltd Board Member, BioProtect Ltd Consultant, AFC Industries, Inc Advisory Board, General Electric Company
Linda B. Haramati, MD, MS, Bronx, NY (Abstract Co-Author) Spouse, Board Member, Bio Protect Ltd; Spouse, Board Member, OrthoSpace Ltd; Spouse, Board Member, Kryon Systems Ltd

TEACHING POINTS
The purpose of this is exhibit is: To review the benefits and biases of current practices in image based screening. To understand the need to study and validate the utility of screening in different populations. To outline an innovative approach to a new radiology subspecialty focus in image based screening. To convey why radiologists are in an ideal position to take on a leadership role in medical screening.

TABLE OF CONTENTS/OUTLINE
1. Leading evidence for and against current imaging based screening practices:
   - Breast cancer – mammography, ultrasound
   - Lung cancer – low dose computed tomography (CT)
   - Coronary heart disease – calcium score CT
   - Colon cancer – CT colonography
   - Osteoporosis – bone densitometry
2. Choosing the appropriate population to screen
3. Types of lesions best suited for image based screening
4. Screening biases and case examples from a poor, diverse, urban population
5. Rationale for a leadership role for radiologists in medical screening
6. Proposed curriculum for residency and fellowship training in epidemiology, detailed understanding of screening-targeted diseases and their treatment and processes and metrics necessary to demonstrate quality and efficacy of image based screening
Teaching Professionalism in Radiology Residency
All Day Room: HP Community, Learning Center

Participants
Justin Holder, MD, Brooklyn, NY (Presenter) Nothing to Disclose
Michael Chill, MD, Brooklyn, NY (Abstract Co-Author) Nothing to Disclose
Vinodkumar Velayudhan, DO, Copiague, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

Define professionalism as it pertains to radiology residents, faculty, technical staff and those who work in private practice. Identify the challenges to professionalism in radiology practice and education. Describe methods of teaching professionalism. Examine ways of assessing professional behavior.

TABLE OF CONTENTS/OUTLINE

The ACGME identifies professionalism as one of the core competencies that radiology in which residents must demonstrate proficiency. Unfortunately, professionalism is an abstract concept that is difficult to measure, define and teach. Professionalism is an essential concept to understand and appreciate, however, since it pervades imaging interpretation, intra- and interdepartmental interactions and patient care. This exhibit will define professionalism as it specifically pertains to radiology practice and address ethical dilemmas that threaten radiologists’ professional behavior. Comprehensive methods of teaching and assessing professionalism will be presented. The participant will gain a newfound appreciation and understanding of professionalism and its importance in the modern healthcare setting.
Development of a General Management System Integrating Power Injectors and Radiology Information System for Contrast Enhancement CT Examinations

All Day Room: HP Community, Learning Center

Participants
Shogo Kamioka, Hiroshima, Japan (Presenter) Nothing to Disclose
Nobuo Kitera, RT, Hiroshima, Japan (Abstract Co-Author) Nothing to Disclose
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Kazuo Awai, MD, Hiroshima, Japan (Abstract Co-Author) Research Grant, Toshiba Corporation; Research Grant, Hitachi, Ltd;
Research Grant, Bayer AG; Research Grant, Eisai Co, Ltd; Medical Advisor, General Electric Company;
Eiji Nishimaru, RT, Hiroshima, Japan (Abstract Co-Author) Nothing to Disclose
Akishito Yoshikawa, Tokyo, Japan (Abstract Co-Author) Nothing to Disclose
Minoru Ishifuro, Hiroshima, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Renal function and the absence of allergies to contrast material and other drugs must be confirmed before subjecting patients to contrast-enhanced CT studies; their habitus plays an important role in indication of contrast enhancement or choosing the contrast injection protocol. A record of the contrast injection parameters such as the injection volume and rate is useful for a retrospective analysis of the adequacy of contrast enhancement, as is a record of the time injection-pressure curves during contrast injection in the event of contrast extravasation. We developed a general management system that integrates a dynamic injector and the Radiology Information System (RIS) to address these issues. Here we present the configuration and availability of our system and discuss issues related to the system.

TABLE OF CONTENTS/OUTLINE
1. The necessity of a management system for contrast-enhanced CT studies
2. Configuration of our system
3. Clinical availability of our system
4. Current issues related to our system
Portable X-ray System for Disaster Radiography: Basic Characteristics and Radiation Protection

All Day Room: HP Community, Learning Center

Participants
Koichi Chida, PhD, Sendai, Japan (Presenter) Nothing to Disclose
Ryota Kobayashi, MSc, Sendai, Japan (Abstract Co-Author) Nothing to Disclose
Yohei Inaba, PhD, Sendai, Japan (Abstract Co-Author) Nothing to Disclose
Sachiko Yashima, Sendai, Japan (Abstract Co-Author) Nothing to Disclose
Yoichi Ohta, RT, Sendai, Japan (Abstract Co-Author) Nothing to Disclose
Chihiro Hoshi, Sendai, Japan (Abstract Co-Author) Nothing to Disclose
Yoichi Ohta, Chiba, Japan (Abstract Co-Author) Nothing to Disclose
Mamoru Kato, PhD, Akita, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
•To understand the usefulness of an uninterruptible power supply (UPS) for portable X-ray systems in disaster radiography • To understand the necessity of disaster radiography for triage • To emphasize the importance of reducing the radiation dose to staff using portable systems, which are typically utilized in non-radiation-shielded rooms

TABLE OF CONTENTS/OUTLINE
•Characteristics of current portable X-ray systems • Development of new portable X-ray systems for disaster radiography • Reducing the radiation dose to which staff are exposed using a portable system OUTLINE: Portable radiography is important in both the home care and hospital setting. Furthermore, disaster radiography for triage is particularly important. The output of the current portable X-ray system has improved with the use of high-frequency inverter generators. The image quality is high because of the use of digital image receptors. Therefore, the performance of the current portable system is superior to that of previous systems. We developed a portable X-ray system for disaster radiography using a small X-ray tube with a high-frequency generator, UPS, and mobile stand with a cart. The UPS includes a battery and can use various power sources, such as solar energy. Protection from scatter radiation is important with the use of these systems because they utilize non-shielded rooms.
Making Radiology Social: Using Tenets of Social Psychology to Improve Mentoring

All Day Room: HP Community, Learning Center

Participants
Meghan E. McNamara, MA, Fife, United Kingdom (Presenter) Nothing to Disclose
Michael P. McNamara Jr, MD, Cleveland, OH (Abstract Co-Author) Stockholder, General Electric Company; Stockholder, Apple Inc

TEACHING POINTS
1. Recent social psychology scholarship regarding leadership(1) is directly applicable to mentoring Residents (as well as colleagues) in medicine. This theory suggests that a shared social identity between a leader and follower (e.g., Attending and Resident) can lead to better outcomes when the group norms are positive. 2. We use the example of an educational program designed to teach image-guided minimally invasive breast procedure that was implemented over a period of years. This program highlighted the Resident as both learner and teacher, and empowered the Resident through engagement and tailored instruction. (1) Haslam, S.A., Reicher, S.D., & Platow, M.J. (2011). The new psychology of leadership: Identity, influence and power. Psychology Press. New York.

TABLE OF CONTENTS/OUTLINE
1. A brief introduction to social psychology 2. Explanation of the psychology of leadership 3a. Application of social psychology to medical mentoring 3b. Explanation of program of teaching minimally invasive breast procedure 3c. Ways to implement this in your own practice 4. Summary (take home points: social psychology theory is relevant to mentoring outcomes in medicine, and suggestions for how you can adapt this yourself)
Participants
Yaru Chai, MD, Zhengzhou, China (Presenter) Nothing to Disclose
Jianbo Gao, MD, Zhengzhou, China (Abstract Co-Author) Nothing to Disclose
Peijie Lv, MD, Zhengzhou, China (Abstract Co-Author) Nothing to Disclose
Jingjing Xing, MD, Zhengzhou, China (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To introduce the principle of manual and automatic spectral parameters selection methods
To illustrate the workflow of manual and automatic selection methods
To demonstrate the effect of different selection methods on image quality and radiation dose by presenting clinical images

TABLE OF CONTENTS/OUTLINE
1. Principle
   Manual spectral CT parameters selection on the basis of the scout mA Table information based on the results of phantom experiments
   Automatic spectral CT parameters selection, GSI assist provide assistance in the selection of GSI preset the optimal preset based on the patient's size
2. Workflow
   Manual spectral CT parameters selection get mA Table information of scout view work out the mAs by multiplying rotation time, then choose suitable GSI mode based on the corresponding relationship
   Automatic spectral CT parameters selection get scout view set suitable noise index value click the "On" button, turn on GSI Assist function the optimal parameters are automatically selected
3. The effect of different selection methods on image quality and radiation dose
   for low BMI patients, manual and auto methods both can acquire good image quality and low radiation dose
   for high BMI patients, need to set higher noise index value for neutralizing radiation dose with GSI assist
Taking Team STEPPS on the Road to Patient Safety: What’s Taking Us So Long?

All Day Room: HP Community, Learning Center

Participants
Ryan O'Malley, MD, Seattle, WA (Presenter) Nothing to Disclose
Suresh Maximin, MD, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Puneet Bhargava, MD, Shoreline, WA (Abstract Co-Author) Editor, Reed Elsevier
Carolyn L. Wang, MD, Seattle, WA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Review the types of team training in healthcare Review measurable improvements demonstrated in other medical subspecialties with emphasis on how radiology lags behind Specific review of TeamSTEPPS and its four skills Review select scenarios in radiology where team training would be beneficial Discuss barriers to implementation and suggested solutions

TABLE OF CONTENTS/OUTLINE
Overview of team training in healthcare with attention to its role in patient safety and preventable medical errors Description of the origins and types of team training in healthcare Crew Resource Management TeamSTEPPS VA Medical Team Training Illustrate how radiology team training lags behind using examples elsewhere in healthcare where team training resulted in significant improvements in clinical processes, patient safety, and patient outcomes Critical care Surgery Emergency department Description of TeamSTEPPS and its four learnable, trainable skills Leadership Situation monitoring Mutual support Communication Sample cases where team training would be beneficial in radiology Morning brief at the beginning of each day Mid-day huddle to identify problems or overload Handoffs for trainees during shift changes Discuss barriers to implementation and potential solutions.

Honored Educators

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Puneet Bhargava, MD - 2015 Honored Educator
Minimizing Errors in Plain Film Reporting: A Novel Teaching Tool for Radiology Residents

All Day Room: HP Community, Learning Center

Awards
Certificate of Merit

Participants
Stephen P. Power, MBBCh, MRCPI, Cork, Ireland (Presenter) Nothing to Disclose
Maximilian F. Ryan, MBBCh, Cork, Ireland (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

Reporting of plain radiographs can be an intimidating task for the junior radiology resident. With the increased emphasis on cross-sectional imaging, less time is available to demonstrate the intricacies of plain film reporting. The volume of accessible plain film teaching tools can often be overwhelming. This educational exhibit will demonstrate a concise checklist to assist the junior resident to minimize errors in their interpretation of plain films. We will demonstrate the important, often injured, anatomical landmarks on plain films as well as providing a brief description of the commonly acquired views for each radiograph. These teaching tools have been introduced to junior residents within our department and have functioned as an invaluable aid during their introduction to plain film interpretation.

TABLE OF CONTENTS/OUTLINE

Present a concise novel plain film checklist which functions as a means to encourage radiology residents to assess commonly overlooked areas on plain radiographs. Present a further more detailed teaching tool which demonstrates the commonly injured anatomical landmarks and gives a brief overview of the basic radiograph technique required for the acquisition of musculoskeletal radiographs. Present feedback from junior residents within our department with regards to their experience with these teaching tools.
MRI in Patients with MR-unsafe Cardiac Implantable Electronic Devices (CIEDs): Clinical Indications and Reimbursement Issues

All Day Room: HP Community, Learning Center

FDA Discussions may include off-label uses.

Awards
Cum Laude

Participants
Joseph Cavallo, MD, New Haven, CT (Presenter) Nothing to Disclose
Yapei R. Zhang, New Haven, CT (Abstract Co-Author) Nothing to Disclose
Rachel Lampert, New Haven, CT (Abstract Co-Author) Consultant, Medtronic plc; Speaker, Medtronic plc; Speaker, St. Jude Medical, Inc; Research funded, Medtronic plc; Research funded, St. Jude Medical, Inc; Research funded, Boston Scientific Corporation; Research funded, General Electric Company
Jeffrey C. Weinreb, MD, New Haven, CT (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

1) Explanation of the various MR-conditional and MR-unsafe CIEDs
2) Appropriate & most common indications for an MRI in patients with MR-unsafe CIEDs
3) The effect of reimbursement on patient compliance with MRIs deemed medically necessary

TABLE OF CONTENTS/OUTLINE

Explanation of MR-conditional versus MR-unsafe vs Legacy (Pre-2000) CIEDs Summary of the Peer-Reviewed data demonstrating safe use of MRI in patients with CIEDs Overview of the screening process Proper protocol for pre and post examination testing
Appropriate indications for MRI in patients with CIEDs Examine the current Center for Medicare and Medicaid Services (CMS) guidelines on reimbursement versus private insurance. (CMS will only reimburse examinations done on patients with MR-conditional CIEDs) Overview of our original HIC approved Retrospective Single Institution Study Methods Most commonly encountered indications for MRI use in patients with CIEDs Changes in patient management resulting from MRI findings Effects of changes to reimbursement policy on patient compliance
Big-data Analytics at Work! Understanding Why Patients No Show- Observations from 8.4 Million Patient Visits during 2000-2015 at a Multicenter Academic Radiology Institution

Awards
Certificate of Merit

Participants
Joshua I. Rosenbaum, MD, Seattle, WA (Presenter) Nothing to Disclose
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Puneet Bhargava, MD, Shoreline, WA (Abstract Co-Author) Editor, Reed Elsevier

TEACHING POINTS
The purpose of this exhibit is to:
1. Understand why patients no show and cancel appointments
2. Provide new insights for improved operations redesign
3. Discuss interventions for improving resource utilization, reducing cost, improving quality, and speed of delivering radiology

TABLE OF CONTENTS/OUTLINE
- Data set of 8.4 million radiology visits, 907,250 unique patients over a 16-year interval
- Distribution of patient cancellation across various practice sites, referring providers and modalities: Mammography > Nuclear Medicine > MRI > US > CT > X-rays
- Distribution of patient no show across various practice sites, referring providers and modalities: Mammography > Nuclear Medicine > US > MRI > CT > X-rays
- Understanding reasons for no shows: No show by patient, duplicate orders, cancelled by referring provider, double booking, changed to alternative study, incorrect order
- Variability of no shows with patient age (peak no show at 40-60 years’ age), time, distance from the point of imaging correlated with median household incomes using color-coded maps
- Annual and seasonal trends correlated with total studies: 7.5% exams cancelled in 2000 vs 8.9% in 2015
- Future directions for research with review of potential strategies to improve throughput and access
- Proposed new algorithm to decrease no show rates to optimize resource and personnel utilization

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Puneet Bhargava, MD - 2015 Honored Educator


**Participants**

Ernest Wiggins, MD, Long Branch, NJ (*Presenter*) Nothing to Disclose  
Deborah L. Reede, MD, Brooklyn, NY (*Abstract Co-Author*) Nothing to Disclose

**TEACHING POINTS**

At the end of this presentation the learner should be able to:  
1. Discuss the importance of cultural competency in medical education and patient care  
2. Have an expanded and inclusive definition of diversity and cultural competency  
3. Articulate strategies to improve diversity among the faculty/ staff and residents at their institution

**TABLE OF CONTENTS/OUTLINE**

Why Teach Diversity  
- ACGME Requirements  
- Healthcare Disparities  
- Local and National Healthcare initiativesHow do we promote/ teach diversity  
- Increasing diversity of faculty/ staff  
- Increasing diversity of residency  
- Mentorship  
- Recruitment/ Retention  
- Educational resources
Participants
Seth Stein, MD, New York, NY (Presenter) Nothing to Disclose
Geraldine B. McGinty, MD, MBA, New York, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is to: 1. Provide a historical background of the quality challenges faced by radiology and how it has responded to such challenges 2. Educate viewers on the economic challenges that the current fee-for-service model has posed 3. Define "quality" and "value" 4. Educate viewers on alternative payment models and what to expect when in practice in the next decade 5. Foster new ideas and encourage involvement in the development of imaging-specific alternative payment models

TABLE OF CONTENTS/OUTLINE
1. Historical timeline of quality standards in imaging, legislative highlights (e.g. MQSA, ACA, MACRA)
2. Define "value" as an economic term
3. Current ACR/CMS quality metrics (e.g. qualified clinical data registries, PQRS, RadPEER)
4. Payment Models (FFS, MIPS, APM) and the landscape ahead to 2026
5. Patient-centered radiology (e.g. Radiology Cares, Imaging 3.0, radiology consult service at our own institution)
6. Innovation and Engagement: Creating value, inspiring innovation and involvement in developing solutions to meet the economic, quality and patient-driven challenges of the future
Current Status of Radiology Curriculum for Advanced Practice Providers

All Day Room: HP Community, Learning Center

Participants
Nora M. Haney, BS, New Orleans, LA (Abstract Co-Author) Nothing to Disclose
Richard A. Shepler, MD, Memphis, TN (Abstract Co-Author) Nothing to Disclose
Jose Morey, MD, Philadelphia, PA (Presenter) Nothing to Disclose

TEACHING POINTS

1. There is an increasing number of advanced practice providers ordering imaging in primary care.
2. There is currently no uniform radiology curriculum for advanced practice providers. Educational programs, as well as the practice of advanced practice providers, vary by state and by program.
3. Radiology is a requested topic by advanced practice provider students and their educators as there is little to no curriculum on the risks of radiation, radiation physics, and proper ordering.

TABLE OF CONTENTS/OUTLINE

Introduction
Survey Results
Type of health professions program (NP, PA, accredited, non-accredited)
Students enrolled
Current radiology curriculum (elective, dedicated, integrated)
Background of educator (anatomist, radiologist, NP, PA, radiology technician, combination)
Curriculum topics (physics concepts, image modality, radiation safety, contrast safety, anatomy correlation, chest, abdominal, musculoskeletal, neuroradiology, other)
Alliance for Medical Student Educators in Radiology (AMSER) guidelines
Distribution of time during a typical week spent on radiology
Teaching software
Methods of assessment (multiple choice, short answer, essay, radiographic identification, pass/fail, ABCDF grading)
Plans for innovative teaching methods
Use of social media
Education problems encountered in teaching radiology
Comments
From Concordance to Curriculum: Taking Rad Path Conference to the Next Level

All Day Room: HP Community, Learning Center

Participants
Elizabeth C. Deans, BS, Chapel Hill, NC (Presenter) Nothing to Disclose
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Sheryl G. Jordan, MD, Chapel Hill, NC (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is to: Illustrate optimization of the resident and medical student educational experience during radiology pathology conferences at an academic medical center Present institutional success in building a robust breast imaging rad path curriculum, far beyond answering the question of concordancy by including BI-RADS® Atlas tenets, basics of mammography, breast ultrasound, and MRI, along with common (and uncommon) World Health Organization-categorized breast diseases Present resident standardized test performance and satisfaction surveys pre- and post-curriculum implementation Demonstrate the use of cutting-edge technology tools in this curriculum by presenting unknown cases for self-assessment

TABLE OF CONTENTS/OUTLINE
Origins of Radiology Pathology Conference Structure of Typical Conference Opportunities for Education in the Radiology Pathology Conference Review of Institution's Curriculum for Radiology Residents and Medical Students Overview of Curriculum Technologic Resources Response of Residents to Curriculum Standardized Test Scores Satisfaction Surveys Illustration of Curriculum via Review of "Rad Path Unknowns" Self-Assessment
Stepping off our Treadmill - Strategies for Reducing Radiologist Stress and Burnout in the Workplace

All Day Room: HP Community, Learning Center

Awards
Identified for RadioGraphics

Participants
Bettina Siewert, MD, Brookline, MA (Abstract Co-Author) Nothing to Disclose
Jonathan B. Kruskal, MD, PhD, Boston, MA (Presenter) Author, UpToDate, Inc
Michael D. Fishman, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. To describe the manifestations of and factors contributing to radiologist burnout
2. Describe steps to reduce radiologist stress and burnout

TABLE OF CONTENTS/OUTLINE
2. Factors contributing to burnout of radiologists.
3. Solutions to help alleviate stress and burnout: Improve sense of community (reduce isolation, foster socialization, reading room designs, lighting, walkabouts, meetings). Foster physical wellbeing, reduce sedentary environment. Monitor & manage workload (adequate staffing, case mix, restore a sense of control, improve efficiency). Reduce emotional stressors (compliance expectations, RTAT, onboarding processes, sense of fairness/equity in workplace). Stop measuring, start managing (eliminate Hawthorne perceptions and realitis, wRVU's expectations, “dashboard demoralization”). Emotional and spiritual wellbeing (adequate time off, no signing reports at home, fair call practices, emotional buddy mentoring systems). Work and career (foster respect for the radiologist, part time options, service hour alternates, no "Nike" radiologist, no dumping, effective management of turf incursions, equity across practices in large enterprises)

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Jonathan B. Kruskal, MD, PhD - 2012 Honored Educator
Jonathan B. Kruskal, MD, PhD - 2016 Honored Educator
Standardizing the Radiologist Ongoing Professional Practice Evaluation (OPPE) Process

All Day Room: HP Community, Learning Center

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
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Bettina Siewert, MD, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Describe key elements and federal requirements of the radiologist OPPE and FPPE
Describe specific metrics and components of an OPPE, and how these can be measured
Describe how to manage OPPE data effectively to drive improved radiologist performance

TABLE OF CONTENTS/OUTLINE

Legal requirements and elements of an OPPE and FPPE.
Steps in the OPPE process (notify, measure, analyze, inform, disclose, mentor, improve) - facilitating the mandatory 8 monthly radiologist review.
The multisource and 360º feedback process - an online tool to take home; referring physician feedback.
Measuring, monitoring and managing the growing demands for compliance (Joint Commission ever-readiness).
Effective benchmarking with colleagues - a proposal for national radiologist performance benchmarks.
Measuring performance - RTAT, report content, peer review and peer learning and practice improvement efforts.
Teaching effectiveness and research impact (the academic OPPE).
Fostering good citizenship.
Measuring outcomes (not to manage incomes!)
The patient perspective.
Measuring the value that radiologists add.
Simple online tools for collecting and analyzing this data - a radiologist performance scorecard.
Getting your radiologists to buy into this process.
Using feedback to drive continuous radiologist performance improvement.

Honored Educators

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https://www.rsna.org/Honored-Educator-Award/

Jonathan B. Kruskal, MD, PhD - 2012 Honored Educator
Jonathan B. Kruskal, MD, PhD - 2016 Honored Educator
Transition from Breast Imaging Fellow to Attending: Top 10 Lessons Learned

All Day Room: HP Community, Learning Center

Participants
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Emily B. Sonnenblick, MD, New York, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. This educational exhibit will highlight some of the lessons learned when transitioning from fellowship to academic or private practice. The beginning attending will encounter equipment and staffing differences as well as differing protocols and practice patterns. Information to take with you as you graduate fellowship and how to effect change in your new practice will be emphasized. 3. Social and professional issues are critically important for a new attending. This abstract will discuss issues how to succeed in a new environment.

TABLE OF CONTENTS/OUTLINE
1. Equipment/Supplies: Make sure to have the brand names and models of all supplies you have come to love, i.e. your favorite go to biopsy needle
2. Job Search: When to commit, how to look for a position
3. How to make sure staff sees you as an attending and not a resident
4. What do you call your new colleagues - first name or Doctor
5. How do you politely introduce new ideas?
6. How do you politely criticize practices in your new position?
7. What documentation of training do you need to take with you?
8. What extra training should you get so you are ready to hit the ground running at your new position?
9. Tips for negotiating start date of new job
10. The elephant in the room: Negotiation: salary, time off, insurance and restrictive covenant negotiations
E-Teaching for Dummies: A Step-by-Step Guide on How to Create Online Procedural Videos

All Day Room: HP Community, Learning Center

Participants
Cristina I. Campassi, MD, Baltimore, MD (Presenter) Nothing to Disclose
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Petra J. Lewis, MD, Lebanon, NH (Abstract Co-Author) Book contract, Oxford University Press; Consultant, Siemens AG

TEACHING POINTS
Objective of this exhibit is to provide educators with a step-by-step guide on how to create web-based educational video modules that can be used by radiologists, radiologists in training, and technologists.

TABLE OF CONTENTS/OUTLINE
E-learning is used in medical education to facilitate lifelong learning of practicing physicians, supplement medical students’ and residents’ education, and offer outreach education to underserved medical professionals. Self-directed tutorial videos hold value in both academic and private radiology settings. The following step-by-step guide explains how to create a web-based educational video.

1. Rationale for development of procedural videos
2. Developing the storyboard
   a. Procedure outline (Fig 1)
   b. Movie elements
   c. Static image elements
   d. Text slides
   e. Annotations
3. Recording the movie elements
   a. Live patients
   b. Models/simulated procedures
   c. Editing the videos
4. Photographing the image elements
5. Powerpoint creation (text, images) (Fig 2)
6. PDF conversion
7. Explain Everything software (and alternatives)
   a. Upload PDF file
   b. Adding Audio (Fig 3)
   c. Adding annotations (Fig 4)
   d. Importing Video files (Fig 5)
8. Converting to MP4
9. Distribution and accessibility
10. Conclusion
Participants
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TEACHING POINTS
Although audience response systems (ARS) have existed since the 1960s, ARS technology has significantly evolved over the past five years due to the increasing availability of smartphones and tablets devices. Using either a native device agnostic application or software as a service, audience members may now respond to sophisticated interactive queries using their own phones or tablets. This exhibit will: Describe the benefits and limitations of using an audience response system. Discuss important features of audience response systems in regards to radiology education. Compare and contrast the advantages and limitations of three commonly used web-based or software as a service audience response systems with emphasis on radiology education.

TABLE OF CONTENTS/OUTLINE
Benefits of Audience Response Systems  Attentiveness  Increased retention  Anonymity  Confirming audience understanding  Creating an interactive and fun learning environment  Team based learning  Data collection and analysis  Important Functions  MQC  Free text response  Sorting  Clickable areas  Matching  Segmentation  Comparison of Audience Response Systems  Poll Everywhere  RSNA  Diagnosis Live  Nearpod  Conclusion
Radiation Exposure in Radiologic Diagnostic Investigations—How Do We Explain to a Layman?

All Day Room: HP Community, Learning Center

Participants
Deepali Bhalla, Brookfield, WI (Abstract Co-Author) Nothing to Disclose
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TEACHING POINTS
1. To understand the effect of radiation in layman’s perspective.
2. To review different imaging modalities and radiation exposure related with them.
3. How to apply these understanding compared with background radiation and exposure of radiation with day to day activities.

TABLE OF CONTENTS/OUTLINE
• Background radiations and its sources.
• Medical radiation and its sources.
• Threshold radiation dose.
• Susceptible cellular mechanisms.
• Individuals at risk and general population.
• Are women at greater risk?
• American College of Radiology guidelines.
Participants
Kamran Ahrar, MD, MBA, Houston, TX (Presenter) Nothing to Disclose
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TEACHING POINTS
Individuals make ordinary decisions by intuition. When making complex decisions for their organizations, leaders should involve a more structured analysis to handle high degree of ambiguity, conflicting goals due to multiple objectives, and complex trade-offs. Upon review of this exhibit, the individual should be able to: Outline elements of decision analysis used to decompose complex strategic problems into a set of simpler decisions Describe the concept of decision modeling and sensitivity analysis Explain how qualitative assessment complements the objective findings from a decision model

TABLE OF CONTENTS/OUTLINE
A tertiary cancer center is planning to build several Hospital Outpatient Departments (HOD) in the suburbs. Should interventional radiology services be provided at HODs? Using this example, we demonstrate the following: Framing a strategic question using decision hierarchy Using objective hierarchy diagram to sort out conflicting goals Creating a complete list of strategic options using a decision table Using an influence diagram to decompose a complex problem Creating a decision model based on key assumptions and uncertainties Comparing financial viability and performing sensitivity analysis Performing a qualitative assessment to ensure the most profitable option fits the objective hierarchy
Development of New System Using Bi-directional Voice Communication in the MRI Noise Environment

All Day Room: HP Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Jyunya Nakashima, RT, Yokohama, Japan (Presenter) Nothing to Disclose
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Toshiyuki Takahashi, Tokyo-To, Japan (Abstract Co-Author) Nothing to Disclose
Yasuo Nakazawa, PhD, Tokyo, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
We have developed the bi-directional voice communication system with the noise reduction feature against MRI noise. This system better assist the voice communication with patients to help reducing the insecure feeling of patients during MRI scanning.

TABLE OF CONTENTS/OUTLINE
1. MRI noise measurement
   At maximum, the equivalent continuous A-weighted sound pressure level was reduced to 27.6 dB by soundproof headphones, and was reduced to 23.3 dB by optical microphone pads activated by ads activated by neck vertebrae conduction.

2. Questionnaires to patients
   According to the results collected from the patients, the evaluation point (EP) of new system was significantly higher for the noise tolerance level, compared to the point of current system (new: 3.27 EP, current: 2.43 EP by 4-point LICKERT scale, P<0.01). Regarding to the evaluation of the insecure feeling level, new system was significantly lower, compared to current system (new: 1.40 EP, current: 2.27 EP by 4-point LICKERT scale, P<0.01).
The purpose of this exhibit is: To describe and briefly discuss cognitive biases that may decrease radiologic accuracy. To suggest potential strategies to prevent cognitive biases in radiologic reasoning.

TABLE OF CONTENTS/OUTLINE

Definition and causes of cognitive biases. Psychological background: the dual process model. Major cognitive biases in clinical imaging and sample cases. Anchoring Attribution Framing Availability Confirmation Gambler’s fallacy Regret Satisfaction of search Hindsight Premature closure Strategies for preventing or minimizing the effect of cognitive biases. Summary and conclusions.
Awards
Certificate of Merit

Participants
Prashant Nagpal, MBBS, Iowa, IA (Presenter) Nothing to Disclose
Bruno A. Policeni, MD, Iowa City, IA (Abstract Co-Author) Nothing to Disclose
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TEACHING POINTS
Dr. William Edward Deming (an American engineer, statistician, professor, author, lecturer, and management consultant) described ‘14 principles’ for quality improvement. These principles will be discussed with specific examples of their execution in healthcare, focusing on radiology. These principles can be applied to day-to-day radiology practice to achieve the goal of quality healthcare at less cost.

TABLE OF CONTENTS/OUTLINE
Introduction to Dr. William Edward Deming and his work. Review of Deming ‘14 principles’: Examples of specific quality improvement initiatives pertaining to diagnostic specialties and frame their success based on specific Deming’s principles. Summarize these principles, highlight how the knowledge of these principles help us to meet the goal of “timely, better, safer and cheaper” patient care.
TEACHING POINTS

1. There is increasing emphasis on continuous quality improvement (QI) for radiologists as demonstrated by its inclusion on examinations and maintenance of certification from the American Board of Radiology (ABR).
2. Charts are important QI tools that schematically outline a process.
3. Charts can be useful for identifying areas for practice enhancement, organizing a QI initiative, and assessing whether process changes have led to improvement.
4. Currently, there is a lack of radiology-specific resources related to charts as tools for QI. However, by reviewing basic descriptions and key distinguishing features of each chart and illustrating their utility with pictorial examples, a solid foundation can be obtained.

TABLE OF CONTENTS/OUTLINE

I. QI background
   a. Definition
   b. The importance of understanding the QI process
      - Improving delivery of care
      - Professional development
      - ABR certification
II. QI charts
   a. Review of current literature
      - Lack of concise, radiology-specific resources
   b. Provide description, key distinguishing features, and pictorial example of each chart
      - Simple Flowchart
      - Swim Lane Flowchart
      - Value Stream Map
      - Spaghetti Diagram
      - Cause and Effect Diagram
      - Run Charts/Trend Charts
      - Control Charts
      - Pareto Chart
   c. How to choose the appropriate flowchart for a particular analysis
Incorporating an ACR Appropriateness Criteria Educational Program into Medical School Radiology Clerkships

All Day Room: HP Community, Learning Center

Participants
Shiraz Rahim, MD, Cleveland, OH (Presenter) Nothing to Disclose
Holly N. Marshall, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To highlight the need for teaching of ACR Appropriateness Criteria to medical students. To demonstrate ways to incorporate ACR Appropriateness Criteria into medical school radiology electives. To show the effectiveness of certain types of ACR teaching methods and the response of medical students to teaching of appropriate imaging in radiology.

TABLE OF CONTENTS/OUTLINE
1) Need for ACR Appropriateness knowledge-Inappropriate imaging in medicine-Common causes of inappropriate imaging
2) Student surveys – medical students state knowledge of appropriate imaging as most important reason for pursuing a radiology clerkship
3) Implementing appropriate imaging into the curriculum-Didactic lectures-Case presentations-Group discussions-Reading room and protocol involvement-Textbook incorporation
4) Testing students for appropriate imaging-Examples from our institution of score improvement-Student perspectives on the usefulness of different teaching modalities
Awards
Certificate of Merit

Participants
Sarah Bastawrous, DO, Seattle, WA (Presenter) Nothing to Disclose
Chenwei Wu, MD, Seattle, WA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

1. To define what is a root cause analysis 2. Discuss importance of determining the root cause to improve patient safety and make necessary process changes3. Illustrate how to conduct a successful root cause analysis in radiology

TABLE OF CONTENTS/OUTLINE

Participants
Adam DeFoe, MD, Omaha, NE (Presenter) Nothing to Disclose
Christopher J. Vargo, MD, Omaha, NE (Abstract Co-Author) Nothing to Disclose
Timothy Donovan, MD, Omaha, NE (Abstract Co-Author) Nothing to Disclose
Andrew Heckman, MD, Omaha, NE (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. Contrast induced nephropathy is recognized by the ACR as a rare, though real entity, albeit difficult to define.
2. Given difficulties in definition, laboratory evaluation of renal function, and finding an adequate control group, studying CIN has proven problematic.
3. Pre-contrast volume expansion is the only currently recommended preventative strategy.

TABLE OF CONTENTS/OUTLINE
Multiple choice questions will be presented, will supplemental slides covering the following:
1. ACR guidelines on intravenous iodinated contrast, with special attention to post-contrast acute kidney injury (PC-AKI) and contrast-induced nephropathy (CIN).
2. Working definition of PC-AKI to apply to one's own practice.
3. Review of the contemporary literature on CIN.
4. Evaluation of purported strategies to prevent PC-AKI and CIN.
Awards
Cum Laude

Participants
Jay Starkey, MD, Tokyo, Japan (Presenter) Nothing to Disclose
Yasuyuki Kunihara, MD, Tokyo, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Radiation dose from CT is a hot topic in patient safety. Many regions are making reporting mandatory. However, the various methods of measuring/estimating radiation dose and its reporting can be confusing. We aim to present the various methods of dose estimation and reporting in a simple way that is easy to grasp and relevant to the practicing radiologist.

TABLE OF CONTENTS/OUTLINE
#Basic review of relevant physics and terms
- Units of dose, their meaning
- Phantom types
#The human body inside a CT scanner
  - How radiation is absorbed
  - Implications of radiation
#The phantom inside a CT scanner
  - How radiation dose is estimated: DLP, CTDivol
  - Limitations of the phantom
#Organ based estimations: IRCP
  - How radiation dose is estimated: IRCP
  - What are 60, 103, and 106?
#Practical applications
  - Understanding dose reports (from the scanner or monitoring software)
  - How to add dose into your reports
How to Develop Clinical Imaging Guidelines: Focused on Evidence-Based Adaptation Process

All Day Room: HP Community, Learning Center

Participants
Seung Eun Jung, MD, Seoul, Korea, Republic Of (Presenter) Nothing to Disclose
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Hwan Seok Yong, MD, PhD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Kyung-Hyun Do, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Justification of medical imaging using clinical imaging guidelines (CIG) is important because CIG can improve patient care by enhancing the appropriate use of diagnostic imaging. In my country, many clinical practice guidelines were developed including some imaging guidelines, but there was still a lack of CIG such ACR appropriateness criteria or iRefer. The radiologic society has worked together with the National Evidence-based Collaborating Agency to develop a comprehensive CIG. Although evidence-based methods for guideline development for clinical care are well defined, there was no clearly set up process of evidence-based adaptation process for CIG. We will present an evidence-based adaptation process protocol used for the development of CIG. This process is different than simply adopting or translating well defined third party guidelines. We hope to share the problems we faced and solutions we found during guideline development, and help other countries by sharing our experience.

TABLE OF CONTENTS/OUTLINE
Questions and problems for development of CIG Why adaptation? Adoption vs. adaptation Process of adaptation Evidence level, recommendation grading, and relative radiation level of CIG Problems, barriers and solutions during development of CIG Sample guidelines How to implement the guidelines
STARD Checklist: It’s Also a Blueprint for Designing and Performing Imaging Trials

All Day Room: HP Community, Learning Center

Awards
Certificate of Merit

Participants
Susanna I. Lee, MD, PhD, Boston, MA (Presenter) Nothing to Disclose
Patrick M. Bossuyt, PhD, Amsterdam, Netherlands (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

Standards for Reporting of Diagnostic Accuracy Studies (STARD) is a list of 30 essential items to be included in a report of a diagnostic or biomarker accuracy study. *Radiology* is among many journals that have adopted STARD for manuscript review. STARD checklist can be used to guide design and performance of a study from its outset. Adherence to STARD standards insures scientific and statistical rigor and ethical transparency.

TABLE OF CONTENTS/OUTLINE

Elements of the STARD checklist
Intended use and clinical role of the index test Is the hypothesis interesting? Frame the question in an enduring paradigm, e.g. disease, presenting symptom What are the competing technologies? Flow of participants, using a diagram What are the inclusion and exclusion criteria? Where are potential biases are being introduced? Index test, in sufficient detail to allow replication Document for reliability – hardware specifications, imaging and reader manuals, data forms Account for variability. Rationale for choosing the reference standard Is it clinically meaningful? Valid - survival, quality of life, cost effectiveness Questionable – response, pathologic/surgical findings Generalizability – Will the results be applicable at other practice settings? Registry and number: ClinicalTrials.gov

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Susanna I. Lee, MD, PhD - 2013 Honored Educator
Quality Improvement: Before You Dictate 'Please Refer to Separately Dictated Chest CT Report or Abdomen CT Report', You Should be Aware of the Following

All Day Room: HP Community, Learning Center

Participants
Ahmed El-Sherief, MD, Los Angeles, CA (Presenter) Nothing to Disclose
Rahul D. Renapurkar, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Joseph T. Azok, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Andrei S. Purysko, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Dana Ataya, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Charles T. Lau, MD, MBA, Broadview Heights, OH (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
- For multiphasic noncontiguous scans of the chest and abdomen/pelvis that are performed separately and are sent to subspecialty radiologists for review, valuable chest information exists on the chest portion of the Abdomen/Pelvis CT and valuable abdominal information exists on the chest portion of the Chest CT given differences in contrast bolus position.
- Review of the chest portion of the Abdomen/Pelvis CT by the chest radiologist and review of the abdomen portion of the Chest CT by the abdominal radiologist will help to:
  1) increase diagnostic accuracy,
  2) reduce misses,
  3) alleviate unnecessary follow up studies, and
  4) improve management

TABLE OF CONTENTS/OUTLINE

Review of Chest Portion of Abdomen/Pelvis CT can help:
- Confirm presence or absence of a pulmonary embolus
- Confirm presence or absence of cardiac thrombus
  - Right atrial thrombus
  - Left atrial appendage tip thrombus
  - Left ventricular apex thrombus
- Confirm presence or absence of cardiac metastasis

Review of Abdomen Portion of Chest CT can help:
- Detect hypervascular abdominal lesions
  - Hypervascular pancreatic lesion
  - Hypervascular liver lesion
- Detect washout of a hypervascular liver lesion
- Pathology about the diaphragm that may be missed
  - Malignant lesions
  - Diaphragm
  - Lower rib
  - Vertebra/Paravertebral soft tissues (about the thoracolumbar junction)

Honored Educators
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https://www.rsna.org/Honored-Educator-Award/

Rahul D. Renapurkar, MD - 2016 Honored Educator
Awards
Certificate of Merit

Participants
Aparna Srinivasa Babu, MD, Darby, PA (Presenter) Nothing to Disclose
Amanda L. Steinberger, DO, Darby, PA (Abstract Co-Author) Nothing to Disclose
Michael L. Brooks, MD, JD, Lansdowne, PA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
This exhibit will enable readers to Understand the role an expert witness plays in a lawsuit Become familiar with the duties of an expert witness Understand expert witness interactions with the attorney and the jury Explore the financial implications of expert witness testimony Gain insight into preparation for becoming an expert witness Aid defense attorney in selecting appropriate expert witnesses if involved in malpractice litigation

TABLE OF CONTENTS/OUTLINE
Brief historical perspective of the role of a radiologist as expert witness Succinct overview of the legal process involved in malpractice lawsuits with emphasis on the expert witness’ role Duties of an expert witness Expert witness financial reimbursement Steps to ensure adequate preparation for the role of an expert witness Expert witness bias and strategies for avoidance Tips to maintain credibility as expert witness Selection of suitable expert witnesses if involved in a malpractice lawsuit
Let Lectures Die. Long Live to YouTube? Overview of the Radiology Education in Med School

All Day Room: HP Community, Learning Center

Participants
Alberto J. Rojas Astorga, MD, Santiago, Chile (Presenter) Nothing to Disclose
Cristian Varela, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Pamela A. Bozzo-Silva, MD, MS, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Daniel I. Lazo, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Eduardo Sina Zepeda, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
• To review the current status of medical education, with emphasis on the teaching of radiology in med school.
• To examine the content that is recommended, The Alliance of Medical Student Educators in Radiology (AMSER) “Must-see” list and its applicability outside USA.
• To compare the different methods of content distribution.
• To learn how to take advantage of the digital content.

TABLE OF CONTENTS/OUTLINE
• Educational aims.
• The medical education nowadays.
• The med student, batteries are not included.
• The AMSER “must-see” list.
• Differences with national curriculum and expert’s recommendations.
• The role of the cases in radiology education. From self-study to self-learning.
• The explosion digital content distribution and how is taking over traditional media in radiology education.
• YouTube Infinite source of open content. Quality is not included.
• Suggested criteria to select the proper educational content for your students.
• Create your own content, the world will thank you.
• Our experience: o Why we stop doing traditional lectures. o How we did it. o What we do instead. o What we are learning in the process.
• Conclusions and concerns.
How to Deliver a Useful Radiology Practice to Medical Students in Five Days

All Day Room: HP Community, Learning Center

Participants
Elisabeth Cruces Fuentes, BDS, Murcia, Spain (Presenter) Nothing to Disclose
Lucia Hernandez Sanchez, MBBS, Murcia, Spain (Abstract Co-Author) Nothing to Disclose
Irene Cases Susarte, Murcia, Spain (Abstract Co-Author) Nothing to Disclose
Begona Marquez-Artegente-del-Castillo, MS, Murcia, Spain (Abstract Co-Author) Nothing to Disclose
Elena Parlorio de Andres, Murcia, Spain (Abstract Co-Author) Nothing to Disclose
Jose Maria Garcia Santos, MD, PhD, Murcia, Spain (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

- Dedicated time for clinical practice in Radiology is sometimes very short, the student’s role is mostly passive and objectives are not clear. Time and professor’s role have to be optimized.
- Mean objectives of short radiological practices should be: to recognize the Radiology Department and the radiologist’s relevance within the clinical process; to be introduced in the basics of radiology reading, not ignoring the need for specialized interpretation; to acknowledge the importance of an appropriate use of medical imaging.
- To be delivered, useful practices have to include: clinical sessions, specific clinical rotations, dedicated radiological and ultrasound hands-on seminars, essentials of brain CT reading, basic seminar on MRI concepts and imaging recognition; and discussion on general appropriateness criteria for medical imaging.
- As professors, radiology residents and medical students improve both involvement and motivation of other medical students.

TABLE OF CONTENTS/OUTLINE

- Variety of clinical sessions
- Objectives of clinical rotations
- Contents of radiological seminars
- Design and contents of ultrasound seminars
- Achieving agreement on qualitative Brain CT assessment
- MR contrast and lesion recognition
- Interactive evidence-based session on imaging appropriateness
- Pros and cons: students’ opinion
**Teaching Points**

The purpose of this exhibit is to review the various criteria available for tumor response assessment to immunotherapy drugs, review the patterns of tumor response to immunotherapy drugs with case-based examples, discuss the challenges and pitfalls encountered while applying the established tumor assessment criteria for imaging reviews in clinical trials.

**Table of Contents/Outline**

Describe response assessment criteria used for monitoring response to immunotherapeutic drugs including RECIST, irRC, irRECIST.

Rationale for appropriate technique and rules for assessment.

Review patterns of tumor response to immunotherapeutic drugs.

Discuss pitfalls including pseudo-progression.

Case-based review of the criteria.

Summary and conclusions.

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Susanna I. Lee, MD, PhD - 2013 Honored Educator
An Interactive Application Incorporating 3D Models and 2D Illustrations for Enhanced Prostate MRI Training

All Day Room: HP Community, Learning Center

**Participants**

Tiffany Raber, Chicago, IL *(Presenter)* Nothing to Disclose
Aytekin Oto, MD, Chicago, IL *(Abstract Co-Author)* Research Grant, Koninklijke Philips NV
Leah Lebowicz, Chicago, IL *(Abstract Co-Author)* Nothing to Disclose
Kevin Brennan, Chicago, IL *(Abstract Co-Author)* Nothing to Disclose
Donna Hughes, Chicago, IL *(Abstract Co-Author)* Nothing to Disclose
Charles W. Westin, MD, Chicago, IL *(Abstract Co-Author)* Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: To visually teach techniques in accurately detecting relevant anatomy and pathological structures in normal prostate and prostate cancer using multi-parametric prostate MRI. To engage the user’s visual memory and spatial ability for greater correlation of the pathology in MRI scans and in three dimensions. To increase understanding of prostate cancer pathology by utilizing interactivity and incorporating 3D models, schematic illustrations, annotations and patient data to create a dynamic learning experience.

**TABLE OF CONTENTS/OUTLINE**

Overview of the role of MRI in prostate cancer detection  Review of zonal prostate anatomy (peripheral, transitional, central zone, AFMS, urethra and seminal vesicles), prostate cancer and its mimic (infection, hemorrhage, BPH). Advantages of three-dimensional visuals in education  Interactivity in higher education  Media consideration

**Principles/design**  Comparison of existing learning modules for MRI education  User interface design  Overview

**Honored Educators**

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Aytekin Oto, MD - 2013 Honored Educator
The Radiology Quality Score Card: An Easy Way to Track all your Quality Metrics

Awards
Identified for RadioGraphics

Participants
Bettina Siewert, MD, Brookline, MA (Presenter) Nothing to Disclose
Olga R. Brook, MD, Boston, MA (Abstract Co-Author) Research Grant, Toshiba Medical Systems Corporation
Ronald L. Eisenberg, MD, JD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Jonathan B. Kruskal, MD, PhD, Boston, MA (Abstract Co-Author) Author, UpToDate, Inc
Mary G. Hochman, MD, Boston, MA (Abstract Co-Author) Stockholder, General Electric Company; Stock options, Nomir Medical Technologies, Inc; Author, UpToDate, Inc

TEACHING POINTS
By viewing this exhibit the radiologist will become familiar with:
- an easy way of organizing quality metrics.
- how to analyze the captured quality data.

TABLE OF CONTENTS/OUTLINE
Introduction- important quality metrics for a radiology department in regards to national patient safety goals, Joint Commission and professional society requirements (such as peer review data)
Anatomy of a Radiology Quality score Card- which metrics need to be included, how are they collected, how are they displayed- front page of the score card (i.e. summary of results)- back pages (display individual data points and information for analysis and discussion)
Analysis of Trends- how the score card is used in departmental quality assurance meetings- analysis of trends- development of improvement measures

Honored Educators
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Jonathan B. Kruskal, MD, PhD - 2012 Honored Educator
Jonathan B. Kruskal, MD, PhD - 2016 Honored Educator
Ronald L. Eisenberg, MD, JD - 2012 Honored Educator
Ronald L. Eisenberg, MD, JD - 2014 Honored Educator
Health Service, Policy and Research Sunday Poster Discussions

Sunday, Nov. 27 12:30PM - 1:00PM Room: HP Community, Learning Center

**Monitoring Radiology Residency Website Traffic During the Interview Season Including The Match**

**PURPOSE**

Unfilled Diagnostic Radiology (DR) residency Match spots have varied over time, with the lowest total percent fill rate (86.9%) occurring in the 2015 Match with 152 unfilled positions compared to only 6 unfilled positions in 2010 (99%). Most unfilled positions fill subsequently in the NRMP Supplemental Offer and Acceptance Program (SOAP), known as the Scramble prior to 2012. We predict SOAP applicants utilize institutional website data to gain information about the unfilled programs, as it is well known that medical students view and learn about GME programs via the internet. Google Trends monitors web search traffic over time, and is a useful tool in industry to help analyze product placement.

**METHOD AND MATERIALS**

Publicly available NRMP Match data for Match years 2005 to 2016 were reviewed. Google Trends (GT) is a free online application available from parent web browser company Google. GT search terms included: radiology residency and residency in radiology, and data was obtained in weekly quantities throughout annual interview cycles during the study period. Cross reference and analysis of NRMP Match and GT search term data was reviewed.

**RESULTS**

Variation in the number of unfilled DR residency Match spots (Figure 1) during the study period of 2005 to 2016 were found: (average = 52, max = 152 (2015), min = 6 (2010)). GT Search Volume Index (SVI) during Match Week (Figure 2) averaged 43 for "Radiology Residency" and related queries. Internet inquiries peaked during the Scramble/SOAP portion of the NRMP Match week when the total number of unfilled DR positions reached a threshold of 40 (Figure 3).

**CONCLUSION**

Recent NRMP Match results demonstrate an increasing trend of unfilled radiology spots. We predicted and confirmed a peak in internet related search traffic for DR residencies during the NRMP Match week, during which unfilled DR spots are replete via the SOAP/Scramble process. Prior evidence points to residency applicants relying on website data for institutional program information. Thus we encourage that website updates occur before Match week.

**CLINICAL RELEVANCE/APPLICATION**

Monitoring radiology residency website traffic via Google Trends application is informative for determining optimal website maintenance scheduling, especially during the interview season.

**Effectiveness of Small Group Workshops in Teaching Residents How to Create Educational Radiology Videos**

**PURPOSE**

The purpose is to evaluate the effectiveness of small group workshops in teaching radiology residents how to create and share educational radiology videos.

**METHOD AND MATERIALS**

Nine 1st-year and 2nd-year radiology residents, who were Mac computer users, were selected for a 90-minute hands-on workshop performed in small groups of 4-5 participants. The workshop was designed and led by two 4th-year radiology residents and a radiology faculty who were all experienced in creating and publishing radiology educational videos. Participants were expected to complete a pre-participation survey and a 15-minute preparatory computer exercise. Residents were also expected to bring their
Categorizing Errors in Abdominal Imaging: Lessons Learned from Quality Assurance Conference

Station #4

Awards
Cum Laude

Participants
Thomas E. Pendergrast, MD, Winston-Salem, NC (Presenter) Nothing to Disclose
Rafel Tappouni, MBBCh, FRCPC, Winston-Salem, NC (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: To discuss categories of errors made in abdominal imaging by individual interpreters: Observation, Interpretation, and Communication. Inadequate Patient Data Gathering will also be included as a category. To demonstrate through example cases the mechanisms by which these errors occur. To share lessons learned through the discussion of errors during abdominal imaging quality assurance conference. These lessons show how categorizing errors can lead to practice modifications.

RESULTS
On the pre-workshop survey, eight of nine residents indicated that they had no prior experience using Mac products to write movie scripts, record videos or edit videos. When asked what resources could potentially be used to write a script, a variety of free resources were listed such as, but not limited to, Google, StatDx and textbooks to name a few. The remaining questions on the pre-workshop and post-workshop surveys had a five point rating scale (1 = not comfortable at all, 5 = very comfortable). The average resident ratings for various activities prior to, one day after and three months after the workshop are presented, respectively: 1) Writing script: 1.8, 3.6, 4.1; 2) Recording video using iPad: 2.1, 4, 4; 3) Transferring video from iPad to iMovie on Mac: 1.8, 4.2, 4; 4) Video splicing, video order rearrangement, video speed and length adjustment: 1.7, 3.3, 3.2; 5) Recording voice over: 1.6, 4, 3.6; 6) Adding text slides: 1.7, 3.8,3.9; 7) Adding radiologic images: 2, 4.1, 4.1; 8) Saving video in iMovie: 1.7, 4.2, 3.8; and 9) Uploading video to website: 1.7, 3.7, 3. Subsequently, the nine residents successfully created their own video projects.

CONCLUSION
Small group workshops are effective teaching tools for improving resident comfort in creating and sharing educational videos.
that improve quality in radiology.

TABLE OF CONTENTS/OUTLINE

Individual errors as barriers to quality Types of individual errors and contributing mechanisms: Error of Observation Error of Interpretation Error of Communication Inadequate Patient Data Gathering Example cases from abdominal imaging with lessons learned Summary of how categorizing errors helps the individual interpreter avoid such errors in the future

Decision Analysis and Cost-effectiveness Analysis in the Diagnostic Imaging: Practical Tips and Guidance

Station #5

Participants
Chong Hyun Suh, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Kyung Won Kim, MD, Seoul, Korea, Republic Of (Presenter) Nothing to Disclose
Seong Ho Park, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Research Grant, DONGKOOK Pharmaceutical Co, Ltd
Junhee Pyo, Boston, MA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

1. Understand the importance of diagnostic imaging in medical decision making and its unique feature of cost-effectiveness research
2. Understand the overall process of cost-effectiveness analysis

Table of Contents/Outline:1. What is Decision Analysis and Cost-effectiveness assessment (CEA)? 2. Unique feature of Decision Analysis and CEA research in the radiology field 3. Overall process of CEA research- Framing of the research question- Developing the decision model- Data sources- Interpretation & Reporting 4. Issues in the cost-effectiveness analysis in the radiology field- Variation of healthcare between societies- Long process between diagnosis and outcome, increasing uncertainty- Factors influencing medical decision other than cost-effectiveness (e.g., ethical issue, religion, circumference, etc).
Knowledge of the Costs of Diagnostic Imaging: A Survey of Trainees at a Large Academic Medical Center

PURPOSE
To study the knowledge of trainees across a variety of specialties regarding the costs of common imaging services.

METHOD AND MATERIALS
During early 2016, we conducted an online survey of all 1,238 trainees enrolled in internships, residencies and fellowships at a large academic medical center. Respondents were asked to estimate Medicare national average total allowable fees for 5 commonly performed imaging examinations: two view chest radiograph, contrast-enhanced CT abdomen and pelvis, unenhanced MRI lumbar spine, complete abdominal ultrasound, and unenhanced CT Brain. Responses within ±25% of the published amount were deemed correct. Respondents were also asked about: training program, postgraduate year of training (PGY status), previous relevant radiology education, and estimated number of imaging studies ordered per week.

RESULTS
A total 381 of 1,238 trainees returned complete surveys (30.8%). Across all five examinations, only 5.7% (109/1,905) of responses were within the correct ±25% range. 76.4% (291/381) of all respondents incorrectly estimated every examination's cost. The vast majority of cost estimates were overestimates (86.8%) with mean absolute percentage estimation errors ranging from 137% for two view chest radiograph to 2852% for unenhanced MRI lumbar spine. Overall, cost estimation accuracy was not associated with number of imaging studies ordered per week or advancing years of training. There was no significant difference in cost estimation accuracy between those who participated in medical school radiology electives vs. those who did not (p=0.14). Only 17.5% of all trainees considered their imaging cost knowledge adequate. 75.3% of respondents would like to see integration of basic cost data into their clinical decision support (CDS) and/or computerized physician order entry systems (CPOE).

CONCLUSION
Post graduate physician trainees across all disciplines demonstrate limited knowledge of the costs of commonly performed imaging studies. Since trainees regularly order imaging studies, they have a unique opportunity to be lifelong stewards of high value care. Targeted medical school education as well as integration of imaging cost information into CDS/CPOE appear indicated.

CLINICAL RELEVANCE/APPLICATION
Improving referring clinicians' knowledge of costs of common imaging studies could help them provide patient's with higher value care.

Did You Miss Me? Bias in Radiology: The How & Why of Misses and Misinterpretations

TEACHING POINTS
The purpose of this exhibit is to: 1. Introduce the cognitive processes used when interpreting radiologic cases. 2. Explain the different types of bias that can lead to error. 3. Demonstrate instructive case examples of misses due to different types of bias. 4. Review strategies for overcoming bias. 5. Identify improvements that can be made to reduce systemic errors and personal errors.

TABLE OF CONTENTS/OUTLINE
Introduction: The rates and types of diagnostic radiologic errors Misses vs. misperceptions
Approaching a case: Type I and Type
Type I thinking: Relies on heuristics and intuition
Type II thinking: Involves logic and reasoning

Types of bias that can lead to error:
- Anchoring
- Attribution
- Availability
- Confirmation
- Satisfaction of search
- Premature closure
- Hindsight
- Instructive case

Examples of radiologic misses and the bias to which they can be attributed

How to reduce systemic errors in your practice:
- Understanding your cognitive process
- Identify useful strategies for reducing personal errors and minimizing bias
- Review quiz
**Imaging Challenges and Change: A Global Perspective**

Sunday, Nov. 27 2:00PM - 3:30PM Room: S403B

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

**Participants**
Frank J. Lexa, MD, Philadelphia, PA *(Moderator)* Nothing to Disclose
Frank J. Lexa, MD, Philadelphia, PA *(Coordinator)* Nothing to Disclose
Shigeru Ehara, MD, Morioka, Japan, (ehara@iwate-med.ac.jp) *(Presenter)* Nothing to Disclose
Geraldine B. McGinty, MD, MBA, New York, NY, (gbm9002@med.cornell.edu) *(Presenter)* Nothing to Disclose
Bruce B. Forster, MD, Vancouver, BC, (bruce.forster@vch.ca) *(Presenter)* Nothing to Disclose
Luis Marti-Bonmati, MD, PhD, Godella, Spain, (Luis.Marti@uv.es) *(Presenter)* Nothing to Disclose

**LEARNING OBJECTIVES**
1) Examine the drivers of change in radiology in four nations: Canada, Japan, Spain and the US. 2) Compare and contrast the challenges that radiology faces globally. 3) Understand how organized radiology is adapting to a rapidly changing societal landscape for its services. 4) Analyze best practices for handling the challenges that we all face.

**ABSTRACT**
Radiologists in many parts of the globe are experiencing rapid changes in the way that they practice their specialty. The drivers of change and the challenges that they create are legion. In this session, we will have distinguished speakers from four nations discuss the challenges that organized radiology faces in their home countries and how they have tried to adapt in these circumstances. The topics will include a wide ranging array of strategic considerations including but not limited to: aging patient populations, rising demand for healthcare, changing government regulation, methods of payment in the public (and where appropriate the private) sector, regulatory issues, radiologist workforce issues and the training of the next generation of radiologists. The session will encompass both presentations and a panel discussion which will be informative and provocative.

**Handout:** Luis Marti-Bonmati

Radiological and Nuclear Terrorism: Like It or Not, Radiology Professionals Will Be in the ‘Hot’ Seat

Monday, Nov. 28 8:30AM - 10:00AM Room: S502AB

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA

Discussions may include off-label uses.

Participants
Donald P. Frush, MD, Durham, NC, (donald.frush@duke.edu) (Moderator) Nothing to Disclose
John Lanza, MD, Pensacola, FL (Presenter) Nothing to Disclose
Nick Dainiak, MD, Oak Ridge, TN, (Nick.dainiak@orau.org) (Presenter) Nothing to Disclose
Brooke R. Buddemeier, Livermore, CA (Presenter) Nothing to Disclose

LEARNING OBJECTIVES

1) To describe the scenarios for a radiological dispersal device (RDD) or improvised nuclear device (IND). 2) To discuss roles of federal, state, and local governments. 3) To review the roles and strategies of hospital teams, including radiology professionals in the setting of an RDD/IND. 4) To provide resources for radiology professionals for response in the setting of RDD/IND. 5) Describe the very large mass casualty scenarios of concern that radiologists might be called to help with. 6) Understand the difference between radiation contamination and exposure. 7) Understand the clinical strategies used to manage contamination and exposure. 8) Identify internet resources physicians can use to inform themselves about preparing for and participating in responses to these types of incidents.

ABSTRACT
MACRA: Radiology Tools for Success  
Monday, Nov. 28 8:30AM - 10:00AM Room: S402AB  

Participants
Ezequiel Silva III, MD, San Antonio, TX (Moderator) Nothing to Disclose
Pamela Kassing, Reston, VA (Coordinator) Nothing to Disclose
Frank J. Rybicki III, MD, PhD, Ottawa, ON, (frybicki@toh.ca) (Presenter) Nothing to Disclose
Mythreyi Bhargavan-Chatfield, PhD, Reston, VA, (mchatfield@acr.org) (Presenter) Nothing to Disclose
J. Raymond Geis, MD, Fort Collins, CO (Presenter) Shareholder, Montage Healthcare Solutions, Inc; Advisor, Nuance Communications, Inc;

LEARNING OBJECTIVES
1) To define MACRA and how it applies to radiology. 2) To provide details regarding new quality programs. 3) To describe how radiologists can participate in quality initiatives as they pertain to metrics and appropriate use of medical imaging exams.

ABSTRACT
MACRA stands for the ‘Medicare Access and CHIP (Children’s Health Insurance Program) Reauthorization Act of 2015’. Details can be found at the following website: cms.gov. This legislation has several important implications for radiology as a practice, and for individual radiologists who add value to the overall healthcare system. MACRA is designed to accelerate the U.S. trend to value-based care. Part of this initiative is participation in quality programs. The two types of programs are Merit-Based Incentive Payment System (MIPS) and Alternative Payment Models (APMs). MIPS, the first strategy, uses pieces of well-established programs that have been important to radiology. The purpose of this presentation is to familiarize conference attendees with ongoing initiatives to improve quality in radiology, in particular with respect to quality metrics designed by radiologists that are important to our field. The presentation will also highlight other initiatives to perform and measure appropriate imaging as a means for quality improvement.

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Frank J. Rybicki III, MD, PhD - 2016 Honored Educator
Value-based Imaging in the ACO Model

Participants
James Whitfill, MD, Scottsdale, AZ, (jwhitfill@shpcare.com) (Moderator) President, Lumetis, LLC;
Rodney S. Owen, MD, Scottsdale, AZ (Presenter) Nothing to Disclose
Gary H. Dent, MD, Macon, GA (Presenter) Officer, Radius LLC; Stockholder, Radius LLC; Advisory Board, Datalyst LLC;

LEARNING OBJECTIVES
1) Review the forces at work which are pushing the US Healthcare system to adopt value based care models. 2) Learn the mechanisms currently used to contract for value based care contracts. 3) Learn how imaging and radiology currently relate to new value based care models. 4) Hear from radiologists who are active leaders in value based models in their community.

ABSTRACT
SSC07

Science Session with Keynote: Health Service, Policy and Research (Evidence-based Medicine/Guidelines/Outcomes)

Monday, Nov. 28 10:30AM - 12:00PM Room: S102D

 AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Janie M. Lee, MD, Bellevue, WA (Moderator) Research Grant, General Electric Company
Fabian Bamberg, MD, MPH, Tuebingen, Germany (Moderator) Speakers Bureau, Bayer AG; Speakers Bureau, Siemens AG; Research Grant, Bayer AG; Research Grant, Siemens AG;

Sub-Events

SSC07-01  Active Surveillance versus Initial Nephron-Sparing Treatment for Small Renal Tumors: A Decision Analysis

Monday, Nov. 28 10:30AM - 10:40AM Room: S102D

Participants
Stella Kang, MD,MSc, New York, NY (Presenter) Nothing to Disclose
William C. Huang, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
Scott Braithwaite, MD,MSc, New York, NY (Abstract Co-Author) Nothing to Disclose
Pari Pandharipande, MD, MPH, Boston, MA (Abstract Co-Author) Nothing to Disclose

PURPOSE

The standard of care for small renal tumors is partial nephrectomy (PN), but consequent renal function decline is associated with worsened overall survival in patients with baseline chronic kidney disease (CKD). We compared the life expectancy (LE) of biopsy and imaging-based active surveillance (AS) with nephron-sparing treatments of PN or percutaneous ablation.

METHOD AND MATERIALS

A state-transition microsimulation model was used to project LE in hypothetical patients with mild or moderate CKD diagnosed with small renal tumors. Tested strategies were: 1) uniform PN; 2) selective PN, favoring ablation for stage 2 or 3a CKD and complex tumor anatomy, or stage 3b CKD and any tumor anatomy; 3) biopsy-based treatment (ablation of most cancers); and 4) imaging AS. The model incorporated tumor anatomic complexity scoring predictive of post-surgical renal functional loss, renal functional decline, mortality rates by CKD stage, comorbidities, benign and malignant lesions, and risk of cancer progression with and without initial treatment. Patients were susceptible to all-cause, surgical, and cancer-specific mortality. Our primary model outcome was LE. Sensitivity analysis was performed to test the stability of results with variability of parameters.

RESULTS

In 65-year-old men with stage 2 or 3 CKD and at least moderate tumor anatomic complexity, biopsy-based treatment had the highest LE relative to other strategies. For example, in stage 3a CKD biopsy LE was +2.2 years, +0.47 years compared to uniform PN and selective PN, respectively. Biopsy favorability was driven by treatment of fewer benign tumors, and sparing of some patients worsened CKD and mortality risks associated with PN. In frail patients with Charlson comorbidity index of at least 1 and stage 3 CKD, AS was less effective than biopsy-based treatment (-0.40 years) but superior to PN (+0.50 years). Results were most sensitive to rates of renal function decline and related mortality.

CONCLUSION

Biopsy of small renal tumors with ablation for cancers is likely the most effective management strategy in patients with stage 2 or 3 CKD and at least moderately complex tumor anatomy. In CKD stage 3 patients, preference likely strongly affects the decision for imaging AS instead of biopsy.

CLINICAL RELEVANCE/APPLICATION

CKD stage and tumor anatomy guide personalized treatment selection for small renal tumors; biopsy-based treatment is likely the most effective option in most tumor and CKD categories.

SSC07-02  Variations in National Benchmarks of CT Dose Metrics for Different Protocols within A Body Part: Analysis of the ACR Dose Index Registry

Monday, Nov. 28 10:40AM - 10:50AM Room: S102D

Participants
Amrhossein Mozafarykhahseh, MD, boston, MA (Presenter) Nothing to Disclose
Atul Padole, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Debapriya Sengupta, MBBS,MPH, Reston, VA (Abstract Co-Author) Nothing to Disclose
Judy Burleson, Reston, VA (Abstract Co-Author) Nothing to Disclose
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PURPOSE

To assess the variation in national benchmark radiation dose metrics associated with different CT protocols with in a body region using the ACR Dose Index Registry (DIR)
METHOD AND MATERIALS

Using Radiology PlayBook identification (RPID) numbers, we assessed CT dose metrics (CT dose index volume (CTDIvol); dose length product (DLP); and size-specific dose estimates (SSDE for chest and abdomen only)) for 969591CT studies in ACR DIR from 2011-2015 (10% sample). Data were stratified according to body regions (head (n=332,137), chest (n = 171,641) and abdomen (n = 271,287)) individual protocols per body region and year of CT study 2011-15. The CT protocols were, head n=6 (routine head, temporal bone, neck, sinuses, face) chest n=6 (low dose chest, pulmonary angiography, high resolution chest, routine chest, cardiac CT angiography, calcium scoring), abdomen, n=4 (routine abdomen pelvis, multiphase renal, kidney stone, multiphase liver). For each subgroup, we determined the 50th (median) and 75th quartiles for CTDIvol (mGy), SSDE (mGy) and DLP (mGy.cm)

RESULTS

The median and 75th quartiles of CTDIvol (mGy) for all protocols of chest (11, 17), abdomen (13, 19) and head (49, 58) were significantly different (p<0.0001). Accordingly, median and 75th quartiles of DLP for chest (393, 694), abdomen (655, 962) and Head (780, 950) were also significantly different (p<0.0001). The median and 75th quartiles of SSDE for chest (13, 19) and abdomen (15, 21) were significantly different (p<0.0001). There has been significant reduction in radiation CTDIvol across different CT protocols from 2011 to 2015 (p<0.0001) with highest dose reduction in chest region (19.4%) and lowest in head region (9.6%). Highest and lowest CTDIvol values for different protocols in each body regions were: chest (low dose chest: 3.1 and cardiac CT angiography: 15); abdomen (kidney stone: 12 and multiphase liver: 14); Head (neck CT: 15 and routine head CT: 51)

CONCLUSION

Amongst body protocols, chest CT is associated with lowest CTDI, DLP and SSDE, while, head CT had the highest dose metrics. The head region also had the lowest decrease in CTDIvol from 2011-2015

CLINICAL RELEVANCE/APPLICATION

Comparing the national dose indices can give a better understanding to every facility to see where its position regarding dose reduction and help optimizing dose management strategies

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Subba R. Digumarti, MD - 2013 Honored Educator

SSC07-03 Do Primary Care Physicians Follow Their Own Specialty Society’s Guidelines Regarding Mammography Screening? An Analysis of Nationally Representative Data

Monday, Nov. 28 10:50AM - 11:00AM Room: S102D

Awards

Student Travel Stipend Award

Participants

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PURPOSE

To determine whether family physicians, internal medicine physicians, and obstetricians/gynecologists (Ob/Gyn) adhered to their specialty society’s recommendations for mammography screening in response to the 2009 U.S. Preventive Services Task Force (USPSTF) revised recommendations (only the last group continued to support annual screening starting at age 40).

METHOD AND MATERIALS

All office-based preventive service visits for women ≥ 40 years old from the National Ambulatory Medical Care Survey (NAMCS) for years 2007-2012 were included. Visits involving patients with breast-related symptoms or history of cancer were excluded. Binary regression analyses were performed to identify changes over time in the mammography referral rate per 1,000 visits by physician specialties. Data were stratified by age and, in multivariate analyses, adjusted for patient- and office-level covariates. All analyses were weighted to account for the multi-stage probability sampling design of NAMCS.

RESULTS

Based on sampling weights, our analysis represented an average of 35,947,290 preventive medicine visits per year from 2007 to 2012. Overall, between 2007-2008 and 2011-2012, mammography referral rate decreased after the 2009 USPSTF revised recommendations (285 to 215 per 1,000 visits, -25.0% adjusted change, p=0.006). The largest decrease in mammography referral rate was among family physicians (230 to 128 per 1,000 visits, -49.0% adjusted change, p<0.001), especially for women ≥ 75 years old (161 to 47 per 1,000 visits, -77.9% adjusted change, p=0.006). This was followed by internal medicine visits (135 to 79 per 1,000 visits, -45.8%, adjusted change, p=0.038). No statistically significant changes were noted in mammography referral rates among obstetricians/gynecologists over time (476 to 419 per 1,000 visits, -14.4% adjusted change, p=0.23).

CONCLUSION

Mammography referral rates decreased after the 2009 USPSTF revised recommendations. However, larger declines were seen
among family and internal medicine physicians compared to obstetricians/gynecologists, commensurate with differences in their respective societal recommendations.

**CLINICAL RELEVANCE/APPLICATION**

Specialty society recommendations influence referral practices for screening mammography. Radiologists should engage with societies to advocate benefits of mammography and greater screening use.

**SSC07-04  Mammography as a Lens to Patient Engagement: Associations between Demographic and Medical Factors and Participation in Screening Mammography**

**PURPOSE**

To use compliance with mammographic screening as a surrogate to understand potential demographic and medical factors affecting patient engagement.

**METHOD AND MATERIALS**

HIPAA-compliant and IRB approved. Women age 50 to 64 who obtained SM in 2005 were followed for 10 years after the index SM to determine compliance. Compliance was rated as low (≤3 SMs over the study period), medium (4-7 SMs) or high (≥8 SMs). High and low compliance groups were compared based on demographic and medical factors, with sub-analysis of a high-cost patient subset. Odds ratios (OR; lower indicating poorer compliance) with 95% confidence intervals (CI), t-tests, and multivariate logistic regression were performed (significance p≤0.0001 before Bonferroni correction).

**RESULTS**

10,166 patients met inclusion criteria: 60.7% demonstrated high compliance, 30.7% moderate compliance, and 8.6% low compliance. Demographic factors associated with low compliance were younger age (p=0.0001), non-English speaking (OR 0.7, CI 0.5-0.9, p=0.008), active smoking (OR 0.4, CI 0.4-0.5, p=0.0001), unmarried (OR 0.7, CI 0.6-0.8, p=0.0001), and less primary care contact (OR 0.5, CI 0.4-0.6, p=0.0001), with active smoking and less primary care contact persistent in the high-cost patient subset. Medical factors associated with low compliance were domestic violence (OR 0.1, CI 0.0-0.7, p=0.005), congestive heart failure (OR 0.4, CI 0.3-0.6, p=0.0003), chronic obstructive pulmonary disorder (OR 0.3, CI 0.2-0.5, p<0.0001), depression (OR 0.5, CI 0.4-0.6, p<0.0001) and drug abuse (OR 0.3, CI 0.1-0.6, p<0.0001) amongst others, with generalized pain (OR 0.3, CI 0.17-0.54, p<0.0001) and posttraumatic stress disorder (OR 0.4, CI 0.2-0.7, p=0.001) unique to the high-cost patient subset. Immunization failure (OR 0.4, CI 0.3-0.6, p=0.008) to the high-cost patient subset. Immunization (OR 2.5, CI 2.1-3.0, p<0.0001), annual physical (ORs 4.6, CI 1.1-18.7, p<0.001) and bisphosphonate use (OR 3.6, CI 1.7-7.6, p<0.0001) were among the factors associated with high compliance.

**CONCLUSION**

A variety of demographic and medical factors are strongly associated with participation in screening mammography, potentially informing system-wide patient engagement efforts.

**CLINICAL RELEVANCE/APPLICATION**

Patient engagement is central to success in value-based care. Radiology can deliver value to health systems by harnessing screening data to inform patient engagement and care optimization efforts.

**SSC07-05  Having a PCP is the Strongest Predictor of Successful Follow-up of Inner-City Patients Enrolled in a Randomized, Controlled Cardiovascular Imaging Trial**

**PURPOSE**

Ethnic minorities, women, and those of low socioeconomic status are widely under-represented in clinical trials. This has led to new emphasis by funding organizations to support urban clinical trials, which are more representative of the patient mix encountered in 21st century U.S. medical practice. Few studies explore factors associated with successful follow-up in these historically difficult to reach patients. To identify patient characteristics and methods of contact that predict successful contact for follow-up in an urban, predominantly ethnic minority, female-majority, poor population to help devise strategies to improve retention.

**METHOD AND MATERIALS**

We retrospectively reviewed records from a prospective randomized controlled trial of 400 hospitalized chest pain patients that received either coronary CT angiography or radionuclide myocardial perfusion imaging in order to determine which characteristics were associated with successful telephone follow-up at one year after enrollment. We assessed demographic variables, medical history, and social factors using bivariate analyses. A multivariate analysis was performed using variables from the bivariate analysis with p≤0.2.
**RESULTS**

The overall successful one-year follow-up rate was 95%(381/400). Study participants who completed follow-up were significantly more likely to have a primary care physician (PCP) [88%(337/381) versus 68%(13/19)], speak English natively [52%(199/381) versus 26%(5/19)], have a higher Charlson comorbidity index score, and be female [64.0%(244/381) versus 42.1%(8/19)]. Having a PCP and native English language remained significant at multivariate analysis. Socioeconomic status score, quantity of contact information and insurance status were not significantly associated with successful follow-up.

**CONCLUSION**

Patients engaged with the healthcare system by having a PCP are significantly more likely to achieve follow-up. Successful follow-up is associated with native English speaking.

**CLINICAL RELEVANCE/APPLICATION**

In running clinical trials it is vital to assess whether participants have a primary care physician - a strong predictor of successful follow-up. This informs resource allocation to optimize protocols.

**SSCO7-06**  
**Impact of Evidence Based Feedback on MRI Lumbar Spine Orders Place the Day of an Outpatient Primary Care Visit for Lower Back Pain**

**Monday, Nov. 28 11:20AM - 11:30AM Room: S102D**

**Participants**

Hanna M. Zafar, MD, Philadelphia, PA (Presenter) Nothing to Disclose  
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Ramin Khorasani, MD, Boston, MA (Abstract Co-Author) Consultant, Medicalis Corp

**PURPOSE**

To evaluate the impact of evidence based feedback on lumbar spine MRI (MRLS) orders placed the day of an outpatient primary care visit for lower back pain (LBP).

**METHOD AND MATERIALS**

After a 7 month baseline observation period, we randomized 114 outpatient primary care providers over 12 months to receive either periodic report cards (group A) or real-time clinical decision support (CDS) at the time of MRLS order entry (Group B) on adherence to the American College of Physicians / American Pain Society Joint Practice LBP Guidelines (Intervention 1). Subsequently, all providers received both forms of feedback over 11 months (Intervention 2). Outpatient visits for LBP were identified through International Classification of Diseases 9th Revision (ICD-9) codes and Medicare fee-for-service patients were excluded. Our primary outcome measure was the proportion of MRLS orders the day of LBP visit. To account for delayed orders, we also analyzed MRLS orders placed 30 days after the initial outpatient LBP visit. Differences between baseline and intervention were assessed using Pearson Chi Squared analysis.

**RESULTS**

A total of 172,999 primary care outpatient visits were included over the study period. Despite randomization, there were significant differences in the proportion of MRLS orders the day of LBP visit between Group A (5.0%, 70 /1,392) and Group B (3.2%, 42 /1,321) (p=0.026) suggesting randomization was not effective; therefore pooled baseline and Intervention 2 data for both groups was evaluated. Although the proportion of outpatient primary care MRLS visits increased between baseline (2,713/42,654, 6.4%) and Intervention 2 (4,466/64,003 (7.0%) (p=0.005), the proportion of MRLS orders the day of LBP visit decreased between baseline (112/2,713, 4.1%) and Intervention 2 (137/4,466 (3.1%) (p=0.028)(Figure 1); this represented an absolute reduction of 1% and relative reduction of 24% ((4.1-3.1)/4.1x100 = 24%); There was no difference in the proportion of MRLS orders placed 30 days after the initial outpatient LBP visit.

**CONCLUSION**

Evidence based feedback can decrease outpatient MRLS orders the day of primary care LBP visit and does not result in delayed MRLS orders.

**CLINICAL RELEVANCE/APPLICATION**

Despite an increase in outpatient primary care LBP visits, evidence based feedback through periodic report cards and CDS can substantially decrease MRLS orders placed the day of LBP visits.

**SSCO7-07**  
**Utilization of Pre-operative Imaging for Colon Cancer: A Population-based Study**

**Monday, Nov. 28 11:30AM - 11:40AM Room: S102D**

**Participants**

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**PURPOSE**

To assess the use of pre-operative imaging for colon cancer and to identify factors associated with utilization in routine clinical
METHOD AND MATERIALS
This population-based, retrospective cohort study used the Ontario Cancer registry to identify a random sample of 25% of all colon cancer patients treated with surgery in the province of Ontario, Canada from 2002-2008. Pre-operative imaging of the chest, abdomen and pelvis was identified from physician billing records. Modified poisson regression was used to analyze factors associated with practice patterns.

RESULTS
Of the 7,249 included patients, 71% had pre-operative chest imaging (CT=63%, CXR=67%) and 77% had abdominal imaging (CT=63%, US=33%, MR=0.5%). Higher rates of imaging in the 2006-2008 cohort when compared with 2002-2004 were identified for: any abdomen imaging (86% vs. 68%; p<0.001); CT abdomen (79% vs. 47%; p<0.001); any chest imaging (79% vs. 62%; p<0.001); CT chest (20% vs. 6%; p<0.001). Variables associated with use of any chest imaging include: age (RR 1.17-1.18 ≥50 vs <50 years, p<0.001); co-morbidity (RR 1.07-1.08 for moderate vs. none, p<0.001); surgeon volume (RR 0.95 for low vs high volume providers, p=0.013); geographic region (regional variability RR 0.90-1.11, p<0.001); and study period (RR 1.28 for 2006-2008 vs 2002-2004, p<0.001). There was no association with gender, hospital volume or socioeconomic status. Variables associated with use of any abdomen imaging included: hospital volume (RR 0.92 low vs high volume providers, p<0.001); geographic region (regional variability RR 0.77-1.09, p<0.001); and study period (RR 1.25 for 2006-2008 vs 2002-2004, p<0.001). There was no association with age, gender, comorbidity, socioeconomic status, or surgeon volume.

CONCLUSION
In clinical practice, use of pre-operative imaging increased over time and was associated with age, comorbidity, geographic region, and provider volume.

CLINICAL RELEVANCE/APPLICATION
While pre-operative chest, abdomen and pelvis imaging to stage colon cancer is considered standard of care, there is considerable variation in routine practice. This variation may reflect opportunities for quality improvement.

SSC07-08 Colorectal Liver Metastases: A Systematic Review and Meta-Analysis of the Diagnostic Performance of MultiDetector CT, Gadoxetate Disodium-Enhanced MRI, and PET/CT

Monday, Nov. 28 11:40AM - 11:50AM Room: S102D

Participants
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Seung Soo Lee, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Moon-Gyu Lee, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose

PURPOSE
To perform a systematic review and meta-analysis of the test performance of multidetector CT, gadoxetate disodium-enhanced MRI, and PET/CT for the diagnosis of colorectal liver metastasis (CRLM) and to identify the factors influencing this performance.

METHOD AND MATERIALS
A systematic search of PubMed MEDLINE and EMBASE was done to identify research studies that investigated the diagnostic performance of multidetector CT, gadoxetate disodium-enhanced MRI, and PET/CT for CRLM from November 2004 to January 2016. Study quality was assessed using QUADAS-2. According to the types of the imaging tests, the threshold effect and study heterogeneity were analyzed and the meta-analytic summary sensitivity and specificity were estimated. Meta-regression analysis was done to further explore study heterogeneity.

RESULTS
Of the 803 articles screened, we found 41 studies in 27 articles reporting imaging diagnosis of CRLM (17 studies for CT, 11 studies for MRI, 13 studies for PET/CT). The meta-analytic summary sensitivity of CT, MRI, and PET/CT were 80.4% (95% CI, 73.7, 85.6%), 79.5% (87.3, 95.6%), and 74.1% (62.1, 83.3%), respectively. The summary specificity of CT, MRI, and PET/CT were 77.8% (95% CI, 61.9, 88.3%), 87.1% (76.2, 93.4%) and 93.9% (83.9, 97.8%), respectively. There was no threshold effect in any of the imaging tests. All of the three imaging tests demonstrated substantial study heterogeneities both in the sensitivity and specificity (I2=90.9%, 92.6% for CT; I2=90.1%, 84.0% for MRI; I2=94.8%, 93.4% for PET/CT). The types of the reference standard (pathology only vs. combined use with follow-up images) were significant factors for study heterogeneity in all of the three imaging tests (P<0.05). Neoadjuvant chemotherapy significantly decreased the sensitivity of CT (P=0.02) and MRI (P<0.01). The sensitivity in CT was significantly higher in studies from eastern countries than in those from western countries (P=0.02).

CONCLUSION
Despite the heterogeneous performances among the studies, gadoxetate disodium-enhanced MRI showed the highest sensitivity and PET/CT showed the highest specificity for diagnosing CRLM.

CLINICAL RELEVANCE/APPLICATION
Gadoxetic disodium-enhanced MRI and PET/CT should be considered as an additional imaging modality to CT when we evaluate patients with suspicious colorectal liver metastasis.

SSC07-09 Healthy Service, Policy and Research Keynote Speaker: Translating Evidence Into Best Practices

Monday, Nov. 28 11:50AM - 12:00PM Room: S102D
Janie M. Lee, MD, Bellevue, WA (Presenter) Research Grant, General Electric Company
Incidental Findings Detected during Research MRI: Analysis in Healthy Volunteers

PURPOSE

Magnetic resonance imaging (MRI) research is frequently performed in healthy volunteers in order to evaluate or optimize new pulse sequences. The purpose of this study was to assess the frequency and clinical significance of incidental findings (IFs) in healthy volunteers undergoing research MRI scans.

METHOD AND MATERIALS

Research MRI scans of 218 healthy subjects (119 male, 95 female, mean age 33.1 ± 10.6 years) performed in our department over a one year period were considered for this analysis. Research scans of the brain (n=65), spinal cord (n=100), kidneys (n=3), liver (n=3), hands (n=13) and hips (n=34) were reviewed systematically by board certified radiologists for incidental findings. Incidental findings were documented and reported directly to the subjects and further. The type of recommended follow-up examinations and their findings were analysed.

RESULTS

Incidental findings were reported in 17 of 218 (7.8%) subjects. 3 ovarian cyst, 1 expanded ductus choledochus and 3 subject with increased number of lymph nodes inguinal. 6 subjects were identified to have disc prolaps in the spinal cord and needed further orthopedic treatement. 1 subject needed further treatment in neurosurgery course of a clivuschonrome and 1 subject needed further treatment by the dermatologist as the IF was identified as a melanoma. 2 subjects didn’t need any further treatment. The most IFs were found in the spinal cord scans (n=14). 3 IFs were identified in the brain scans. No IFs were found in the hand, renal, hepatic or hip scans.

CONCLUSION

Incidental findings that required further medical examination may occur in up to 8% of healthy volunteers undergoing research MRI scans. Therefore, subject should be informed about the possibility of an incidental findings and the research scans should be revised by a board certified radiologist.

CLINICAL RELEVANCE/APPLICATION

MRI research scans should be systematically evaluated for incidental findings.

A Study of the Clinical Significance of Short-Term Repeat Computed Tomography Examination on Same Anatomic Region

PURPOSE

To evaluate the clinical significance of repeat computed tomography (CT) examination on the same anatomical region within 1 month for the diagnosis and management of the patient.

METHOD AND MATERIALS

Our retrospective cohort enrolled the 182 patients whose outside CT scans were registered in our picture archiving and communicating system (PACS) and who underwent repeat CT examination on same anatomical region within 1 month from October to December of 2013. The reasons for repeat CT examinations were classified four categories; unrelated, follow-up, duplicative, and supplementary examinations. And then, we classified clinical significance of repeat CT examination based on the changes of clinical symptoms, management, and CT findings.
RESULTS
In total of 182 patients, unrelated, follow-up, duplicative, and supplementary examinations were 4 (2.2%), 114 (62.7%), 20 (11%), and 44 (24.1%) cases, respectively. Among them, appropriate examinations were 155 (85.2%) and inappropriate examinations were 27 (14.8%) cases. Each of appropriate-unhelpful and inappropriate-helpful examinations were 4 cases (2.2%). Consequently, there were 8 cases (4.4%) of cause-clinical significance discordance (CCSD).

CONCLUSION
Most of the repeat CT examinations were helpful and beneficial to clinical practices. The guideline for repeat CT examinations needs to be widely spread and used to train the physicians to reduce the CCSD and unhelpful repeat CT examinations.

CLINICAL RELEVANCE/APPLICATION
In 2011, repeat computed tomography examinations on the same anatomical region within 1 month were reported as up to 20% in Korea. For this reason, Korean society of radiology published ‘The guideline for CT examination and repeat CT examination’ for reducing unnecessary repeat CT examination. In our study based on this guideline, most of the repeat CT examinations were appropriate and helpful for the diagnosis and management of the patient, but there were some unhelpful repeat CT examinations. And there were a few unhelpful examinations, which were classified to appropriate and a few helpful examinations, which were classified to inappropriate examinations according to the guideline, showing CCSD. Therefore, we think that modification of the guideline and training of clinicians about the guideline will help to reduce the CCSD and unhelpful repeat CT examination.

HP208-SD- MOA3 Trends in Cardiac Magnetic Resonance Imaging within the Medicare Population from 2002-2014

Participants
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Baskaran Sundaram, MRCP, FRCR, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

PURPOSE
To study trends in the use of cardiac magnetic resonance imaging (CMR) in the Medicare population from 2002-2014.

METHOD AND MATERIALS
The nationwide Medicare Part B Physician/Supplier Procedure Summary Master Files for 2002 through 2014 were the data source. All primary CPT-4 codes for CMR were selected and grouped together. The add-on codes for velocity flow mapping were analyzed separately. Procedure volumes for the codes were provided by the databases each year. Medicare's specialty codes were used to indicate how many exams were performed by radiologists, cardiologists, and other physicians. Trends were analyzed over the course of the study.

RESULTS
In 2002, 3019 CMR exams were performed in the Medicare population. Volume increased to 12,210 in 2007 (+304%). Over the next 2 years, volume declined, but then increased to 14,227 in 2010. From 2010 to 2014, there were steady increases each year, reaching 18,925 in the latter year (+33% compared with 2010). In 2002, radiologists had performed 70% of all CMR exams, while cardiologists had performed 24%. Thereafter, participation by cardiologists increased much more rapidly than it did by radiologists. By 2005, cardiologists were doing more than radiologists, but both specialties continued to increase their participation at the approximately the same rates in subsequent years. In 2014, radiologists performed 8902 cases (47%) while cardiologists performed 9196 (49%). The add-on velocity flow mapping exams were rarely done clinically until 2010, when 3515 were done. By 2014, 5460 were done, of which 40% were by radiologists and 56% by cardiologists.

CONCLUSION
The use of CMR in the Medicare population grew rapidly from 2002 to 2007, then more slowly thereafter. However, overall volume of primary CMR exams is low, compared with other cardiac imaging modalities. Participation by radiologists and cardiologists in 2014 was approximately equal.

CLINICAL RELEVANCE/APPLICATION
N/A

HP209-SD- MOA4 ICD-10 Implementation: Initial Report of Its Impact on Radiology A Large Multi-Hospital Radiology Practice

Participants
Margaret Fleming, MD, Atlanta, GA (Presenter) Nothing to Disclose
Richard Duszak JR, MD, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
Dan MacFarlane, Atlanta, GA (Abstract Co-Author) Nothing to Disclose

PURPOSE
Last year’s conversion of the nation’s International Classification of Diseases (ICD) coding system from 14,025 ICD-9 to 69,823 ICD-10 codes was projected to result in a 6-fold increase in codes used by radiology practices. We aimed to determine the actual code conversion magnitude and the revenue impact of ICD-10 on a large multi-hospital practice that diligently prepared for this transition.

METHOD AND MATERIALS
Using billing data stripped of all patient identification, we studied all 232,798 professional claims for 118 radiologists at a large health system for the first 5 months after ICD-10 implementation on October 1, 2015. Primary ICD-10 codes for the top 90th percentile of all radiology examinations were identified, both overall and by subspecialty division. Using ICD-9 codes for the entirety of 2014 and previously described methodology, we calculated code conversion impact factors (number of applicable ICD-10 codes ÷ number of applicable ICD-9 codes). To assess the impact of the ICD-10 implementation on cash flow, average monthly claims days in accounts receivable status both before and after October 1, 2015 were compared.

RESULTS
For all 232,798 radiology service claims, 5,135 ICD-10 codes were used as primary diagnoses, but only 540 codes (11% of all) comprised the top 90% of all claims. By comparison, 348 ICD-9 codes accounted for the top 90% of all claims in 2014. This translates to a code conversion impact factor of 1.6 for the department as a whole, far less than the literature predicted 6-fold increase. The code conversion impact for individual divisions ranged from 0.5 (breast) to 3.3 (musculoskeletal). All other divisions saw impact factors in the 1.5-2.0 range. The average monthly number of days claims were in accounts receivable status ranged from 33 to 39 days both before and after ICD-10 implementation. Monthly averages for the 7 months prior to and the 5 months after ICD-10 conversion were similar (35.0 vs. 35.2, p=0.86).

CONCLUSION
For large radiology groups adhering to “best practice” ICD-10 implementation planning guidelines, the impact of last year's widely feared ICD-10 transition, both with regard to code conversion magnitude and delays in cash flow, was negligible.

CLINICAL RELEVANCE/APPLICATION
For well-prepared radiology practices, the coding and revenue impact of last year’s widely feared national ICD-10 transition was minimal.

Natural History of Intraductal Papillary Mucinous Neoplasm Regarding Development of Pancreatic Cancer: A Systematic Review and Meta-analysis

Participants
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PURPOSE
Current management guidelines for intraductal papillary mucinous neoplasm (IPMN) of the pancreas largely consider the association between morphologic features and odds of harboring malignancy at a cross-sectional time. Knowledge of natural history of the disease will help guide even more proper patient management. This study was to create a systematic evidence synthesis on cumulative incidence of pancreatic cancer in IPMNs during follow-up.

METHOD AND MATERIALS
Original research studies that investigated cumulative incidence of pancreatic cancer, including both noninvasive and invasive cancers, in unresected IPMNs or presented data detailed enough for the cumulative incidence to be drawn were identified with thorough systematic search of PubMed MEDLINE and EMBASE (until December 31, 2015). We calculated meta-analytic estimates of the cumulative incidence at 1-, 3-, 5- and 10-year follow-up separately for low-risk patients, defined as lack of mural nodule/solid component and main pancreatic ductal dilation, and non-low-risk patients. Studies containing a small fraction (<10%) of non-low-risk patients were pooled together with low-risk group. Study heterogeneity was analyzed using Higgins’ $I^2$ and Cochrane Q test.

RESULTS
Of 1304 papers screened, we found 9 studies for low-risk group, also including 3 studies containing a small fraction (1.8–9%) of non-low-risk patients, for a total of 2388 patients and 10 studies for non-low-risk group for a total of 879 patients. Meta-analytic pooled cumulative incidence at 1-, 3-, 5- and 10-year follow-up was 0.25% (95% CI, 0.03–0.58%; $I^2=64.3%$), 3.55% (1.20–6.97%; $I^2=0.1%$) and 8.28% (5.18–11.98%; $I^2=80.4%$) for low-risk group; and 1.78% (0.01–5.29%; $I^2=82.3%$), 6.37% (1.65–13.29%; $I^2=86.9%$), 12.17% (5.00–21.59%; $I^2=12.17%$) and 24.32% (14.42–35.71%; $I^2=75.2%$) for non-low-risk group.

CONCLUSION
Despite some ambiguity related to large study heterogeneity, the natural history of unresected IPMNs also supports the current risk stratification for management. Potentially fairly high long-term incidence of cancer in low-risk IPMNs may indicate a need for long-term follow-up while large study heterogeneity requires further data accumulation.

CLINICAL RELEVANCE/APPLICATION
Knowledge of natural history of IPMN regarding cancer development in addition to known morphologic risk factors for harboring cancer facilitates more precise patient management.

Radiation Safety in the Fluoroscopy Suite: History, Current Devices, Future Developments, and Controversies

Participants
Diane Szaflikarski, MD, Mineola, NY (Presenter) Nothing to Disclose
Esther E. Coronel, MD, Mineola, NY (Abstract Co-Author) Nothing to Disclose

Awards
Certificate of Merit
TEACHING POINTS

1. Many radiation protection devices, such as newer lightweight aprons and slim fitted leaded glasses, may fit and look better, but may not offer the same degree of protection as some of their counterparts. 
2. As new data emerges regarding how much radiation exposure is too much, radiologists must be aware of risks to eyes, brain, and other critical structures so that they can take appropriate measures to maximize safety and mitigate risks.

TABLE OF CONTENTS/OUTLINE

- Review current guidelines for radiation exposure to workers in the fluoro suite
- Detail the function and use of radiation badges, including appropriate use and interpreting their results
- Review history of radiation safety in the fluoro suite, including original, current, and future products
- Thoroughly review current devices
- Specific topics discussed include (but are not limited to):
  - Time, distance, and shielding
  - Dose reduction in the IR suite, including last image hold, changing frame rate, and road mapping
  - Shielding built into the fluoro suite
  - Lead aprons, glasses, face shields, and caps
  - Leaded gloves
  - Detailed discussion about current radiation safety controversies, including possible changes to exposure limits, cataracts and brain tumors in fluoroscopy suite workers, and debates over various types of personal protective devices (lightweight lead, leaded caps, etc.)
Participants

Participating in this Lunch & Learn are:

James Whitfill, MD, Phoenix, AZ

Program Information

This course does not offer CME credit.
Participants

PARTICIPANTS

Jerry Thomas, MS, FAAPM, DABR, CHP, DABSNM, Wichita, KS
William Tobin BS, Tyler, TX

PROGRAM INFORMATION

This course does not offer CME credit.
**Health Service, Policy and Research Monday Poster Discussion**

**Monday, Nov. 28 12:45PM - 1:15PM Room: HP Community, Learning Center**

**HP**

**AMA PRA Category 1 Credit ™**: .50

**Participants**
Paul P. Cronin, MD, MS, Ann Arbor, MI (Moderator) Nothing to Disclose

**Sub-Events**

**HP211-SD-MOB1**  
**Reviewing the Reviewers: The Timeliness of Peer Review in Radiology Journals**  
Station #1

**Awards**

**Student Travel Stipend Award**

**Participants**
Kip Guja, PhD, Stony Brook University, NY (Presenter) Nothing to Disclose
Anuradha Janardhanan, MBBS, Ampang, Malaysia (Abstract Co-Author) Nothing to Disclose
Mauricio Castillo, MD, Chapel Hill, NC (Abstract Co-Author) Nothing to Disclose
Mark E. Schweitzer, MD, Stony Brook, NY (Abstract Co-Author) Consultant, MMI Munich Medical International GmbH Data Safety Monitoring Board, Histogenics Corporation

**PURPOSE**
Timeliness is a key attribute of scholarly peer review because it allows new evidence to become promptly available to readers, and lack thereof is thought to contribute to longer publication cycle times. Hence, we sought to identify patterns among late reviewers.

**METHOD AND MATERIALS**
We analyzed 17,404 editorial requests for manuscript peer review sent from Radiology (RSNA), JMRI, and AJNR from July 2013 to June 2015. Data were obtained directly from the editorial staff of the journals and analyzed in Scholar One, a web-based peer review tool. Reviewers were classified as on-time or late based on compliance with the 14-day window provided. Each review was quality scored independently, and these scores were correlated with reviewer seniority, geographic location, and reviewer frequency.

**RESULTS**
During the two-year period analyzed, 3,251, 4,055, and 10,096 peer reviews were submitted to JMRI, AJNR, and RSNA, respectively. Of those, 36%, 37%, and 26% were submitted late. Nearly half of the late reviews were overdue by 1-3 days (41% in JMRI, 44% in AJNR, and 53% in RSNA). Only 1% of the reviews submitted to RSNA and AJNR were overdue by two weeks or more, but that figure rose to nearly 9% for the JMRI reviews. However, there was no statistically significant difference in score between JMRI reviews that were on-time when compared to those that were two weeks late or more. Interestingly, reviewer scores in RSNA tended to worsen with lateness, such that the on-time average was 1.0 vs 1.7 (higher is inferior) for reviews that were two weeks late or more. A similar trend was seen in AJNR, where the on-time average was 2.73 vs 2.53 (lower is inferior) for late reviews. Reviewers from the US or Europe are nearly twice as likely to be late (40%) as compared to reviewers from other parts of the world (25%).

**CONCLUSION**
The study shows that over a two-year period, more than 25% of peer reviews were submitted late, and a significant portion of the late submissions were overdue by more than 7 days. Late reviews were associated with worse scores, smaller journals, and reviewers from either the US or Europe.

**CLINICAL RELEVANCE/APPLICATION**
Rigorous and timely peer review is vitally important, as highlighted by growing concern over the reproducibility of research. Lack of timely peer review is a common problem in radiological journals.

**HP212-SD-MOB2**  
**Beyond Reading Images: A National Survey of Radiology Residents’ Study Habits**  
Station #2

**Participants**
Fadi Toonsi, MBBS,FRCP, Montreal, QC (Presenter) Nothing to Disclose
Wael Kattan, MBBS, MA, Montreal, QC (Abstract Co-Author) Nothing to Disclose
Fahad Essbaiheen, MBBS,FRCP, Ottawa, ON (Abstract Co-Author) Nothing to Disclose
Jeffrey Chankowsky, MD, Montreal West, QC (Abstract Co-Author) Nothing to Disclose

**PURPOSE**
Our goal was to identify study habits of radiology residents across the country’s residency training programs and to rank their top reading resources.

**METHOD AND MATERIALS**
An online survey investigating various study habits was distributed to residents in 11 university-based radiology programs. The
survey was adopted from the literature and designed to measure study habits unique to radiology residency. 263 residents were emailed. 80 responded (30% response rate). Two responses were excluded, one was in the internship year and the other did not specify residency level.

RESULTS
Outside working hours, the mean number of hours spent studying per week was 11 (min 2 max 50, standard deviation 8.6). Recommended reading lists provided by other/senior residents were considered important in guiding 70% of respondents’ reading, while only 23% of residents depended on lists provided by their departments. None depended on the ACR recommended readings lists. 54% of residents had specific reading goals in terms of material to cover during the year. Only 32% of them covered more than 40% of this material. 43% of residents decided upon a radiology textbook. Selected textbooks were Fundamentals of Diagnostic Radiology (59%), Primer of Diagnostic Imaging (26%), Diagnostic Imaging series and Radiology Review Manual (6%). Textbooks were most ranked as the top educational source for radiology reading (39%), followed by case-based books (24%) then the online website STATdx (20%). Radiographics was considered an important study source by 87% of residents, Radiology by 56%, The American Journal of Radiology by 44%, The Journal of American College of Radiology by 10%. 83% of residents try to keep daily reading relevant to the rotation they are doing and 88% try to read about pathologies they encounter in daily work.

CONCLUSION
Radiology residents tend to follow a pattern of reading habits and focus their readings to specific resources. Most residents follow recommendations from each other on what and where to read from.

CLINICAL RELEVANCE/APPLICATION
Identifying study habits and most used radiology resources can guide new residents to trusted reading sources, saving them time and money. Our survey could potentially be used for detection and eventual guidance of low-performing residents.

METHOD AND MATERIALS
This retrospective study was approved by the institutional review board, with waiver of informed consent. Natural language processing was used for filtering of potential adrenal incidentaloma cases in all thoracic and abdominal CT reports from 2010 till 2012. A total of 635 patients, with initial presentation or follow-up imaging for adrenal incidentaloma during this period, were identified. Demographical data, the radiological characteristics of the lesion, values of biochemical evaluation, and patient outcome were all recorded. Stepwise logistic regression was used to construct the prediction model. The model predicts the presentation of an adrenal incidentaloma if a patient is at risk for malignancy or hormonal hyperfunction of the adrenal gland, thus generates a predicted probability for every individual patient. The prediction model was evaluated on its usefulness in clinical practice using decision curve analysis based on different threshold probabilities. For patients whose predicted probability is lower than the predetermined threshold probability, treatment can be omitted. Patient outcomes were verified with the nationwide network and registry of histo- and cytopathology in the Netherlands (PALGA).

RESULTS
A prediction model was successfully developed, with an area under the curve (AUC) of 0.76 on both the training and validation data. Unnecessary diagnostic work-up was avoided in 7% of patients with an adrenal incidentaloma by using a threshold probability of 1.5% on the validation data. The sensitivity of the decision curve analysis was 100% and specificity was 7%. By increasing the threshold probability to 2%, unnecessary diagnostic work-up was avoided in 23% of the patients, but clinically relevant patients were missed. The sensitivity and specificity were 90% and 24%.

CONCLUSION
Using a prediction model for predicting a clinically relevant outcome of adrenal incidentalomas is an effective solution for saving patients from unnecessary diagnostics. Hereby, management of this growing patient group can be tailored to the individual patient.

CLINICAL RELEVANCE/APPLICATION
Our prediction model enables both radiologists and referring physicians to reduce unnecessary work-up for adrenal incidentaloma.
Unnecessary medical services, including the repetition of medical tests, has been estimated to contribute to $210B healthcare costs annually. The purpose of this study was to quantify repeat head CT imaging rates for repeat patient visits for similar clinical indications.

**METHOD AND MATERIALS**

Our clinical data warehouse was retrospectively queried for all patients 18 years or older who underwent a head CT examination within 24 hours (h) of an emergency department (ED) visit at any of our health system’s four hospitals during 2014 (index enrollment). All head CT scans performed prior to and after the index enrollment and associated ICD-9 codes were obtained. Our primary outcome measure was the rate of repeat head CT imaging (defined as any head CT obtained on the same patient before or after index enrollment in 2014). We assessed rates of repeat head CT by ICD-9 code category.

**RESULTS**

In 2014, 1,259 patients who visited one of our health system ED underwent a head CT examination within 24h of their encounter. These patients underwent a total of 1,673 head CT examination during any encounter before or after index enrollment that year. 27.4% (345/1,259) of patients underwent 414 repeat head CTs in addition to their initial head CTs (total of 759 head CTs) with an overall repeat imaging rate of 24.7% (414/1,673). Repeatedly imaged patients underwent between 2 - 5 scans. In repeatedly imaged patients, the most common ICD codes for initial and repeat head CT scans were head injury (26.7%; 203/759), headache (14.8%; 113/759), altered mental status, dizziness, or syncope (9.7%; 74/759) and convulsion or epilepsy (5.2%; 40/759).

**CONCLUSION**

At least a quarter of head CT examinations in the ED setting result in a repeat study during the same year, with the majority being trauma related. In non-trauma patients, headache, altered mental status, and convulsion are the most common ICD-9 codes associated with repeat imaging.

**CLINICAL RELEVANCE/APPLICATION**

A substantial number of patients in the ED setting undergoing head CT imaging undergo at least one additional examination for a similar indication during another ED visit within one year.

**HP215-SD-MOBS**

**Tuberculosis Screening in Asylum Seekers during Germany’s Migrant Crisis: A Single Center Experience**

Station #5

Participants
Michael Kostrzewa, MD, Mannheim, Germany (Presenter) Institutional research agreement, Siemens AG
Anja M. Weidner, MD, Mannheim, Germany (Abstract Co-Author) Nothing to Disclose
Erika Buchholz, Mannheim, Germany (Abstract Co-Author) Nothing to Disclose
Thomas Henzl, MD, Mannheim, Germany (Abstract Co-Author) Research support, Siemens AG; Speaker, Siemens AG
Stefan O. Schoenberg, MD, PhD, Mannheim, Germany (Abstract Co-Author) Institutional research agreement, Siemens AG
Gerald Weisser, MD, PhD, Mannheim, Germany (Abstract Co-Author) Institutional Grant support, Apple Inc

**PURPOSE**

Europe’s migrant crisis has posed a multitude of challenges, especially to the health care systems. We report on our experiences and outcomes after 15 months of screening for tuberculosis (TB) and present an overview of our adopted workflow and findings.

**METHOD AND MATERIALS**

The German law for asylum seekers defines the following screening algorithm: asylum seekers older than 15 years, not pregnant, living in a camp, have to accept a medical investigation for infectious diseases including one x-ray of the chest. From September 2014 until December 2015 all asylum seekers referred to our University Medical Center from two reception camps (Mannheim and Darmstadt) were included in this retrospective study. Screening consisted of a chest x-ray in one plane posterior-anterior. In case of abnormal findings a low dose chest computed tomography (CT) without contrast medium was performed. Patients with suspicious findings for infectious disease on CT were then admitted to our ward for infectious diseases for further diagnostic workup and therapy if necessary.

**RESULTS**

In total, 7238 asylum seekers were screened (1043 female, 6195 male, mean age 28y). Most frequent countries of origin were Syria (1577), Gambia (1063) and Iraq (572). It has to be noted that reception camps are assigned asylum seekers of a certain origin, thus our patient cohort is not representative of the whole asylum seeker collective in Germany. In 2014 until December 2015 all asylum seekers referred to our University Medical Center from two reception camps (Mannheim and Darmstadt) were included in this retrospective study. Screening consisted of a chest x-ray in one plane posterior-anterior. In case of abnormal findings a low dose chest computed tomography (CT) without contrast medium was performed. Patients with suspicious findings for infectious disease on CT were then admitted to our ward for infectious diseases for further diagnostic workup and therapy if necessary.

In our cohort of 7238 asylum seekers the prevalence of acute TB of 0.22% was lower when compared to the current literature. We assume, that the low prevalence is due to preselection of people who flee from their countries (younger, well educated, healthier) and a preselection of countries.

**CONCLUSION**

Due to the European migrant crisis TB screening and prevalence among asylum seekers has a high impact on the German health care system.

**HP133-ED-MOBS**

**Interpretative Error in Radiology - Etiologies and Potential Solutions**

Station #6

Awards
TEACHING POINTS

After reviewing this exhibit you will be able to:
1) Classify errors in diagnostic interpretation.
2) Recognize factors that contribute to interpretive error.
3) Explain methods to mitigate and prevent error.

TABLE OF CONTENTS/OUTLINE

In addition to potential patient harm, there are significant medicolegal ramifications of interpretative errors in radiology. In 2008, the average indemnity payment for radiology was $358,349. Oversight of abnormalities/misinterpretation of radiologic images also termed 'failure to diagnose', accounted for 40%-54% of these radiology-related medical malpractice cases. Therefore, it is important that radiologists become familiar with the literature on interpretive error and factors that impact diagnostic interpretation. This presentation describes the types of interpretative error (perception and cognitive), contributing factors, and strategies for error mitigation.
In the evolution from fee-for-service health care to value-driven population health, health care systems must learn to embrace patient-centered, value-focused practices, and the leaders of these systems must be committed to building these cultures. Radiology departments serve as a centralized core of experts guiding accurate diagnosis and informing care pathways, and therefore have tremendous opportunity in defining and enhancing value for providers and their patients. At University of Utah and elsewhere, engaged radiologists are tapping into the health system’s culture of value to evolve the way providers engage with imaging specialists to improve patient expectations, and created real and measurable cost efficiencies. Important tools that have been implemented include “value-driven outcomes” to measure quality and costs, patient-reported outcomes tools to integrate patient perspectives in the value equation, patient and referrer-satisfaction measurement tools, and new value improvement training programs for residents and fellows are among several examples to be discussed. The transformation of health care requires engaged radiologists to produce more cost effective, high quality, patient-centered outcomes.
SSE12
Science Session with Keynote: Health Service, Policy and Research (Economic Analyses/Utilities)
Monday, Nov. 28 3:00PM - 4:00PM Room: S102D

Participants
Christoph I. Lee, MD, Los Angeles, CA (Moderator) Research Grant, General Electric Company
Pari Pandharipande, MD, MPH, Boston, MA (Moderator) Nothing to Disclose

Sub-Events

SSE12-01  Health Service, Policy and Research Keynote Speaker: Measuring Value in Imaging
Monday, Nov. 28 3:00PM - 3:10PM Room: S102D

Participants
Pari Pandharipande, MD, MPH, Boston, MA (Presenter) Nothing to Disclose

SSE12-02  Cost-Effectiveness of Endovascular Therapy in Acute Ischemic Stroke: A Meta-Analysis-Based Patient Subgroup Evaluation
Monday, Nov. 28 3:10PM - 3:20PM Room: S102D

Awards
Trainee Research Prize - Resident

Participants
Wolfgang G. Kunz, MD, Munich, Germany (Presenter) Nothing to Disclose
M.G. Myriam Hunink, MD, PhD, Rotterdam, Netherlands (Abstract Co-Author) Nothing to Disclose
Sebastian E. Beyer, Munich, Germany (Abstract Co-Author) Nothing to Disclose
Maximilian F. Reiser, MD, Munich, Germany (Abstract Co-Author) Nothing to Disclose
Wieland H. Sommer, MD, Munich, Germany (Abstract Co-Author) Founder, QMedify GmbH
Kolja M. Thierfelder, MD, MSc, Munich, Germany (Abstract Co-Author) Nothing to Disclose

PURPOSE
Endovascular therapy in addition to IV thrombolysis (EVT+IVT) has been proven to be more effective compared to IV thrombolysis alone (IVT alone) in acute ischemic large vessel occlusion stroke within 6 hours of symptom onset. Our aim was to determine cost-effectiveness of the two approaches depending on the patient’s initial ASPECTS, NIHSS score, time from symptom onset, and occlusion location.

METHOD AND MATERIALS
A decision analytic model based on Markov simulations estimated the lifetime costs and quality-adjusted life years (QALY) associated with both approaches (model overview provided in Figure 1). The analysis was performed in a United States setting from a societal perspective. Model input parameters were obtained from recently published literature (base-case values and references provided in Table 1), in particular a meta-analysis of 5 randomized clinical trials (MR CLEAN, ESCAPE, REVASCAT, SWIFT PRIME, EXTEND IA). Probabilistic sensitivity analyses (PSA) using 10,000 Monte Carlo simulation runs were performed to estimate the overall uncertainty of model results. The net monetary benefit (NMB), incremental costs (IC), incremental effectiveness (IE) and incremental cost-effectiveness ratios (ICER) were derived from PSAs. The willingness to pay (WTP) was set to 50,000$/QALY.

RESULTS
Overall, EVT+IVT was cost-effective compared to IVT alone (IC: 4569$, IE: 1.59 QALYs, ICER: 2876$/QALY) in 100% of simulation runs and therefore very robust within our model. Across all patient subgroups, EVT+IVT led to gained QALYs and the mean ICERs were considered cost-effective below the WTP threshold (results provided in Table 2). However, the subgroups of patients with ASPECTS ≤5 or with M2 occlusions showed considerably higher ICERs (14,281$/QALY and 25,278$/QALY) and only reached suboptimal acceptability in the PSAs (75.6% and 60.7%). All other subgroups had an acceptability in the PSAs between 93% and 100%.

CONCLUSION
Endovascular therapy in addition to IV thrombolysis is likely to be cost-effective across most patient subgroups. In patients with ASPECTS ≤5 or with M2 occlusions EVT+IVT reached suboptimal acceptability in the PSAs and therefore cost-effectiveness remains uncertain in these subgroups.

CLINICAL RELEVANCE/APPLICATION
EVT is not only an effective but in general a highly cost-effective therapy of acute ischemic stroke. Larger studies are required to determine cost-effectiveness in unfavorable patient subgroups.

SSE12-03  ICD-10 Implementation: Initial Report of Its Impact on Radiology A Large Multi-Hospital Radiology Practice
Monday, Nov. 28 3:20PM - 3:30PM Room: S102D

Participants
Margaret Fleming, MD, Atlanta, GA (Presenter) Nothing to Disclose
Richard Duszak JR, MD, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
PURPOSE
Last year's conversion of the nation's International Classification of Diseases (ICD) coding system from 14,025 ICD-9 to 69,823 ICD-10 codes was projected to result in a 6-fold increase in codes used by radiology practices. We aimed to determine the actual code conversion magnitude and the revenue impact of ICD-10 on a large multi-hospital practice that diligently prepared for this transition.

METHOD AND MATERIALS
Using billing data stripped of all patient identification, we studied all 232,798 professional claims for 118 radiologists at a large health system for the first 5 months after ICD-10 implementation on October 1, 2015. Primary ICD-10 codes for the top 90th percentile of all radiology examinations were identified, both overall and by subspecialty division. Using ICD-9 codes for the entirety of 2014 and previously described methodology, we calculated code conversion impact factors (number of applicable ICD-10 codes ÷ number of applicable ICD-9 codes). To assess the impact of the ICD-10 implementation on cash flow, average monthly claims days in accounts receivable status both before and after October 1, 2015 were compared.

RESULTS
For all 232,798 radiology service claims, 5,135 ICD-10 codes were used as primary diagnoses, but only 540 codes (11% of all) comprised the top 90% of all claims. By comparison, 348 ICD-9 codes accounted for the top 90% of all claims in 2014. This translates to a code conversion impact factor of 1.6 for the department as a whole, far less than the literature predicted 6-fold increase. The code conversion impact for individual divisions ranged from 0.5 (breast) to 3.3 (musculoskeletal). All other divisions saw impact factors in the 1.5-2.0 range. The average monthly number of days claims were in accounts receivable status ranged from 33 to 39 days both before and after ICD-10 implementation. Monthly averages for the 7 months prior to and the 5 months after ICD-10 conversion were similar (35.0 vs. 35.2, p=0.86).

CONCLUSION
For large radiology groups adhering to "best practice" ICD-10 implementation planning guidelines, the impact of last year's widely feared ICD-10 transition, both with regard to code conversion magnitude and delays in cash flow, was negligible.

CLINICAL RELEVANCE/APPLICATION
For well-prepared radiology practices, the coding and revenue impact of last year's widely feared national ICD-10 transition was minimal.
At facilities which are qualified for additional reimbursement per exam, repeat MR exam for benign lumbar/cervical conditions in working-age subjects was more frequent compared to other facilities.

**SSE12-05 Cost Effectiveness of MRI for Detection of Prostate Cancer**

*Monday, Nov. 28 3:40PM - 3:50PM Room: S102D*

**Awards**

**Trainee Research Prize - Fellow**

**Participants**

Shivani Pahwa, MD, Cleveland, OH (*Presenter*) Research support, Siemens AG
Nicholas K. Schiltz, PhD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Lee E. Ponsky, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Ziang Lu, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Mark A. Griswold, PhD, Cleveland, OH (*Abstract Co-Author*) Research support, Siemens AG Royalties, Siemens AG Royalties, General Electric Company Royalties, Bruker Corporation Contract, Siemens AG

**PURPOSE**

To evaluate the cost-effectiveness of MRI guided strategies versus transrectal ultrasound guided (standard) biopsy strategy for detection of prostate cancer

**METHOD AND MATERIALS**

A decision analysis model was created using base case of hypothetical biopsy-naïve men in three age groups (41-50 years, 51-60 years, and 61-70 years), with a biopsy indicated based on clinical criteria. The strategies evaluated were: 1) Standard biopsy. 2) A diagnostic MRI exam followed by MRI targeted biopsy using either of the following techniques if a lesion is detected: (a) Cognitive guided biopsy; (b) MRI-ultrasound fusion biopsy; (c) in-gantry MRI biopsy; no further biopsy is performed if no lesion is seen on MRI. 3) A diagnostic MRI exam followed by one of the MRI targeted biopsy techniques; a standard biopsy is performed even when MR does not depict suspicious lesions. Each strategy was further examined with and without Gadolinium contrast. Parameters as prevalence of cancer, sensitivity and specificity of each technique, procedure costs, and Quality Adjusted Life Years (QALY) values for each strategy were derived from the literature and other published sources. Incremental cost effectiveness ratio (ICER) per QALY for each strategy was calculated using standard biopsy strategy as the common comparator group.

**RESULTS**

The strategy of using a non-contrast MRI exam to detect lesions, followed by cognitive MR biopsy, and foregoing standard biopsy if no suspicious lesion is seen, was most cost-effective with an ICER of $2095; in-gantry biopsy strategy yielded the highest gain in QALY with an ICER of $6675. Other MRI strategies were also cost effective with ICER ranging from $2485-$15816.

**CONCLUSION**

MRI guided strategies for detection of prostate cancer are cost-effective.

**CLINICAL RELEVANCE/APPLICATION**

The simple strategy of performing an MRI exam to detect lesions, followed by cognitive guided biopsy could be easily adopted in clinical practice. Advanced MRI methods that improve disease characterization could further improve cost-effectiveness of MRI in detecting aggressive prostate cancers.

**SSE12-06 2005-2014 CT and MRI Single Market Utilization Trends with a Non-Denial Prior Authorization Program**

*Monday, Nov. 28 3:50PM - 4:00PM Room: S102D*

**Participants**

Adam C. Powell, PhD, Houston, TX (*Presenter*) Researcher, HealthHelp, LLC; President, Payer+Provider Syndicate; Co-founder, ArxViva, Inc
David C. Levin, MD, Philadelphia, PA (*Abstract Co-Author*) Consultant, HealthHelp, LLC; Board of Directors, Outpatient Imaging Affiliates, LLC
Erin M. Kren, Houston, TX (*Abstract Co-Author*) Employee, HealthHelp, LLC
Roy A. Beveridge, MD, Louisville, KY (*Abstract Co-Author*) Employee, Humana Inc
James W. Long, Louisville, KY (*Abstract Co-Author*) Employee, Humana Inc
Amit K. Gupta, Houston, TX (*Abstract Co-Author*) Employee, HealthHelp, LLC

**PURPOSE**

Reducing unnecessary testing may benefit patients, as some computed tomography (CT) and magnetic resonance imaging (MRI) exposes patients to contrast, and all CTs expose patients to radiation. This study assessed shifts in CT and MRI utilization over a 9-year period after a private health insurer's implementation of a non-denial, consultative prior authorization program. As the insurer had previously experienced 10% annual utilization growth, the program was devised to improve patient safety.

**METHOD AND MATERIALS**

Normalized rates of exams per 1,000 members were plotted over 2005-2014 for people with commercial and Medicare Advantage health plans in one Southwest market, with utilization during 2005 set as the baseline. The prior authorization program was implemented at the start of 2006. CT and MRI utilization changes were compared with changes in plain film and ultrasound utilization. Changes were examined separately for health maintenance organization (HMO) and preferred provider organization (PPO) plans. Normalized utilization rates in 2006 and 2014 were reported.

**RESULTS**

Growth in imaging utilization decelerated or reversed during the study period among people with plans from the private insurer.
Contemporaneous low-tech imaging trends were mixed. By 2006, CT utilization dropped to being 76% to 90% of what it had been in 2005, depending on the plan. In 2014, it was 52% to 88% of its initial level. MRI utilization declined to 86% to 94% of its initial level in 2006, and further to 50% to 75% in 2014. Plain film radiography was between 74% and 88% of its initial level in 2006, depending on the plan, and then 60% to 88% of its initial level in 2014. Ultrasound utilization was 67% to 95% of its initial level in 2006, and 84% to 125% of its initial level in 2014.

CONCLUSION
There was a decline in CT and MRI utilization in the market after the introduction of the non-denial prior authorization program. The mixed trends in low-tech imaging suggest that a factor other than a decline in low-tech imaging contributed to the decline. The immediate declines suggest that the program may have contributed to the change, rather than an external factor.

CLINICAL RELEVANCE/APPLICATION
Both immediate and long-term decreases in CT and MRI utilization can occur after the implementation of a non-denial prior authorization program.
Prospering in the Era of Payment Reform

Tuesday, Nov. 29 8:30AM - 10:00AM Room: N226

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
James A. Brink, MD, Boston, MA (Moderator) Nothing to Disclose
James A. Brink, MD, Boston, MA (Coordinator) Nothing to Disclose

Learning Objectives
1) To understand the Merit-Based Incentive Payment System (MIPS) and Alternative Payment Models (APMs) required as part of the Medicare Access and CHIP Reauthorization Act of 2015. 2) To explore mechanisms to respond to the shift from volume to value-based reimbursement models. 3) To consider ways to provide both personalized and population-based imaging care.

Sub-Events

RC327A MACRA Mandates and How to Deal with Them

Participants
Ezequiel Silva III, MD, San Antonio, TX (Presenter) Nothing to Disclose

Learning Objectives
View learning objectives on main course title.

RC327B Involving Patients In Their Radiological Care: Radiologist Visibility, Personalized Care and Improving Outcomes

Participants
Geraldine B. McGinty, MD, MBA, New York, NY, (gbm9002@med.cornell.edu) (Presenter) Nothing to Disclose

Learning Objectives
View learning objectives on main course title.

RC327C The Radiologist's Role in Population Health Management: Leveraging Technology for Better Outcomes

Participants
James A. Brink, MD, Boston, MA (Presenter) Nothing to Disclose

Learning Objectives
View learning objectives on main course title.
**SSG06**

**Science Session with Keynote: Health Service, Policy and Research (Quality)**

Tuesday, Nov. 29 10:30AM - 12:00PM Room: S102D

**AMA PRA Category 1 Credits ™: 1.50**

**ARRT Category A+ Credit: .50**

**Participants**
Jonathan James, BMBS, Nottingham, United Kingdom (*Moderator*) Nothing to Disclose
Edward Y. Lee, MD, MPH, Boston, MA (*Moderator*) Nothing to Disclose

**Sub-Events**

**SSG06-01** Improving Appropriateness in Medical Imaging of Low-Back Pain Patients in the Emergency Department Using Clinical Decision Support: A Choosing Wisely Initiative

Tuesday, Nov. 29 10:30AM - 10:40AM Room: S102D

**Participants**
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Vivian Chan, MPH, PhD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Ruben Aristizabal, MSc, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Bruce B. Forster, MD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose

**PURPOSE**
To determine whether Electronic Health Record (EHR)-based clinical decision support (CDS) can effectively reduce inappropriate medical imaging (MI) of patients who present to the emergency department (ED) with low-back pain (LBP) without discouraging appropriate use of MI.

**METHOD AND MATERIALS**
This was a prospective, single-centre study of lumbar imaging referrals made by 25 ED physicians at a major acute-care centre. A point-of-care checklist of accepted red flag symptoms for LBP was embedded in the computerized order-entry for MI on 03/04/15. If physicians identified no red flags, they were required to enter their reason for imaging in a free-text box (medium stop). We compared the number of lumbar X-ray, CT, and MRI referrals of each physician before and after the implementation of the checklist (from 06/01/14 to 08/31/15). We then performed secondary pre- and post-intervention analysis to measure the potential harms of reduced imaging.

**RESULTS**
After intervention, the median proportion of LBP patients with an imaging order fell significantly (22.6% to 19.4%; p=0.0043; CI=0.95) compared to pre-intervention baseline, and variation in MI ordering rates across physicians decreased (interquartile range pre=16%; post=11%). There was no significant difference in the decrease in imaging across modalities. Further analysis showed no significant increase in harmful outcomes as a result of reduced MI. The percentage of patients without imaging who were later imaged at a hospital outpatient clinic within 30 days was 2.2% before intervention and 2.3% after. In addition, the proportion of patients discharged from the ED without MI who subsequently visited the same or another local ED within 30 days was 2.6% before intervention and 3.7% after, and 88% of returning patients were subsequently diagnosed on the second visit again with acute back pain or sciatica. One minor thoracic spine compression fracture was missed post-intervention; however, management was not impacted.

**CONCLUSION**
CDS integrated in electronic order-entry can safely and effectively reduce MI orders for LBP patients in the ED.

**CLINICAL RELEVANCE/APPLICATION**
Clinical decision support can reduce the number of inappropriate lumbar imaging studies ordered by emergency physicians who manage patients with acute, uncomplicated low-back pain.

**SSG06-02** Epinephrine Auto-injector Versus Manual Intramuscular Delivery for Treatment of Moderate–Severity, Anaphylactoid Contrast Reactions: Comparison of Errors, Administration Times and Provider Preferences

Tuesday, Nov. 29 10:40AM - 10:50AM Room: S102D

**Participants**
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Jay K. Pahade, MD, New Haven, CT (*Abstract Co-Author*) Consultant, Precision Imaging Metrics, LLC

**PURPOSE**
Given the rarity of contrast reactions in practice, most radiologists have little to no experience in management, and errors are common. We compared treatment of an anaphylactoid reaction in an adult without hypotension (moderate-severity) with 0.3 mg IM 1:1,000 epinephrine utilizing either the traditional manual method of drawing up and delivering epinephrine from a sealed 1 mg vial with needle/syringe or an epinephrine auto-injector (Auvi-Q). We hypothesized that use of an epinephrine auto-injector would result in decreased time to administration, fewer errors, and increased provider comfort.

METHOD AND MATERIALS
All non-interventional radiologists at our institution were requested to participate in our annual contrast reaction simulation program, which consisted of three simulation scenarios in a high-fidelity simulation lab. During the moderate-severity simulation scenario, the time to administer IM epinephrine and any errors in administration were recorded. Groups were randomized to use an auto-injector device or a manual method of drawing up and delivering IM epinephrine. All participants completed a survey assessing prior experience with epinephrine and comfort in treating a contrast reaction with a traditional manual approach vs. epinephrine auto-injector.

RESULTS
There were 188 participants in the contrast reaction simulation program over the course of 25 sessions, with 76 participating in the moderate-severity reaction simulation in groups of 2-5. Mean total time to administration was significantly longer (108.8 s) for manual delivery vs. the auto-injector (38.7 s), p<0.001. There were 11 errors in the manual group and 1 error in the auto-injector group, p=0.005. The most common error was administration of the wrong dose of IM epinephrine, which occurred in 5/13 (46%) simulation sessions. 94% of participants reported feeling “very comfortable” or “comfortable” with the auto-injector vs. 60% for manual delivery (p<0.001). Overall, 96% of participants thought the auto-injector was easier to use.

CONCLUSION
Use of an epinephrine auto-injector for treatment of contrast reactions was associated with significantly increased provider comfort, shorter time to administration, and fewer errors.

CLINICAL RELEVANCE/APPLICATION
Our study demonstrates the benefit of IM epinephrine auto-injectors for the treatment of contrast-related anaphylactoid reactions and supports replacing epinephrine vials designed for IM use with auto-injectors.

SSGG06-03 Use of Patient Questionnaires to Obtain Additional Clinical History: Impact on Abdominopelvic CT Interpretation

Tuesday, Nov. 29 10:50AM - 11:00AM Room: S102D

Participants
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PURPOSE
In our department, outpatients awaiting CT complete a written questionnaire with items pertaining to symptoms and medical history, which is subsequently scanned into the electronic medical record. The aim of this study was to evaluate if the questionnaires impact the interpretation of abdominopelvic CT performed for abdominal pain.

METHOD AND MATERIALS
100 adult outpatient contrast-enhanced abdominopelvic CT examinations performed for the evaluation of abdominal pain were included. The indication entered by the ordering physician and the patient questionnaire were compared in terms of specificity of the location of pain. An abdominal imaging fellow (R1) and abdominal radiologist with 5 years of experience (R2) independently interpreted the examinations in two separate reading sessions separated by 4 weeks. In the first session, readers were only provided with the exam indication entered by the ordering physician. In the second session, readers were also provided with the patient questionnaire. During each session, readers recorded any identified cause for abdominal pain and rated their confidence in interpretation (scale of 1 – 5; least to greatest). Paired Wilcoxon test was used to compare the two sessions.

RESULTS
The questionnaire contained a more specific location for pain than the exam indication entered by the ordering physician in 29% of cases. Among these, the pain was localized to a specific quadrant in 45%. In comparison with use of the provided history alone, use of the questionnaire resulted in identification of a cause for abdominal pain by the radiologist in an additional 7% of cases for R1 and 4% of cases for R2. For R1, additional identified causes of pain included diverticulitis, cystitis, peritoneal implants, epiploic appendagitis, and osseous metastatic disease. For R2, = additional causes of pain included umbilical hernia, gastritis, SMA syndrome, and cystitis. Confidence in interpretation was significantly greater using the questionnaire (R1: 4.8 ± 0.6 vs. 4.0 ± 0.5; R2: 4.9 ± 0.3 vs. 4.7 ± 0.5, p < 0.001).

CONCLUSION
Patient questionnaires provide additional relevant clinical history, increased diagnostic yield, and improve radiologists’ confidence.

CLINICAL RELEVANCE/APPLICATION
Radiology practices are encouraged to implement patient questionnaires and to make these readily available to radiologists at the time of interpretation in order to improve exam interpretations.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at:
How Satisfied are Patients with their Radiologists? Assessment Using a Patient Ratings Website

Participants
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Richard Duszak JR, MD, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
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PURPOSE
To use a public patient ratings website to assess the performance of radiologists in patient satisfaction.

METHOD AND MATERIALS
Patient reviews were retrieved from www.RateMDs.com for all radiologists in the 297 U.S. cities with population ≥100,000. Each review included ratings of 1-5 in four categories (staff, punctuality, knowledge, helpfulness). For Medicare-participating radiologists, group practice size and years in practice were obtained from the Physician Compare database. Common words in reviews’ free-text comments were assessed. Statistical analysis included Spearman’s rank coefficients, coefficients of variation (CV), ANOVA, and Kruskal–Wallis tests.

RESULTS
1,891 patient reviews for 1,259 unique radiologists were identified. For all four categories, the most common score was 5 (63-74%), and second most common score was 1 (14-20%); scores of 2-4 were less frequent (2%-12%). Scores for the four categories were all highly correlated with one another (r=0.781-0.951). Only 3% of reviews had a substantial discrepancy between average scores for radiologist factors (knowledge/helpfulness) and office factors (staff/punctuality). For 106 radiologists receiving ≥3 patient reviews (total of 572 reviews), average CV was 27%, indicating moderate reproducibility among different patients’ reviews for a given radiologist; in addition, ANOVA demonstrated that the radiologist accounted for 30% of total variation in the average score across patient reviews. The Northeast scored significantly lower than other U.S. regions in average scores for staff (p<0.001) and punctuality (p<0.001); scores for helpfulness and knowledge were similar across regions. Radiologists’ group practice size and years since graduation showed no correlation with satisfaction scores (r=-0.140-0.021). Common words in free-text comments included “caring”, “knowledgeable”, and “professional” for positive reviews, and “rude”, “pain”, and “unprofessional” for negative reviews.

CONCLUSION
Radiologists overall performed well, though patients posting online reviews tended to have strongly positive or negative views. Scores across categories were highly correlated, suggesting a halo effect influencing patients’ global perceptions of radiologists.

Effectiveness of a Radiation Advisory Group (RAG) in CT Dose Reduction at a Tertiary Academic Medical Center

Participants
Neena Joseph, BS, BA, HERSHEY, PA (Presenter) Nothing to Disclose
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PURPOSE
To determine the effectiveness of a Radiation Advisory Group to reduce radiation dose in CT studies performed at a tertiary academic medical center.

METHOD AND MATERIALS
IRB approved retrospective study. A sample of patients who underwent specific CT examinations were selected following a search of the RIS. CT exam types described in the results. The Radiation Advisory Group (RAG) was functional in 2011. Studies from 2009 comprised the pre RAG group, and 2013 the post RAG group. Imaging protocols before and after the implementations of RAG were compared. Total mAs and DLP values were extracted from 50 CT dose sheets of each of the specified studies from 2009 and 2013 for data analysis. Wilcoxon Rank Sum test was used, with p-value of <0.05.

RESULTS
798 cases were included for analysis. The median DLP for studies performed in 2009 compared to 2013 were as follows: CT abdomen/pelvis with contrast (854.5 vs. 720.2, p=0.023), abdomen/pelvis without contrast (837.5 vs. 675.0, p=0.001), chest with contrast (651.5 vs. 380.4, p<0.001), chest without contrast (646.5 vs. 492.9, p<0.001), head/neck perfusion (7248.5 vs. 3730.0, p<0.001), CT urogram (2110.0 vs. 1243.9, p<0.001), and triphasic abdomen with pelvis (1612.5 vs. 1297.9, p=0.003). The median DLP increased for CT head without contrast (832.5 vs. 1021.2, p<0.001). The total mAs was similarly significantly reduced for all studies with the exception of CT head, which showed significant increase.

CONCLUSION
Overview of CT examinations by the multidisciplinary members of a Radiation Advisory Group can lead to a multifaceted approach to radiation dose reduction in commonly performed CT examination. Failure to use tube current modulation in the x, y and z direction in head CT scans can lead to higher than expected CT doses.

**CLINICAL RELEVANCE/APPLICATION**

Effective CT dose reduction requires a multidisciplinary team approach. Dose reduction strategies include divisional standardization of CT protocols, specifying scan ranges, optimizing acquisition parameters (effective mAs, kV & pitch), and technologist education. Breast shields were eliminated and sampling rate for perfusion studies was reduced. Failure to apply built in dose reduction techniques in scanning protocols can increase radiation dose. A RAG should be a standard committee at any facility performing X-Ray examinations.

**SSG06-06    Fluoroscopy Suites: A Lead Exposure Hazard?**

**Tuesday, Nov. 29 11:20AM - 11:30AM Room: S102D**

**Participants**
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Kevin Burns, MD, Bronx, NY (Abstract Co-Author) Nothing to Disclose
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**PURPOSE**

Dust containing lead (Pb) is a known source of exposure that can result in elevated blood lead levels (BLLs). We have reported previously that dust obtained from surfaces of radiation shields worn by medical workers often contains Pb, presumably due to seepage from the inner layers of Pb (RSNA 12/2015). This study was designed to achieve two aims: 1. to determine whether radiology room surfaces also contain Pb dust; 2. to assess whether these sources of Pb exposure result in hand and blood contamination of radiology workers.

**METHOD AND MATERIALS**

Surface dust samples were collected from 13 Radiology Department rooms: 9 fluoroscopy suites and 4 non-fluoroscopy control rooms; and from the dominant hand of 42 radiology workers. BLLs were collected from 58 radiology workers. Surface dust was collected from floors, walls and table tops. All samples were analyzed by atomic absorption spectrometry. For surface dust, data are expressed in micrograms per foot squared (ug/ft²), minimum detection limit (MDL) 5 ug/ft². Hand dust samples are reported in ug/wipe, MDL 3 ug/wipe. Venous BLLs are expressed in micrograms per deciliter (ug/dL), MDL 1 ug/dL.

**RESULTS**

Of fluoroscopy room samples 7 (78%) had detectable floor Pb; 2 (20%) detectable table Pb and 1 had measureable wall Pb. All control room samples except for one floor sample had values <5 ug/ft². Of note, an upward trend in fluoroscopy table samples was observed from <3 to 8 to 15 ug/ft² at morning, afternoon, and evening time points. Repeat fluoroscopy floor samples taken after floor surfaces were cleaned decreased from 20 to <5 ug/ft². All hand dust samples had values < 3 ug/wipe. 49 (84.5%) workers had BLLs ≤1 ug/dL, 8 (13.8%) had BLLs of 2 ug/dL, and 1 had a value of 3 ug/dL. There was no association between duration of shield use and BLLs.

**CONCLUSION**

Pb can be detected in dust obtained from surfaces in fluoroscopy rooms, with amounts increasing throughout the day and presumably originating in the use of Pb containing shields. BLLs were well below OSHA standards of concern for adults. However, low BLLs have been associated with lower cognitive scores in children, who may be at risk if undergoing multiple radiologic exams.

**CLINICAL RELEVANCE/APPLICATION**

Cleaning surfaces reduces dust Pb content to undetectable levels and sufficient hand hygiene may be reducing hand dust Pb to undetectable levels, which likely prevents elevated BLLs in workers.

**SSG06-07    Authority Gradients in an Academic Radiology Department: A Safety Hazard?**

**Tuesday, Nov. 29 11:30AM - 11:40AM Room: S102D**

**Participants**
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Ronald L. Eisenberg, MD, JD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Mary G. Hochman, MD, Boston, MA (Abstract Co-Author) Stockholder, General Electric Company; Stock options, Nomir Medical Technologies, Inc; Author, UpToDate, Inc

**PURPOSE**

To investigate barriers to reporting of safety events in an academic radiology department and to evaluate the role of authority gradients as a potential barrier to safety event reporting.

**METHOD AND MATERIALS**

A survey was sent out to the Radiology Department email list of a tertiary care institution in a major metropolitan area. The email addressed all Department staff (total number of staff N=648: 331 radiology technologists (51%), 80 attending physicians (12%), 70 residents and fellows (11%), 49 schedulers (8%), 43 nurses (7%), 37 administrative staff (6%), 23 image archive staff (3%) and 15 transport staff (2%)and included a link to a 10 point online questionnaire. Questions recorded respondent’s frequency of speaking up about safety events, and respondent’s perceived barriers to speaking up. Barriers listed included: high reporting threshold, challenging someone in authority, lack of being listened to, fear of disrespect being expressed, fear of retribution, individuals creating an uncomfortable work environment (toxic captain), responsibility within a team, shy personality, and lack of language skills. Respondents were asked to quantify the number of safety events they did not report annually (0, 1-5, 6-10, 11-20, >20
RESULTS

363 of 648 (56%) of employees completed the survey. 182 of 363 (50%) employees reported always speaking up about safety concerns, 134 of 363 (37%) most of the time, 36 of 363 (10%) sometimes, 7 of 363 (2%) rarely, and 4 of 363 (1%) never. Thus, 50% of employees do not speak up about safety concerns 100% of the time. Barriers to speaking up were: high reporting threshold 69%, challenging someone in authority 67%, fear of disrespect being expressed 53%, lack of being listened to 52%, fear of retribution 34%, lack of language skills 29%, individuals creating an uncomfortable work environment (toxic captain) 28%, and shy personality 25%.

CONCLUSION

50% of employees in a large academic radiology department do not attain 100% reporting of safety events. The most common barriers to speaking up are: high reporting threshold, not wanting to challenge authority and fear of disrespect. This suggests that existing authority gradients interfere with full reporting of safety events.

CLINICAL RELEVANCE/APPLICATION

To encourage full reporting of safety events, academic radiology departments need to focus on eliminating common barriers such as high reporting threshold, challenging authority and fear of disrespect.

Honored Educators

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Ronald L. Eisenberg, MD, JD - 2012 Honored Educator
Ronald L. Eisenberg, MD, JD - 2014 Honored Educator

PURPOSE

Identify factors that contribute to positive and negative patient satisfaction ratings so radiology practices can improve patient satisfaction, a component of quality care.

METHOD AND MATERIALS

This retrospective study examined web-based patient satisfaction surveys (Figure 1) collected at 5 outpatient imaging centers from 1/7/13-11/11/15. Construct validity was examined using factor analysis of the survey items using Promax rotation. Ratings were compared among sites, exam types, and survey questions. Optional free-text comments were grouped into categories (general, staff, wait time, facilities, convenience, cost, safety, and other) and compared by exam type.

RESULTS

6512 surveys were completed out of 137059 encounters (4.8% response). 3 factors were observed, as indicated by the scree plot, when using factor loading cutoffs of >.3. The factors were exam experience (Q8-10), intake experience (Q5-6), and facilities/convenience (Q3-4 and Q7). Good scale reliability was observed with a Cronbach's Coefficient Alpha value of .79. Though differences in survey responses were observed among sites, all ratings were above 95%, and differences were not large enough to be meaningful. Among survey questions, quality of care had the highest number of positive ratings (95.5%). Wait time had the highest number of negative/neutral ratings (19.9%) followed by preregistration process (11.9%); others <10%. 1859 free-text comments (91.8%) were positive (60.0% pertained to staff, 28.2% to general experience, 11.9% to preregistration process, others <10%), and 10 (0.5%) were neutral. Patients who had an MRI were most likely to write a negative comment (40.0% of negative comments vs. 26.0% of responder exams), most of which pertained to facilities (e.g., noisy machine, hard bed).

CONCLUSION

Patient satisfaction surveys should address exam experience, intake experience, and facilities/convenience. Wait-time and preregistration process were rated most negatively. Free-text negative comments pertained most frequently to convenience, facilities, and staff. Patients who underwent MRI were more likely to write a negative comment than patients who underwent other exams.

CLINICAL RELEVANCE/APPLICATION

Radiology practices may improve patient satisfaction by decreasing wait times, streamlining registration process, and improving patient comfort during MRI exams.

SGG06-09  Health Service, Policy and Research Keynote Speaker: Duty of Candour-Impact on Disclosure of Audit

Tuesday, Nov. 29 11:50AM - 12:00PM Room: S102D

Participants
Eleanor Cornford, MBBS, Nottingham, United Kingdom (Presenter) Research Grant, General Electric Company
Has the Objective Quality of Imaging Papers Changed Over the Last 20 Years?

**PURPOSE**

Government bodies and insurance companies are requiring higher evidence and technical efficacy levels in order to provide reimbursements for medical and imaging procedures. Hence we sought to determine if both the evidence levels as well as the technical efficacy levels of imaging manuscripts have changed over the last twenty years.

**METHOD AND MATERIALS**

Using Web of Science (2014) we determined the 10 highest impact factor imaging journals. For each journal the 10 most cited and 10 average cited papers were compared, for each of the following years: 1994, 1998, 2002, 2006, 2010 and 2014. Evidence level (EL) was graded on a scale of 1-5, with 1 being prospective randomized trials, and hence the highest level, and 5 being “expert opinions”, considered the lowest evidence level. Technical efficacy (TE) was graded on a scale of 1-6, with 1 being the lowest, focused on image quality, and 6 as the highest, based on the criteria of Thornbury and Fryback [1]. Statistical software R and package lme4 were used to fit mixed regression models with fixed effects for group (average vs. top cited) and year, and a random effect for journal.


**RESULTS**

The evidence level of manuscripts has improved over time, -0.03 every year on average (p <0.001). In 1994 the average EL was 3.81, and in 2014, it was 2.99. Furthermore, the more cited papers also had better evidence levels (group effect = -0.23, SE 0.09, p = 0.011). Interestingly, the levels of technical efficacy were lower in top cited as compared to average cited articles, although the difference was not significant (group effect = -0.14, SE = 0.09, p = 0.16). However, technical efficacy level did increase modestly over this 20 year time period, with an average score of 1.57 in 1994 to 2.83 in 2014 (0.06 per year, SE = 0.007, p <0.001).

**CONCLUSION**

Compared to average cited papers, top cited papers have better evidence levels, with no difference in technical efficacy level. Over the last 20 years, imaging journal articles have improved modestly in quality, as measured by evidence level and technical development.

**CLINICAL RELEVANCE/APPLICATION**

The quality of top impact factor imaging journal articles has improved over time, which may impact clinical knowledge base.

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Clinical Impact of Second-Opinion Musculoskeletal Interpretations in an Orthopedic Oncology Patient Population

**PURPOSE**

To analyze the impact on clinical management when subspecialty musculoskeletal radiologists render second opinion consultation...
In breast imaging, there is a need to provide better online patient information in more simplistic terms.

METHOD AND MATERIALS

An institutional PACS database was searched for secondary interpretations placed on outside imaging studies as requested by an orthopedic oncology service from January 2014 to February 2016. The MSK consultation reports were compared to the original interpretations, when available. Reports were categorized using a seven-point scale: I (no discrepancy), II (failure to detect a clinically insignificant abnormality), III (clinically insignificant difference in interpretation), IV (difference in imaging follow up recommendation), V (equivocal initial interpretation with subsequent definitive subspecialty interpretation), VI (clinically significant difference in interpretation), VII (failure to detect a clinically significant abnormality). Clinical significance was defined by whether a discrepant interpretation resulted in a change in diagnosis or treatment.

RESULTS

214 patients met inclusion criteria, with an average age of 47.0 ±19.2 years. The most common indication for initial imaging was “pain” (76%). There were 49 (22.9%) instances of discrepant interpretations resulting in clinically significant differences in management; 36 (16.8%) were category VI and 13 (6.1%) were category VII. An additional 42 subjects (19.6%) were identified as category IV and another 11 (5.1%) as category V, yielding at total of 102 (47%) clinically relevant discrepancies. When definitive diagnosis was available from pathology reports, the secondary consultations were determined to be correct in 23 of 29 cases (79%) and the outside interpretations were determined to be correct in 15 of 29 cases (52%, p<0.05).

CONCLUSION

A 22.9% rate of clinically significant difference in interpretations was observed between primary reads and secondary musculoskeletal consultations in an orthopedic oncology patient population. Consistent with published literature, most discrepancies were interpretational as opposed to observational.

CLINICAL RELEVANCE/APPLICATION

The substantial rate of clinically relevant discrepant interpretations suggests that subspecialty expertise is likely to improve patient outcomes. The findings represent a tremendous opportunity for subspecialty radiologists to demonstrate their value in the accountable healthcare paradigm.

Abstract Co-Author

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METHOD AND MATERIALS

Websites of all ACR-accredited breast imaging centers in the United States with a designation of Breast Imaging Center of Excellence (BICOE) were searched for information regarding screening mammography, tomosynthesis, and breast density by five graduate students. Any material on these websites that provided patient education regarding risks and benefits of 2D mammography or tomosynthesis, the actual mammography/tomosynthesis procedure, patient preparation tips, and screening issues in high density breasts was then analyzed for well-known readability variables.

RESULTS

1482 breast centers were analyzed out of which 1451 (98%) had websites. 79% of these websites had information regarding mammography whereas only 45% and 16% had information regarding tomosynthesis and breast density respectively. Readability analysis showed that the average grade level of patient information was 12.38 +/- 2.43. Additional average readability scores, which all mark the level of education needed to understand the text, were: Flesch Kincaid Grade Level of 11.46 +/- 2.74, Gunning Fog Score of 14.05 +/- 2.49, Coleman Liau Index of 14.07 +/- 2.24, and SMOG Index of 10.9 +/- 2.08. The average Flesch Kincaid Reading Ease score was 45.01 +/- 14.05, which corresponds to a high school to college education level.

CONCLUSION

Although most breast centers have websites and information regarding mammography, there is overall scarcity of information regarding tomosynthesis and breast density. Additionally, this patient education material has readability scores much higher than the 7th grade level at which an average American reads.

CLINICAL RELEVANCE/APPLICATION

In breast imaging, there is a need to provide better online patient information in more simplistic terms.
High-Risk Medical Device Innovation from 2000-2015: Benchmarking the Performance of Radiology with Other Medical Specialties

PURPOSE
To assess high-risk radiological device innovation via the pre-market approval (PMA) pathway and compare innovation activity to other specialties.

METHOD AND MATERIALS
Class III approvals were mined from the Food and Drug Administration (FDA) Center for Devices and Radiological Health (CDRH) public online database across a recent period of 15 years (September 1, 2000 to August 31, 2015). The number of approvals in radiology was determined by using the parameters of Advisory Committee: “Radiology” and Supplement Type: “Originals Only”. The number of approvals from other medical specialties was also determined based on existing FDA advisory committee designations. For each radiological device the following data was extracted: device modality, manufacturer, and indication.

RESULTS
Twenty-one distinct medical and surgical specialties were identified. In assessing high-risk device approvals of specific specialties within the corresponding period of time (Figure 1), cardiology ranked highest with 161 approvals. 23 unique radiological device approvals were identified. Molecular genetics, hematology, and toxicology medical device fields did not have any approvals and were excluded from the figure. The most represented modality was mammography, which accounted for 16 (70%) of the approvals. Computer aided detection (CAD) software packages accounted for 9 (39%) of the approvals. 22 (96%) of the approvals were for diagnostic indications.

CONCLUSION
In comparison to other specialties, radiology ranked 7th out of 20 in the number of PMA approvals from September 1, 2000 to August 31, 2015 based on FDA advisory committee designation. Radiology devices accounted for approximately 5% of PMA approvals across all specialties with mammography and CAD software packages being most represented. Although high-risk device innovation represents one important metric of a robust research and development environment, many substantial components of radiological innovation do not fall into the category of Class III devices. Direct comparison of innovation activity among specialties is difficult. High-risk approvals provide a limited yet important perspective and serve as a single benchmark to improve upon.

Clinical Relevance/Application
High-risk radiological device innovation increases the utility of radiology in medicine and enhances patient care. Efforts should be made to spur impactful device innovation in the field.

Do Patients Get What They Pay For? Relationship between Imaging Examination Cost and Imaging Center Yelp Ratings

PURPOSE
To identify associations between the cost of radiology examinations and imaging center Yelp ratings.

METHOD AND MATERIALS
OKcopay.com, a publicly available website that provides the costs of medical services, was searched to identify the self-pay costs of brain MRI, abdominopelvic CT, and pelvic ultrasound exams within the 16 U.S. cities represented on the website at the time of the study. Yelp.com was searched to identify overall satisfaction scores from patient reviews for the corresponding imaging centers. Imaging centers were included if: a non-hospital based center, cost information on OKcopay.com included both professional and technical fees, and ≥ 3 patient reviews available on Yelp.com. Spearman’s correlation coefficients were computed between imaging examination price and imaging center rating for the three exams.

RESULTS
98 imaging centers were included, providing data for 87 brain MRI, 72 abdominopelvic CT, and 65 pelvic ultrasound exams. These three exams had costs of [listed as mean (range)]: $725 ($250 – $3129), $467 ($190 – $3117) and $256 ($80 – $1000), respectively. The mean number of Yelp reviews per imaging center was 13.2 ±11.9 range (3 – 59). The mean Yelp rating (1-5 scale; 5=highest score) was 2.97±0.97. For all three imaging exams, price and Yelp scores exhibited weak, albeit statistically significant, positive correlations: brain MRI, r=0.224 (p=0.037); abdominopelvic CT, r=0.248 (p=0.036); and pelvic ultrasound, r=0.376 (p=0.002).

CONCLUSION
Imaging exam prices and Yelp scores exhibited weak positive correlations. Thus, an imaging center selected based on a low price may be associated with poorer patient satisfaction.
Patients must be cautious when "shopping" for radiology services using price alone, as price variation may be associated with additional variation in patient experience.

**Morphological and Functional Tumor Response Assessment Criteria: A Primer for Radiologists**

**Station #6**

**Awards**

**Magna Cum Laude**

**Participants**

Bhanusupriya Somarouthu, MD, Boston, MA *Presenter* Nothing to Disclose  
Hamed Kordbacheh, MD, Boston, MA *Abstract Co-Author* Nothing to Disclose  
Trinity Urban, Boston, MA *Abstract Co-Author* Nothing to Disclose  
Gordon J. Harris, PhD, Boston, MA *Abstract Co-Author* Medical Advisory Board, Fovia, Inc; Stockholder, IQ Medical Imaging LLC; Dushyant V. Sahani, MD, Boston, MA *Abstract Co-Author* Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc  
Avinash R. Kambadakone, MD, Boston, MA *Abstract Co-Author* Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is to Review various morphological and functional criteria available for tumor response assessment to various therapies Discuss limitations and challenges encountered while applying criteria Discuss with case based examples for each of the response assessment criteria

**TABLE OF CONTENTS/OUTLINE**

Discuss various morphological response assessment criteria including RECIST (Response Evaluation Criteria in Solid Tumors), Cheson, immune related RECIST etc Discuss functional criteria including EORTC (European Organization for Research and Treatment of Cancer guideline), PERCIST (PET Response Criteria in Solid Tumors) Discuss 3D imaging based criteria such as tumor volumes for brain lesions Rationale for appropriate technique and rules for assessment while using standardized response assessment criteria Case based examples highlighting the various criteria Discussion of pitfalls including pseudo-progression Summary and Conclusion

**Honored Educators**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: [https://www.rsna.org/Honored-Educator-Award/](https://www.rsna.org/Honored-Educator-Award/)

Dushyant V. Sahani, MD - 2012 Honored Educator  
Dushyant V. Sahani, MD - 2015 Honored Educator  
Dushyant V. Sahani, MD - 2016 Honored Educator
Bacterial Contamination of CT Equipment: Efficacy of ATP Detection as a Surrogate Marker for Equipment Cleanliness

Station #1

Participants
David C. Levin, MD, Philadelphia, PA (Moderator) Consultant, HealthHelp, LLC; Board of Directors, Outpatient Imaging Affiliates, LLC

Sub-Events
HP221-SD-TUB1

Bacterial Contamination of CT Equipment: Efficacy of ATP Detection as a Surrogate Marker for Equipment Cleanliness

Participants
John C. Childress III, MD, Ann Arbor, MI (Presenter) Nothing to Disclose
Deb Burch, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Carol Young, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Cheryl Kucharski, RT, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Ella A. Kazerooni, MD, Ann Arbor, MI (Abstract Co-Author) Royalties, Wolters Kluwer nv;
Matthew S. Davenport, MD, Cincinnati, OH (Abstract Co-Author) Royalties, Wolters Kluwer nv;

PURPOSE
Evaluate the suitability of an adenosine triphosphate (ATP) sanitation monitoring system as a surrogate marker for CT equipment bacterial contamination.

METHOD AND MATERIALS
The bore, table, and wrap of two tertiary care center inpatient CT scanners were assayed with an ATP detection system and bacterial culture on eight consecutive weekdays. ATP detection swabs were applied to a 6 x 3" area of the bore, table, and wrap of each scanner. Swabs were placed in an ATP detector (AccuPoint ATP Sanitation Monitoring System by Neogen, Lansing, MI). The relative light unit (RLU) value was recorded for each sample. A cutoff value of 350 RLU was considered positive for contamination per manufacturer recommendations. Cotton swabs (Eswab by Copan Diagnostics, Murrieta, CA) were applied synchronously to a 6 x 3" adjacent area of the bore, table, and wrap of each scanner. Swabs from each site were placed into a Staphylococcus enrichment broth and incubated aerobically at 37C for 48 hours. Broths were then applied to Staph aureus Select and Methicillin Resistant Staph aureus (MRSA) Select chromogenic agar culture material. Culture results were recorded as positive or negative at the enrichment broth phase. Results were recorded as MRSA positive or negative at the agar phase. Culture rates were compared with Chi Square tests; RLU values were compared with Mann-Whitney U test.

RESULTS
A cutoff value of 350 RLU did not predict a positive generic broth culture (>350 RLU: 36% [4/11]; ≤350 RLU: 49% [18/37], p=0.5) or a positive SA select culture (>350 RLU: 0% [0/11]; ≤350 RLU: 19% [7/37], p=0.18). Positive SA select cultures were more likely to be found on the CT wrap (38% [6/16]) than the CT table (0% [0/16], p=0.02) or CT bore (6% [1/16], p=0.08). Similarly, the RLU values were higher on the CT wrap (median 173, mean 632) than the CT table (median 58, mean 100; p=0.06) and CT bore (median 42, mean 208; p=0.16), but those differences were not statistically significant.

CONCLUSION
There was no relationship between ATP detection and the likelihood of a positive culture. However, both the ATP detection system and the bacterial culture results identified the CT wrap as the most contaminated piece of equipment, providing an opportunity for targeted intervention.

CLINICAL RELEVANCE/APPLICATION
ATP detection is a crude method of evaluating CT equipment cleanliness that is less labor intensive than bacterial culture but is unreliable for the prediction of culture positivity.

Honored Educators
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Ella A. Kazerooni, MD - 2014 Honored Educator

HP222-SD-TUB2

Predictors of High Scores in the American College of Radiology In-Training Exam (DXIT): A National Multicenter Study

Station #2

Participants
Fadi Toonsi, MBBS,FRCPC, Montreal, QC (Presenter) Nothing to Disclose
Fahad Essbaiheen, MBBS,FRCPC, Ottawa, ON (Abstract Co-Author) Nothing to Disclose
Jeffrey Chankowsky, MD, Montreal West, QC (Abstract Co-Author) Nothing to Disclose
Training programs implement various methods to ensure trainees are attaining certain benchmarks during residency. The American Board of Radiology In-Training Exam (DXIT) is one example. We aim to identify predictors of high scores on DXIT, assessing factors identified in clinical fields other than radiology.

**METHOD AND MATERIALS**

An internet-based questionnaire was distributed to 263 residents in 11 Canadian radiology training programs inquiring about various study habits. DXIT results and residency levels were collected by a follow-up survey and from consenting residents' programs. Hierarchical multiple linear regression was performed using SPSS.

**RESULTS**

80 residents responded. DXIT scores were collected from 63 participants. The average number of hours spent studying per week was eleven (SD = 8.6). The average number of hours slept per night was 6.75 (SD = .9). The mean DXIT scaled score was 61.61 (SD = 10.8). Controlling for participants' residency training program, our model accounted for 61.9% of the variance of DXIT scores (p < .001). Significant predictors (p < .05) were 1- Being a resident in one of three of the 12 residency training programs. 2- The average number of hours slept per night, and 3- The residency level. The number of hours spent studying per week was not a significant predictor. Holding other variables constant, the residency level was the best predictor of the scaled score. An increase of one year in residency level would increase the score on DXIT by 6.37 points. An increase of one hour of sleep would increase DXIT score performance by 2.38 points.

**CONCLUSION**

Our results concur with non-radiology literature on the effect of sleep and residency level on exam performance and could help radiology residents' exam preparation. The detected significant difference among various accredited residency programs and non significance of the number of hours spent studying is unexpected and warrants exploration.

**CLINICAL RELEVANCE/APPLICATION**

Employing healthy sleeping habits could promote residents' performance in standardized tests. Investigating the reasons behind significantly different scores amongst universities, despite their being equally accredited by a national governing body, could potentially enhance some programs' performance by identifying un-monitored gaps in their training.

**HP223-SD-TUB3 Use of Statistical Analysis in Publications from an Academic Medical Imaging Department: Back to the Basics**

Station #3

Participants
Pascal N. Tyrrell, PhD, Toronto, ON (Presenter) Nothing to Disclose
Alan R. Moody, MD, Toronto, ON (Abstract Co-Author) Nothing to Disclose
Hao-Yue H. Lan, Toronto, ON (Abstract Co-Author) Nothing to Disclose
Alana Man, Toronto, ON (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

To assess what statistical methods are most commonly used in medical imaging research and how they are presented in articles published from a large academic medical imaging department.

**METHOD AND MATERIALS**

A cross-sectional survey of abstracts of original articles published in 2013 from a large academic department of medical imaging was conducted. Data collected consisted of article citation, bibliometric indicators, study methodology and statistical analysis. The primary outcome was level of statistical methods performed categorized into four levels: Basic I, Basic II, Intermediate, and Advanced. Descriptive, summary, and parametric statistics were performed.

**RESULTS**

Three hundred and twenty-two articles were published in 2013 by 177 faculty (26 full professor, 43 associate professor, 92 assistant professor, and 16 lecturers). The most common study types were retrospective cohort (18%), prospective cohort (22%), review (15%), and case-report (14%). Statistical analyses were performed in 65% of published articles with the majority of Basic I (45%) and Basic II (34%) levels. Relatively few studies required Intermediate or Advanced statistical analyses (19% and 3%, respectively). The median journal impact factor was 2.7 (IQR = 1.7 – 3.7) with American Journal of Neuro Radiology (6%), Pediatric Radiology (4%), and Canadian Association of Radiologists Journal (3%) as the most frequently published journals. The median h-index of the corresponding authors was 10 (IQR = 4 – 22) and only 20% of corresponding authors were faculty from within the department. No association was found between corresponding author h-index and journal impact factor or level of statistics.

**CONCLUSION**

These data support the continued need to offer broad training in research methodology, but suggest that a more cost effective and enabling education program would result from better emphasis on basic level statistics. These results should be of interest to academic departments when addressing their own training needs, and help support the development of research methodology curricula in the field of medical imaging.

**CLINICAL RELEVANCE/APPLICATION**

Academic departments need to address their own training needs in order to better support the development of research methodology curricula in the field of medical imaging.

**HP224-SD-TUB4 Patient Satisfaction in Radiology: Where Should We Improve?**

Station #4

Participants
Johannes Boos, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Improving Oncology Patient and Caregiver-Centered Radiology Reporting

Station #5

Participants

Andy Tang, BS, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Daniel S. Hippe, MS, Seattle, WA (Abstract Co-Author) Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company
Ryan O’Malley, MD, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Carolyn L. Wang, MD, Seattle, WA (Presenter) Nothing to Disclose

PURPOSE

To explore optimal mechanisms of delivering radiology results directly to patients through a survey of patients’ values in current and new models of reporting.

METHOD AND MATERIALS

A questionnaire was developed in collaboration with oncology patient representatives to evaluate how patients are currently receiving radiology images and reports and to identify gaps between information patients desire to learn from radiology reports and what they currently receive. This questionnaire was administered to all oncologic patients undergoing CT or MRI at a major cancer institute over a 4-month period. Responses were converted to a 5-point Likert scale for quantitative analysis.

RESULTS

105 questionnaires were completed. 66% of the patients have been offered their written report at least once. 76% of patients who read their written reports graded their understanding of the report as well or completely and 93% found their written report useful. 72% of patients would like to always receive copies of the written report. 76% of patients had been shown their images at least once and 88% of them found it useful. 66% of imaging review was with oncologists, 10% with radiologists. 65% of patients always want to see their images, and 66% in all circumstances. When asked how responders would like to get their imaging results (first choice out of 6 options): 19% preferred a photo diary of significant images along with the written report, 19% the same written report their doctor receives, 19% a simplified written report in non-technical language, and 18% wanted to review images with a radiologist.
CONCLUSION

A significant portion of oncology patients have received their written radiology reports and reviewed their images at least once and have found it useful. There is also a significant portion of patients who want to receive written reports and view images more frequently. However, current data do not yet show consensus on a single best option for the model of delivering radiology images and reports to patients. Speaking directly to the patient may not be the solution for patient-centered reporting. Further work needs to be done to develop individualized reporting which is feasible, effective, and cost effective.

CLINICAL RELEVANCE/APPLICATION

Patients desire more access to both radiology written reports and images but there is currently no consensus amongst the patients as to the best model for delivering this information to patients.

MR Safety Controversies: Basic Concepts to Practical Implementation

Station #6

Participants
Nicole M. Hindman, MD, New York, NY (Presenter) Nothing to Disclose
Nathan Hyson, BS, New York, NY (Abstract Co-Author) Nothing to Disclose
Thomas Callahan, BA, ARRT, New York, NY (Abstract Co-Author) Nothing to Disclose
Graham Wiggins, New York, NY (Abstract Co-Author) Nothing to Disclose
Danny C. Kim, MD, White Plains, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

1. Learn about the physics principles that guide the practical interpretation of MR Safety.
2. Cover current controversies in MR imaging, and present a practical approach to balancing patient safety and best clinical care (e.g., gadolinium deposition in the brain, imaging cardiac stents, pregnant patients and peri-operative patients).

TABLE OF CONTENTS/OUTLINE

1. MR Safety History (2001 Westchester seminal incident; ACR safety creation, Zoning, MAUDE database)
2. MR Physics principles (Maps of different scanners, magnetic field strength variance, RF heat deposition, antenna principle of increased burns at 3T vs. 1.5T)
3. Sample MR Screening workflow
4. Current Controversies
   A. Pacemakers (on and off label scanning)
   B. Pregnancy
   C. Cardiac stent scanning 1.5T and 3T
   D. Perioperative scanning - 6 weeks time limit, what is data?
   E. Gadolinium and NSF/Brain deposition
**Purpose**
Using structured reporting to characterize imaging findings indeterminate or suspicious for cancer in the abdomen enables the study of the patterns of radiologist reporting of these lesions.

**Method and Materials**
A coding system analogous to BI-RADS® was developed for focal lesions in the liver, pancreas, kidneys and adrenal glands at our main hospital. Lesions were categorized as benign (category 1, 2 or 7), indeterminate (category 0 or 3) and suspicious (category 4 or 5); category 99 was used for technically inadequate imaging, and category 6 for known cancer. The system was incorporated into a structured template required for all abdominal CT, MR and US exams, and mined using a recommendation-tracking engine. Data collected by the engine for the first 2 years were reviewed to characterize the variability in assigning degrees of suspicion for malignancy between radiologists.

**Results**
A total of 57,500 abdominal CT, MR and US exams were reported by 29 radiologists using the system between 7/1/2013 and 6/30/2015. Radiologists identified indeterminate findings in the liver at a similar frequency, with interquartile ranges (IQRs) between 1.7% and 2.7% for all modalities. Both indeterminate and suspicious findings in the kidneys and adrenal glands were also identified on CT and MR with low variability among radiologists (IQRs 0.4-1.7%). By contrast, identification of indeterminate findings in the pancreas on MR demonstrated high inter-radiologist variability, with an IQR of nearly 10% and one radiologist reporting such findings nearly 25% of the time. Wider inter-radiologist variability was also noted for suspicious liver findings, particularly when identified on MR (IQR 3.5%); one radiologist reported such findings nearly 11% of the time.

**Conclusion**
Radiologists variably report indeterminate and suspicious findings on abdominal imaging depending on organ and modality. Understanding this variability can lead to more consistent reporting and potentially reduce unnecessary follow-up imaging.

**Clinical Relevance/Application**
Structured radiology reporting can be used to characterize radiologists’ reporting patterns for indeterminate and suspicious findings of cancer on abdominal imaging.

**Honored Educators**
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Mitchell D. Schnall, MD, PhD - 2013 Honored Educator

**SSJ12-02 Cadaver-Specific CT Scans Visualized at the Dissection Table Combined with Virtual Dissection Tables Improve Learning Performance in General Gross Anatomy**

**Awards**
Trainee Research Prize - Resident

**Participants**
Daniel Paech, MD, Heidelberg, Germany (Presenter) Nothing to Disclose
Sara Doll, Heidelberg, Germany (Abstract Co-Author) Nothing to Disclose
CONCLUSION
The rate of incomplete disclosures was 11%-19% in journals with strict policies as opposed to 3%-29% in journals with looser policies. The rate of incomplete disclosures was higher (57% (1081)) of other specialists writing in non imaging journals (p<0.0002). However, 34% (253) of radiologists writing in imaging journals correctly denied COIs, as opposed to 22% (431) of other specialists writing in non imaging journals (p<0.0002).

CLINICAL RELEVANCE/APPLICATION

To quantify the benefit of the incorporation of radiologic anatomy (RA), in terms of student training in RA-seminars, cadaver CT scans and life size virtual dissection tables on the learning success in general anatomy.

METHOD AND MATERIALS

Three groups of a total of 238 students were compared in a multiple choice general anatomy examination. The intervention group (year 2015, n1=50) with training in radiologic image interpretation (RA-seminar) and additional access to cadaver CT scans was compared to a group that was trained in the RA-seminar only (2011, n2=90) and a control group without any radiologic image interpretation training (2011, n3=98). All participants took a test of 40 highly discriminating questions, comprising of 10 questions each on head & neck, abdomen, thorax and extremities derived from the 10% most difficult questions of the National Board Examinations (2005-2010). Furthermore, the students’ perception was assessed qualitatively through a survey (12 questions; 5 item Likert-scale).

RESULTS

The average test score of the intervention group (21.8 ± 5.0) was significantly higher both compared to the group that was trained in the RA-seminar only (18.3 ± 5.0) and to the control group (17.1 ± 4.7) (p<0.001). The intervention group showed highly significant improvements compared to the other two groups in the subcategories head & neck (p<0.001) and extremities (p<0.001, p=0.002). In the category of thorax small but significant differences were detectable between the students of the intervention and the control group. Significant differences between the RA-seminar and the control group were only found in the category of thorax (p=0.025). 87.8% of the students agreed that teaching with radiologic imaging modalities was a good supplement to first year gross anatomy and a large majority of 85.4% stated that it was sensible to learn how to read CT scans at the beginning of their medical studies.

CONCLUSION

The incorporation of cadaver CT scans and life size virtual dissection tables significantly improved the performance of medical students in general gross anatomy. Medical imaging and virtual dissection should therefore be considered to be part of the standard curriculum of gross anatomy.

CLINICAL RELEVANCE/APPLICATION

Training in radiologic image interpretation on cadaver CT-scans and virtual dissection tables improves general anatomical knowledge and facilitates a smooth transition into the clinical work.

SSJ12-03 Conflict of Interest Disclosure in Medical Journals: Comparing Imaging Journal to Non-imaging Journals and Radiologists to other Specialists

Participants

Nasrin Fatemi, MD, Stony Brook, NY (Presenter) Nothing to Disclose
Danielle Kruse, BA, Stony Brook, NY (Abstract Co-Author) Nothing to Disclose
Mark E. Schweitzer, MD, Stony Brook, NY (Abstract Co-Author) Consultant, MMI Munich Medical International GmbH Data Safety Monitoring Board, Histogenics Corporation

PURPOSE

To determine authors’ compliance with the conflict of interest (COI) policies published in specific medical journals, and to see if this compliance is different for imaging oriented journals and for radiologists as opposed to other specialists.

METHOD AND MATERIALS

COI reports submitted by authors to 15 medical journals for a three month period, from July to September of 2015, were collected. The journals were chosen to be able to compare imaging journals with clinical medicine and surgical ones. These journals included Radiology, AJR, AJNR, JVIR, JBSIS, CORR, Spine, JCO, Cancer Research, JACS, Neurosurgery, Arthritis and Rheumatology, Clinical Rheumatology, JVS and JAMA Surgery. Physician authors who are required by law to report their payments and other transfer values to the government, were identified. The data were compared with the open payment data available at the government CMS (Center for Medicare and Medicaid Services) website. Data was stratified by journal type (imaging vs non imaging), and physician specialty (radiologists vs other specialists).

RESULTS

1336 articles were analyzed with 2368 contributing authors qualified. Review of the COI policies of 15 journals showed that 3 required a full unconditional report, with 12 having less rigorous disclosure polices. Overall only 0.3%-7% of authors fully reported their COI. Three journals studied had robust COI disclosure, nonetheless 30%, 61% and 62% of authors denied any COI in contradiction to the financial data published on the CMS website. Similar false denial rates ranged from 27% to 83% in the journal with looser policies. The rate of incomplete disclosures was 11%-19% in journals with strict policies as opposed to 3%-29% in journals laxer disclosure requirements. In imaging journals 30% (220) of radiologists falsely denied COI as compared to a much higher rate (57% (1081)) of other specialists writing in non imaging journals (p<0.0002). However, 34% (253) of radiologists writing in imaging journals correctly denied COIs, as opposed to 22% (431) of other specialists writing in non imaging journals (p<0.0002).

CONCLUSION

A surprisingly small percent of scientific authors acknowledge their financial support. Radiologists seems more compliant with these published policies.

CLINICAL RELEVANCE/APPLICATION
Structured Reporting of Focal Abdominal Masses Suspicious for Cancer: Lessons Learned from a Two-Year Initiative at a Multi-Hospital Academic Medical Center

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (Presenter) Nothing to Disclose
Dancock Lalicic, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Seetharam C. Chadalavada, MD, MS, Cincinnati, OH (Abstract Co-Author) Nothing to Disclose
Caroline Sloan, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Curtis P. Langlotz, MD, PhD, Menlo Park, CA (Abstract Co-Author) Shareholder, Montage Healthcare Solutions, Inc; Spouse, Consultant, Novartis AG
Rebecca Hubbard, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Mitchell D. Schnall, MD, PhD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Charles E. Kahn JR, MD, MS, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Hanna M. Zafar, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

PURPOSE
Using structured reporting to characterize imaging findings suspicious for cancer in the abdomen allows radiologists to quantify the types of lesions identified within the solid abdominal organs and monitor patients who require follow-up evaluation.

METHOD AND MATERIALS
Our main hospital developed a coding system analogous to BI-RADS® for focal lesions in the liver, pancreas, kidneys and adrenal glands. Lesions were categorized as benign (category 1, or 7), indeterminate (category 0 or 3) and suspicious (category 4 or 5); category 99 was used for technically inadequate imaging, and category 6 for known cancer. The system was incorporated into a structured template used for CT, MR and US imaging in the abdomen, and a recommendation-tracking engine was built. The first 2 years’ worth of data from the system were reviewed, to study the types of studies performed and the distribution of lesion types across the reported organs and modalities.

RESULTS
A total of 57,778 abdominal imaging exams (34,991 CT; 10,751 MR; and 12,036 US) were performed at our main hospital between 7/1/2013 and 6/30/2015. 61% exams were performed in the outpatient setting, 22% in the inpatient setting, and 16% in the emergency department; patient location could not be determined for 1% of exams. Abdominal imaging was ordered by physicians (79%), advanced practice nurses (14%) and physician assistants (4%); ordering provider type could not be determined for 3% of exams. The majority of cases were coded as benign. 16% of all exam reports identified indeterminate (9%) or suspicious (7%) findings. Most of these findings were identified in the liver using CT (4.6% of exams) or MR (2.1%). In the kidneys, 2.7% were identified using CT and 1% using MR. Only 2.1% and 1.8% of all exams revealed either indeterminate or suspicious findings in the pancreas and adrenal glands, respectively.

CONCLUSION
In a 2-year period, 16% of abdominal imaging reports identified findings indeterminate or suspicious for malignancy. Most such findings were identified in the liver and kidneys.

CLINICAL RELEVANCE/APPLICATION
Combining structured reporting with a standardized nomenclature and an informatics solution enables identification and monitoring of patients at risk for missed follow-up and adverse outcomes.

Prevalence of Burnout Among Practitioners of a Radiology Subspecialty

Participants
Felix S. Chew, MD, Seattle, WA (Presenter) Nothing to Disclose
Michael J. Mulcahy, PhD, Ellensburg, WA (Abstract Co-Author) Nothing to Disclose
Jack A. Porrino Jr, MD, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Hyojeong Mulcahy, MD, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Annemarie Relyea-Chew, JD,MS, Seattle, WA (Abstract Co-Author) Nothing to Disclose

PURPOSE
According to Maslach, burnout is a job-related psychological syndrome with three aspects: emotional exhaustion, depersonalization, and perceived lack of personal accomplishment. Burnout has been associated with deleterious effects on both the workers and the quality of their work. When burnout affects physicians, their well-being and longevity and the care of their patients may be at risk. Recent reports concerning burnout among physicians tend to treat specialists such as radiologists as a single group. We sought to explore the prevalence of burnout in a sample of musculoskeletal (MSK) radiologists.

METHOD AND MATERIALS
An IRB waiver was obtained. During Jan 2016, the 1,190 members of a society of MSK radiologists were invited to take an
An IRB waiver was obtained. During Jan 2016, the 1,190 members of a society of MSK radiologists were invited to take an anonymous survey that included questions adapted from the Maslach Burnout Inventory (MBI). The MBI evokes responses on a seven-point scale along the three dimensions of burnout: emotional exhaustion, depersonalization, and perceived lack of personal accomplishment. Maslach’s normative categorization of MBI scores divided occupational subgroups into thirds, representing low, average, and high levels of burnout. We considered a manifestation of burnout to be present if the specific MBI subscore for that manifestation would have placed the respondent into the high burnout level for the medicine occupational subgroup. There were 433 respondents (36% response rate). Not every respondent completed every question.

RESULTS
In our sample, the prevalence of emotional exhaustion was 62%, of depersonalization 53%, and of perceived lack of accomplishment 40%. Only 20% reported no manifestations of burnout, while 80% reported manifestations along at least one dimension of burnout, 52% along at least two, and 22% along all three. Between men and women, the overall prevalence of burnout was similar. In private practice, emotional exhaustion and depersonalization was worse than in academics, but in academics, lack of accomplishment was worse than in private practice.

CONCLUSION
Among MSK radiologists, the prevalence and severity of burnout was worse than previously reported for radiologists. There were differences between genders and practice settings.

CLINICAL RELEVANCE/APPLICATION
The high prevalence of burnout among MSK radiologists suggests that ameliorating burnout should be a priority. Doing so may help address manpower needs and quality of care concerns.

Honored Educators
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Felix S. Chew, MD - 2012 Honored Educator
Felix S. Chew, MD - 2016 Honored Educator

SS120-06 Health Service, Policy and Research Keynote Speaker: Recent Trends Suggest Private Office Imaging May Be in Jeopardy

Tuesday, Nov. 29 3:50PM - 4:00PM Room: S102D

Participants
David C. Levin, MD, Philadelphia, PA (Presenter) Consultant, HealthHelp, LLC; Board of Directors, Outpatient Imaging Affiliates, LLC
The Business of Radiology: Updates and Issues (Sponsored by the Associated Sciences Consortium) (An Interactive Session)

Tuesday, Nov. 29 3:30PM - 5:00PM Room: S105AB

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Patricia Kroken, Albuquerque, NM, (pkroken@comcast.net) (Moderator) Nothing to Disclose
Alexander Yule, DSc, Cardiff, United Kingdom (Moderator) Nothing to Disclose

LEARNING OBJECTIVES
Session attendees will 1) Gain practical industry knowledge that can be compared to their individual practice situations, 2) Understand the issues related to the implementation of ICD-10 and better prepare for the next stages and 3) Be able to compare examples of billing over-automation to their challenges maximizing revenue.

ABSTRACT
Radiology, as a business, increases in complexity each year as it responds to growing regulatory demands, downward revenue pressures and the need to do more with less. This session addresses the impact of ICD-10 after its first year of implementation and how reality matches to initial expectations. Did it live up to dire predictions or meet the promise of improved coding documentation? And what should we expect next? The session also reviews the trend of low-cost, highly automated billing options which have resulted in the commoditization of radiology billing; that is, the selection of billing options based primarily on price (rather than value). Examples of actual problems created by over-automation will be presented and the impact on revenue discussed. Together, the topics covered are timely and reflect common challenges for the business of radiology.

Sub-Events
MSAS34A  Getting What You Pay For: The Commoditization of Radiology Billing

Participants
Patricia Kroken, Albuquerque, NM, (pkroken@comcast.net) (Presenter) Nothing to Disclose
Jennifer Kroken, MBA, Lewisville, TX (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
The session is designed to provide physicians and administrative leadership with specific examples they can use to examine the effectiveness of their billing operations. Attendees can 1) Identify common industry problems with over-automation that may be occurring in their organizations. 2) Understand the revenue implications of "low bid" decisions related to billing. 3) Better understand the issues of price versus value.

ABSTRACT
The use of technology in radiology billing has been critical in lowering operational overhead, largely because increases in individual staff member productivity reduce the number of people needed to do the work. At the same time, competition has driven down billing company fees to the point where billing options have become commoditized; that is, dependent primarily on price. Have we gone too far? The presentation will review the impact of over-automation, evident as organizations struggle with providing the lowest cost options, and the financial consequences for physicians. Blinded examples from billing audits conducted over the past four years will be included to illustrate the types of problems encountered with low-cost billing options. The presenters make the case for seeking value in a billing relationship, rather than focusing strictly on price.

MSAS34B  ICD-10 and Radiology: The Good, The Bad & The Ugly

Participants
Melody W. Mulaik, Powder Springs, GA, (melody.mulaik@codingstrategies.com) (Presenter) President, Coding Strategies, Inc;

LEARNING OBJECTIVES
1) The current overall status of ICD-10-CM after one year of implementation. 2) Specific areas of coding and documentation concerns for radiology practices. 3) How to identify specific areas of opportunity to minimize negative financial outcomes.

ABSTRACT
Effective October 1, 2015, healthcare organizations replaced the ICD-9 diagnosis and procedure coding system with ICD-10. Although ICD-10 codes are assigned by staff, or handled by an outsourced vendor, the implementation of ICD-10 has impacted radiologists in a variety of ways. For example, due to the structure and granularity of the ICD-10 code set, there is a need for new or additional information in the radiology report to allow proper coding and thus avoid payment denials and/or delays. This session is designed to give radiologists the information they need to ensure that they, and their organization, are doing everything possible to avoid payment delays and/or denials. The information flow process from the receipt of orders to the radiologists' dictation will be reviewed in detail to identify opportunities for process improvement and individual physician impact. Ample time will be provided for answer attendee questions.

Active Handout: Melody W. Mulaik
What's Up with the New Requirements for Diagnostic Imaging Services? The Joint Commission, Medicare and Beyond

Tuesday, Nov. 29 4:30PM - 6:00PM Room: N229

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Tyler S. Fisher, Gardena, CA, (tyler@therapyphysics.com) (Presenter) Nothing to Disclose
Andrea D. Browne, PhD, Oakbrook Terrace, IL (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Identify new requirements applying to medical imaging. 2) Assess the degree to which their current policies and procedures will meet the new requirements. 3) Develop and implement new policies and procedures that will satisfy the new requirements.

Active Handout: Tyler S. Fisher

Active Handout: Andrea D. Browne
Incorporating Patient and Family Centered Care Principles into Your Practice

Tuesday, Nov. 29 4:30PM - 6:00PM Room: S102D

HP

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
James V. Rawson, MD, Augusta, GA (Moderator) Nothing to Disclose
James V. Rawson, MD, Augusta, GA (Coordinator) Nothing to Disclose

LEARNING OBJECTIVES
1) Identify opportunities for Radiologist to Improve Patient Experiences. 2) Review tools for improving Patient Experiences.

Sub-Events

RC427A  From Physician to Family Member Lessons Learned

Participants
Jennifer L. Kemp, MD, Denver, CO, (jkemp@divrad.com) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
View learning objectives under the main course title.

RC427B  Technologist and Patient Interactions

Participants
Layne Mitchell, MBA, RT, Augusta, GA (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
View learning objectives under the main course title.

RC427C  Interacting with Parents: A Chance to Add Value

Participants
Lynn A. Fordham, MD, Chapel Hill, NC (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) In this session we will review challenges and opportunities for talking with parents and their children.

ABSTRACT

RC427D  Opportunities in Informatics to Increase Patient Value

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
View learning objectives under the main course title.
Participants

**RC432A** Radiology Compensation Issues.

Participants
Vincent P. Mathews, MD, Elm Grove, WI (*Presenter*) Nothing to Disclose

**LEARNING OBJECTIVES**
1) To learn about the implementation of fair market value compensation plans. 2) To understand the importance of utilizing appropriate benchmarks for clinical productivity metrics.

**ABSTRACT**

**RC432B** The Impact of Health Care Reform on Radiology Reimbursement and Revenue

Participants
Robert J. Witte, MD, Rochester, MN, (witte.robert@mayo.edu) (*Presenter*) Nothing to Disclose

**LEARNING OBJECTIVES**
1) Provide a history of important legislation and policies that have had a significant impact on health care reform. 2) Review recent transformative health care legislation and policies that will impact radiology reimbursement. 3) Present concepts that can help radiology departments adapt to the changing reimbursement environment.

**RC432C** Testifying as an Expert Witness: Rules, Compensation and Other Rewards, Prevarications and Penalties

Participants
Leonard Berlin, MD, Skokie, IL, (lberlin@live.com) (*Presenter*) Nothing to Disclose

**LEARNING OBJECTIVES**
1) Define the need for, and importance and role of, the expert witness in the initiation and execution of a medical malpractice lawsuit. 2) Identify the factors that increase, and diminish, the value and effectiveness of the expert witness before a courtroom jury. 3) Appreciate the potential rewards, and the potential penalties, that can arise from testifying as an expert witness on behalf of the plaintiff, or the defendant.

Tuesday, Nov. 29 4:30PM - 6:00PM Room: S504AB

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
David B. Larson, MD, MBA, Los Altos, CA (Moderator) License agreement, Bayer AG; Potential royalties, Bayer AG

Sub-Events

RC454A Overview of the Imaging Decision Support Requirement

Participants
Curtis P. Langlotz, MD, PhD, Menlo Park, CA, (langlotz@stanford.edu) (Presenter) Shareholder, Montage Healthcare Solutions, Inc; Spouse, Consultant, Novartis AG;

LEARNING OBJECTIVES
1) Understand the requirements and scope of the U.S. Federal decision support requirement in the Protecting Access to Medicare Act of 2014. 2) Learn the legal definitions of appropriate use criteria and qualified provider-led entity. 3) Review the consequences of non-compliance. 4) Recognize the challenges CMS will face in implementing the law. 5) Recognize the challenges health care organizations will face in responding to the law. 6) Learn the latest information on implementation approach and timetable.

RC454B The Origins of the Imaging Decision Support Legislation

Participants
Keith J. Dreyer, DO, PhD, Boston, MA (Presenter) Medical Advisory Board, IBM Corporation

RC454C Experience and Recommendations of the High Value Health Care Collaborative

Participants
Keith S. White, MD, Murray, UT, (Keith.White@imail.org) (Presenter) Software support, Jidoka Systems

LEARNING OBJECTIVES
1) Understand the key differentiators of a Quality Improvement (QI) from a Quality Assurance (QA) program. 2) Understand how local teams should organize to establish QI programs focusing on Priority Clinical Areas (PCAs) to optimize local success in implementing PAMA regulations. 3) Identify pitfalls and strategies to mitigate risks of implementation of PAMA regulations. 4) Identify opportunities and strategies to optimize outcomes of local implementation of PAMA regulations.

ABSTRACT
Active Handout: Keith S. White

RC454D CMS Approach to Implementing the Legislation: Current Status

Participants
Joseph Hutter, Baltimore, MD (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Understand the key provisions of Section 218(b) of PAMA 2014. 2) Understand the CMS Final Rule setting up a new nationwide program for appropriate use criteria for imaging. 3) Understand the timetable for future components of the CMS program.
Academic and Community Practice Integration: Challenges and Strategies for Success

Wednesday, Nov. 30 8:30AM - 10:00AM Room: S104A

AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Jason N. Itri, MD, PhD, Charlottesville, VA (Moderator) Nothing to Disclose
Jason N. Itri, MD, PhD, Charlottesville, VA (Coordinator) Nothing to Disclose
Michael N. Patlas, MD, FRCP, Hamilton, ON, (patlas@hhsc.ca) (Presenter) Nothing to Disclose
Laura K. Findeiss, MD, Knoxville, TN, (lfindeiss@utmck.edu) (Presenter) Nothing to Disclose
Howard B. Fleishon, MD, Johns Creek, GA (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Discuss the challenges of running successful hybrid academic-community practice. 2) Highlight the unique advantages of academic subspecialty radiology group in providing quality service for the community. 3) Propose solutions for the successful integration of a joint academic and community practice.

ABSTRACT
There is increasingly blurring distinction between academic and community radiology practices. However, the duality brings multiple challenges to the management of a hybrid practice. Academic subspecialty trained radiologists may require retraining to cover a wider spectrum of modalities expected from the community imager. Similarly, community-based generalists can struggle to find a proper niche in a tertiary center, in terms of teaching, clinical research, and serving and collaborating successfully with specialized clinicians. The presentation will reflect on authors' leadership experience in a large academic-community hybrid radiology practice.
Will MACRA and MIPS Kill Your Practice?

Wednesday, Nov. 30 10:30AM - 12:00PM Room: S501ABC

Participants
David C. Levin, MD, Philadelphia, PA, (david.levin@jefferson.edu) (Moderator) Consultant, HealthHelp, LLC; Board of Directors, Outpatient Imaging Affiliates, LLC
Ezequiel Silva III, MD, San Antonio, TX (Presenter) Nothing to Disclose
J. Raymond Geis, MD, Fort Collins, CO (Presenter) Shareholder, Montage Healthcare Solutions, Inc; Advisor, Nuance Communications, Inc;

LEARNING OBJECTIVES
1) Understand what ramifications the Medicare Access and CHIP Reauthorization Act (MACRA) have for a radiology practice. 2) Understand what we know so far about how the Merit-Based Incentive Payment System (MIPS) will affect a radiology practice. 3) Be aware of the aspects of MIPS that are still being formulated.

ABSTRACT
Consort Reaction Training in US Radiology Residencies: A COARDRI Study

**Participants**
Laura M. Fayad, MD, Baltimore, MD (Moderator) Nothing to Disclose
Paul P. Cronin, MD, MS, Ann Arbor, MI (Moderator) Nothing to Disclose

**Sub-Events**

**Purpose**
To assess current contrast reaction training in U.S. diagnostic radiology residency programs.

**Method and Materials**
A 16 question anonymous electronic survey was distributed to diagnostic radiology residency program directors in the U.S. from 9/2015-11/2015. Programs were classified as small or large (≤20 vs. >20 residents). Descriptive analyses were performed, and small and large programs were compared using a combination of Fisher's exact test and chi-square test for trend.

**Results**
25.7% responded to the survey. Radiology residents are the first responders to contrast reactions in 91.5% of programs. 95.7% of programs provide contrast reaction management training. 89.4% of programs provide didactic lectures. The frequency of didactic lectures was significantly different (p=0.011) for small vs. large programs (one time: 52.9% vs. 84.0%; two times: 29.4% vs. 16.0%; three times 5.9% vs. 0%; at least four times, 5.9% vs. 0%; respectively). 37.8% of programs provided hands-on simulation training with only one program providing pediatric contrast reaction simulation. Among these 17 programs, residents participate once per year in 14, two times per year in 1, and at least three times per year in 2. Only residents participate in 5 programs; residents and fellows in 4; and residents, fellows, and staff in 8. Additional educational tools utilized by programs include simulation computer modules offered by another academic medical center, post-event debriefing, ACR CME materials on contrast reactions, and a safety curriculum consisting of required readings and an assessment exam. 57.7% of programs with a contrast reaction training program indicated that they were willing to share their contrast allergy curriculum with other radiology residency programs. A significantly larger fraction of small than large programs (66.7% vs. 51.9%, respectively) was willing to share its curriculum (p=0.026).

**Conclusion**
In comparison with prior literature, contrast reaction management training is increasingly incorporating simulation training and online content (including standardized modules and online material shared among centers). However, training in contrast reaction management remains inadequate in a majority of programs.

**Clinical Relevance/Application**
To address patient safety needs, it is imperative that a national curriculum which includes periodic simulation be developed and implemented.

Student Navigator: Healthcare and Learning Benefits in a Breast Unit

**Participants**
Begona Marquez-Ar gente-del-Castillo, MS, Murcia, Spain (Abstract Co-Author) Nothing to Disclose
Juana M. Plasencia-Martinez, MD, Murcia, Spain (Abstract Co-Author) Nothing to Disclose
Carmen Trejo-Gallego, MS, Murcia, Spain (Abstract Co-Author) Nothing to Disclose
Lucia Hernandez Sanchez, MBBS, Murcia, Spain (Presenter) Nothing to Disclose
Maria Martinez Galvez, Murcia, Spain (Abstract Co-Author) Nothing to Disclose
Jose Maria Garcia Santos, MD, PhD, Murcia, Spain (Abstract Co-Author) Nothing to Disclose

**Purpose**
To evaluate health care and mammogram learning benefits by involving medical students in a radiological breast unit (RBU).

**Method and Materials**
We randomized 327 consecutive RBU women in two groups by a permuted-block approach. All them had been appointed for a mammogram due to cancer follow-up, breast symptoms or familiar risk. Group 1 patients were welcomed, navigated and, when normal, finally informed on the outcome by a medical student. Group 2 patients were navigated by a technician as usual. Women with abnormal mammograms or needing ultrasound were excluded. Those included took the State Trait Anxiety Inventory (STAI)
before and after the appointment, considering other information like age, family status, number of children, level of education, feeling of support at the RBU and wish to know the results. The students (n=6) took a simple mammogram test before and after their 10-days attending period to the RBU. Anxiety level was assessed by univariate and multivariate (binary logistic regression – BLR- and general lineal model-GLM-) analysis and student-radiologist diagnostic agreement, by kappa test.

RESULTS
Finally, 199 normal mammogram patients were included. First, both groups were similar in State (21.43±11.61 vs. 22.21±11.75, P = 0.646) and Trait (21.94±11.33 vs. 23.56±12.25, P = 0.346) anxiety. When leaving, anxiety was significantly lower in group 1 (median: 13, interquartilic range: 8-21 vs. median: 19.5; interquartilic range: 11.75-28.25, P = 0.001; patients with anxiety level ≥275 32.3% vs. 67.7%, P = 0.028. State anxiety reduction 6.6 vs. 1.7, P = 0.001). Students’ intervention independently reduced anxiety according to the multivariate analysis (RLB: OR 3.1; 95%CI: 1.39-7.11; P = 0.006. GLM: F = 9.3; P = 0.003) regardless the particular student (P = 0.275). The absolute reduction in risk was 0.18 (95%CI 0.05-0.30) and the number needed to treat, 6 (95%CI 3-19). Student-radiologist agreement improved in 9 of 12 comparison (final kappa = 0.405-0.692).

CONCLUSION
Students involved in the RBU decreased women anxiety independently and increased their mammogram skills moderately.

CLINICAL RELEVANCE/APPLICATION
Integrating university and health system could offer mutual benefits.

SSK10-03 Radiology Rounds with the NICU Through a Telepresence Model: Technology that may Resurrect the Tradition of Daily Film Review

Wednesday, Nov. 30 10:50AM - 11:00AM Room: S102D

Participants
Janet R. Reid, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Christina Chougur, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
John Chuo, MD, MS, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Anne M. Ades, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Jorge Delgado, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Parvez Kazmi, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
David T. Saul, MD, Garnet Valley, PA (Presenter) Nothing to Disclose

PURPOSE
To evaluate the impact of a novel teleconferenced film review.

METHOD AND MATERIALS
From Jan-April 2016, 15 min interactive rounds were delivered by a radiologist (Rad) from a central reading room to a clinical team in a 98 bed neonatal ICU using a telepresence system. Stations were equipped with panoramic web-cams with polycom high fidelity audio. Each session included a 3 min microlecture followed by discussion of a case. Rad and neonatologists (Neo) completed the following assessments: Pre and Post Trial Evaluation; Short survey following each session. Evaluations included: confidence in image interpretation; necessity of interaction between Rad and Neo; graded value of interaction based on modality (scale 1-10 (median, range)) and obstacles to interaction.

RESULTS
Pre-post trial evaluation: 21 and 9 Rad and 22 and 2 Neo answered the pre- and post- trial evaluation, respectively. Confidence: for Rad, pre-trial score: 7 (5-9); post-trial score: 8 (7-10) (P=0.028); for Neo, pre-trial score: 7.5 (3-10); post-trial score: 7.5 (7-8). Necessity of rounds: for Rad, pre-trial score: 7 (4-10); post-trial score: 9 (7-10) (P=0.008); for Neo, pre-trial score:8 (3-10); post-trial score: 9 (8-10). Obstacles to interaction: Rad: most important obstacles were time and perceived value (14/21); Neo: time away from patient care (18/22). Modalities needing more interaction: for Rad there was no difference between interaction for different modalities (p=0.99); Neo required more interaction for nuclear medicine and abdominal/chest MRI/CT, and least for abdominal/chest XR (p<0.01). Surveys: Rad: 8/9 Rads’ imaging interpretation matched the clinical interpretation; 7/9 reinforced the interpretation; 1/9 did not impact interpretation and 1/9 cases changed the interpretation. All reported having a better understanding of the case after the interaction. Neo: For 22/25 the intervention reinforced the care plan, for 3/25 the intervention did not impact the care plan. Level of confidence in their radiologic interpretation: major improvement in 5/25, moderate in 17/25, no change in 3/25.

CONCLUSION
Our novel film review between NICU and radiology using telepresence was highly desirable, effective and educational and can replace the traditional model.

CLINICAL RELEVANCE/APPLICATION
This project embodies Radiology 3.0 in adding value to patient care through improved communication and interdisciplinary education.

SSK10-04 Multi-year Evaluation of Inter-professional Simulation Team-training (TT) for Management of Acute Contrast Reactions (ACR): Educational Impact on Team-Performance

Wednesday, Nov. 30 11:00AM - 11:10AM Room: S102D

Participants
Alexi Otrakji, MD, Boston, MA (Presenter) Nothing to Disclose
Hillary R. Kelly, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Alexandra Penzias, Boston, MA (Abstract Co-Author) Nothing to Disclose
Joanne Forde, Boston, MA (Abstract Co-Author) Nothing to Disclose
Sanjay Saini, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Gloria M. Salazar, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
S alerts of education or high comfort level in understanding radiology. Nurse practitioners and physician assistants have a significant role in influencing imaging ordered by supervising physicians despite their formal degree programs.

**CLINICAL RELEVANCE/APPLICATION**

A survey of APPs in neurosurgery showed that a majority influenced imaging orders of physician counterparts despite a lack of education or high comfort level in understanding radiology. APPs overwhelmingly felt that radiology education should be included in their formal degree programs. "Very confident" about diagnostic imaging knowledge. 6% felt "not at all confident" and 44% felt "somewhat confident" with confidence of imaging knowledge and comfort in discussing radiology with patients were positively associated with the number of years of practice (p=0.01).

**RESULTS**

Completed surveys obtained from 92 APPs, 61% nurse practitioners and 39% physician assistants. Most worked for less than 2 years or 2-5 years, representing 35% and 25%, respectively. 99% of respondents felt that radiology education should be included in a NP or PA degree program but 45% reported that they had not received formal classroom education. 71% of APPs felt "very comfortable" about diagnostic imaging knowledge, 6% felt "not at all confident" and 44% felt "somewhat confident" with correct administration of epinephrine auto-injector seems to be significantly improved when inter-professional participants designated a team leader. Our study demonstrates no significant improvement of objective performance when CA is utilized. Moreover, correct administration of epinephrine auto-injector seems to be significantly improved when inter-professional participants designated a team leader. Further research is needed to evaluate the impact of these two variables in simulation performance for ACR.

**CONCLUSION**

Our study demonstrates no significant improvement of objective performance when CA is utilized. Moreover, correct administration of epinephrine auto-injector seems to be significantly improved when inter-professional participants designated a team leader. Further research is needed to evaluate the impact of these two variables in simulation performance for ACR.

**CLINICAL RELEVANCE/APPLICATION**

Effective management of anaphylaxis secondary to ACR depends on well-designed cognitive aids (CA) and recurrent training of staff. We sought to evaluate the impact of simulation in team performance. Designating a team leader resulted in significantly higher correct utilization of auto-injector as compared to teams that did not assign a leader (p=0.004), however no differences were detected when evaluating time to institute epinephrine and calling for additional help (Table 2).

**METHOD AND MATERIALS**

A retrospective analysis of objective performance of radiology inter-professional teams (physician, technologist, and/or nurse) undergoing high-fidelity simulation training for the management of ACR was conducted from October 2012 through June 2015.

**PURPOSE**

To evaluate the impact of cognitive aids (CA) and TT skills in the proper medical management of simulated contrast reactions.

**RESULTS**

We identified 280 radiology teams where 30% (n=85) utilized CA and 37% (n=103) designated a team leader to help manage the ACR. Teams administered the correct medication at 3.6 minutes (average) of the beginning of the simulated ACR (SD 1.3, 2-7 minutes). There were no statistical differences in time to response and correct administration of epinephrine auto-injector when comparing teams that utilized CA versus teams that did not (Table 1). When evaluating the impact of non-technical skills during simulation, our data showed that designating a team leader resulted in significantly higher correct utilization of auto-injector as compared to teams that did not assign a leader (p=0.004), however no differences were detected when evaluating time to institute epinephrine and calling for additional help (Table 2).

**CONCLUSION**

Our study demonstrates no significant improvement of objective performance when CA is utilized. Moreover, correct administration of epinephrine auto-injector seems to be significantly improved when inter-professional participants designated a team leader. Further research is needed to evaluate the impact of these two variables in simulation performance for ACR.

**CLINICAL RELEVANCE/APPLICATION**

Effective management of anaphylaxis secondary to ACR depends on well-designed cognitive aids (CA) and recurrent training of staff. We sought to evaluate the impact of simulation in team performance. Designating a team leader resulted in significantly higher correct utilization of auto-injector as compared to teams that did not assign a leader (p=0.004), however no differences were detected when evaluating time to institute epinephrine and calling for additional help (Table 2).

**METHOD AND MATERIALS**

A survey was conducted at the American Association of Neurological Surgeons (AANS) Advanced Practice Providers (APP) educational course consisting of a 14-point questionnaire about the context in which the course participants utilized imaging and their perceived understanding of radiology. Multivariate analysis was performed with STATA statistical software to compare perceptions based on prior radiology education and years of practice experience. A survey of APPs in neurosurgery showed that a majority influenced imaging orders of physician counterparts despite a lack of education or high comfort level in understanding radiology. APPs overwhelmingly felt that radiology education should be included in their formal degree programs.
Students and residents underwent the same lecture and workshop series during July (2012-2015). Our student elective course

**METHOD AND MATERIALS**

exam scores obtained by the two groups, student (S) and resident (R).

July educational experience as the 4th year student elective, including the end of elective exam. This study was a review of the experiences. To try and reduce this variability, for the last 4 years, we have had our first year residents take part in the identical Radiology residents start their training with highly variable levels of baseline knowledge of radiology, dependant on their prior experiences. To try and reduce this variability, for the last 4 years, we have had our first year residents take part in the identical

**PURPOSE**

Petra J. Lewis, MD, Lebanon, NH (Presenter) Consultant, Adient Medical Inc; Stockholder, Adient Medical Inc; A. Kyle Jones, PhD, Houston, TX (Abstract Co-Author) Shareholder, Sirte Medical Ltd

Ryan K. Clarke, MHA, Houston, TX (Abstract Co-Author) Nothing to Disclose

Simrit Parmar, Houston, TX (Abstract Co-Author) Nothing to Disclose

**RESULTS**

A total of 1153 participants completed the full survey, 302 (26%) in the HealthLoop group, 363 (31%) in the PDF group, and 488 (42%) in the control group. When asked "Do you know the definition of ionizing radiation", 66% of the HealthLoop group, 57% of the PDF group, and 22% of the control group answered "Yes". When asked which imaging modalities used ionizing radiation, the HealthLoop group was significantly more knowledgeable than the other two groups. When asked about the relative radiation doses used by different imaging modalities, the HealthLoop group again significantly outperformed the other two groups. The HealthLoop group was significantly less concerned about radiation exposure than the other two groups. The overwhelming majority of participants in the HealthLoop groups (84%) were satisfied or very satisfied with their experience and found it helpful or very helpful (85%).

**CONCLUSION**

Health literacy in imaging is a problem. Our control population demonstrated a basic lack of understanding of the use of ionizing radiation in diagnostic imaging and the relative radiation doses used by different modalities. A quality improvement effort consisting of educating patients before their procedure using either conventional paper educational materials or an innovative online platform increased knowledge, however, the online platform produced significantly higher increases in most endpoints. Further, patients who used the online platform were less apprehensive about radiation and found their educational experience both satisfying and helpful. As national patient awareness increases as a result of educational initiatives, including Image Wisely, Image Gently, and Choosing Wisely, imaging practices should consider expanding the use of online education platforms.

**METHODS**

Two weeks prior to a scheduled imaging appointment, patients were contacted via email and asked if they would like to participate. They were then sent either a login to the HealthLoop program, a PDF document, or no educational aid. Within one week following their imaging exam, all participating patients were emailed a link to a 22 question survey. The primary endpoints were responses to survey questions about facts and risks related to diagnostic imaging. To evaluate for nonresponse bias, those who did not complete the survey were sent a second, abbreviated survey and the two sub groups were compared. Finally, the HealthLoop group was sent a second survey to rate their experience with the web-based educational tool.

**PDF UPLOAD**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Joseph R. Steele Jr, MD - 2013 Honored Educator

**SSK10-06** A Digital Patient Engagement Platform to Enhance Patient Knowledge about Diagnostic Imaging

Wednesday, Nov. 30 11:20AM - 11:30AM Room: S102D

Participants

Joseph R. Steele JR, MD, Houston, TX (Presenter) Consultant, Adient Medical Inc; Stockholder, Adient Medical Inc; A. Kyle Jones, PhD, Houston, TX (Abstract Co-Author) Shareholder, Sirte Medical Ltd

Ryan K. Clarke, MHA, Houston, TX (Abstract Co-Author) Nothing to Disclose

Simrit Parmar, Houston, TX (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

High quality healthcare requires that well informed patients work in concert with their providers to make good decisions. Many patients lack health literacy around imaging. In particular, they do not understand the use of ionizing radiation, and as a result may make decisions that are not in their best interest. The primary objective of this study was to determine if an interactive online program (HealthLoop, Mountain View, CA) is more effective for educating patients about diagnostic imaging than conventional aids (paper documents).

A total of 1153 participants completed the full survey, 302 (26%) in the HealthLoop group, 363 (31%) in the PDF group, and 488 (42%) in the control group. When asked "Do you know the definition of ionizing radiation", 66% of the HealthLoop group, 57% of the PDF group, and 22% of the control group answered "Yes". When asked which imaging modalities used ionizing radiation, the HealthLoop group was significantly more knowledgeable than the other two groups. When asked about the relative radiation doses used by different imaging modalities, the HealthLoop group again significantly outperformed the other two groups. The HealthLoop group was significantly less concerned about radiation exposure than the other two groups. The overwhelming majority of participants in the HealthLoop groups (84%) were satisfied or very satisfied with their experience and found it helpful or very helpful (85%).

**RESULTS**

A total of 1153 participants completed the full survey, 302 (26%) in the HealthLoop group, 363 (31%) in the PDF group, and 488 (42%) in the control group. When asked "Do you know the definition of ionizing radiation", 66% of the HealthLoop group, 57% of the PDF group, and 22% of the control group answered "Yes". When asked which imaging modalities used ionizing radiation, the HealthLoop group was significantly more knowledgeable than the other two groups. When asked about the relative radiation doses used by different imaging modalities, the HealthLoop group again significantly outperformed the other two groups. The HealthLoop group was significantly less concerned about radiation exposure than the other two groups. The overwhelming majority of participants in the HealthLoop groups (84%) were satisfied or very satisfied with their experience and found it helpful or very helpful (85%).

**CONCLUSION**

Health literacy in imaging is a problem. Our control population demonstrated a basic lack of understanding of the use of ionizing radiation in diagnostic imaging and the relative radiation doses used by different modalities. A quality improvement effort consisting of educating patients before their procedure using either conventional paper educational materials or an innovative online platform increased knowledge, however, the online platform produced significantly higher increases in most endpoints. Further, patients who used the online platform were less apprehensive about radiation and found their educational experience both satisfying and helpful. As national patient awareness increases as a result of educational initiatives, including Image Wisely, Image Gently, and Choosing Wisely, imaging practices should consider expanding the use of online education platforms.

**METHODS**

Two weeks prior to a scheduled imaging appointment, patients were contacted via email and asked if they would like to participate. They were then sent either a login to the HealthLoop program, a PDF document, or no educational aid. Within one week following their imaging exam, all participating patients were emailed a link to a 22 question survey. The primary endpoints were responses to survey questions about facts and risks related to diagnostic imaging. To evaluate for nonresponse bias, those who did not complete the survey were sent a second, abbreviated survey and the two sub groups were compared. Finally, the HealthLoop group was sent a second survey to rate their experience with the web-based educational tool.

**PDF UPLOAD**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Joseph R. Steele Jr, MD - 2013 Honored Educator

**SSK10-07** Do Medical Students and Commencing First Year Radiology Residents Perform Differently in a Standardized Radiology Exam?

Wednesday, Nov. 30 11:30AM - 11:40AM Room: S102D

Participants

Petra J. Lewis, MD, Lebanon, NH (Presenter) Book contract, Oxford University Press; Consultant, Siemens AG

**PURPOSE**

Radiology residents start their training with highly variable levels of baseline knowledge of radiology, dependant on their prior experiences. To try and reduce this variability, for the last 4 years, we have had our first year residents take part in the identical July educational experience as the 4th year student elective, including the end of elective exam. This study was a review of the exam scores obtained by the two groups, student (S) and resident (R).

**METHOD AND MATERIALS**

Students and residents underwent the same lecture and workshop series during July (2012-2015). Our student elective course
Students and residents underwent the same lecture and workshop series during July (2012-2015). Our student elective course includes about 50 hours of didactic/interactive teaching, workshops & games and about 25 hours of general radiology resident teaching that all residents and students attended. The elective course covers all modalities/specialties but focuses on appropriate image ordering, basic image interpretation and technique, anatomy, patient safety etc. Both groups were provided with the same text book (Oxford Handbook of Radiology) and all completed 17 CORE cases online (Med-u.org). Exams were deployed through Radiology ExamWeb, using exams developed by Alliance of Medical Student Educators (AMSER). Both had access to a 20 question practice test and completed a 113 question final exam after 4 weeks (AMSER SE1).

RESULTS
20 S and 22 R took part in the July course. Anecdotally feedback from residents was very positive. They felt that this provided them with an excellent grounding in radiology and there were no complaints about being taught alongside students. There were no significant differences in the test results between students and residents but both groups scored significantly higher than the national mean (p<0.001). Final test score % (mean/sd) S (n=20): 87.1/3.8, R (n=22): 84.7/5.7. National results on this test (n=1702):75.0/8.7

CONCLUSION
At the end of a one month course in radiology at the start of residency, student and residents perform no different from each other on a standardized exam despite 24 months difference in education. Performance was significantly better in both groups than the national mean. This latter may be due to the intensive nature of our course.

CLINICAL RELEVANCE/APPLICATION
Residency programs should consider a short intensive basic course at the beginning of PGY2 to establish uniformity of entry knowledge with a standardized post course evaluation such as the AMSER Standardized Exam.

PURPOSE
This study evaluates the level of readability of online radiology resources written specifically for patients to see if they meet the guidelines set forth by the American Medical Association (AMA) and National Institutes of Health (NIH). Given the relative ease of Internet access, patients and their families frequently turn to the Internet as a source of further information. The online resources we provide as radiologists can help enhance the communication between us and our patients.

METHOD AND MATERIALS
The online patient education resources from professional organization including the Society of Interventional Radiology, Cardiovascular and Interventional Radiology Society of Europe, American Society of Neuroradiology, Society of Neurointerventional Surgery, European Society of Radiology, and the jointly sponsored ACR-RSNA website radiologyinfo.org were evaluated for their level of readability. Further readability analysis was performed on 8 different websites that provide educational resources on radiation safety. The level of readability is quantitatively evaluated using 10 well-established readability scales.

RESULTS
Collectively, the 300 individual patient education resources were written at a 12.8 grade level. The level of readability ranged from a low a 12.2 grade level for resources available on radiologyinfo.org to the 14.5 grade level for resources on the SIR website. None of the 300 articles were written at the AMA and NIH recommended 3th – 7th grade level to meet the needs of the average American that reads at an 8th grade level.

CONCLUSION
The readability of online patient education resources from the major radiologic societies as well as those with an interest in radiation safety, largely miss the guidelines of the AMA and NIH. Providing educational resources for patients is critical in helping patients better understand their disease, how it’s diagnosed, and their treatment options. Rewriting patient education resources in a simpler format will increase the number of readers who can fully comprehend the material and ultimately derive more benefit with the goals of improved outcomes and patient satisfaction.

CLINICAL RELEVANCE/APPLICATION
Patients frequently use the Internet as an educational resource; it is therefore imperative that these resources be written no higher than the NIH and AMA recommended 7th grade level to ensure widespread understanding by the average American.

Participants
Laura M. Fayad, MD, Baltimore, MD (Presenter) Nothing to Disclose
Practice Ready? Assessing Medical Students' Abilities in Recognizing Important and Emergent Radiological Findings

**Station #1**

**Participants**
James V. Rawson, MD, Augusta, GA (*Moderator*) Nothing to Disclose

**Sub-Events**

**HP226-SD-WEA1**

**Purpose**
The purpose of this study was to examine medical students' abilities to recognize important radiological findings on plain film and computed tomography (CT) scans.

**Method and Materials**
An online survey invitation was sent to third and fourth-year medical student rotating at our institution. The questionnaire contained ten radiological images, including both positive and negative plain film and CT studies. Students were asked to describe the pertinent finding in each image. Additional information was gathered about each respondent, including year of study, clinical rotations completed, confidence in interpreting radiological imaging, preparation and desired residency specialty.

**Results**
Sixty-one (61) completed surveys were received and analyzed. The majority of students were not able to correctly identify important imaging findings, with an overall average of 29% correct responses. The normal chest radiograph was most correctly identified, at 59%; acute pancreatitis on CT had the lowest correct response rate at 3.1%. Having completed an intensive care unit (ICU) rotation was associated with better diagnostic ability (approaching significance, p=0.054). When plain film chest radiographs were analyzed separately, students who completed an ICU rotation were significantly better able to make the correct diagnosis (p<0.01). Neither the completion of any other clinical rotation, nor desired residency specialty, was correlated with improved diagnostic ability. Likewise, students' year of study did not show any significance.

**Conclusion**
Radiology education is a crucial yet often overlooked aspect of medical education. Although a radiologists' insightful interpretation of complex studies will always play an important role in guiding patient care, every physician should possess the ability to accurately recognize basic and common disease processes. Based on the findings of this study, medical students are not adequately prepared to diagnose important diseases on radiological studies. Therefore, a heavier emphasis should be placed on teaching students how to accurately interpret medical imaging, both during basic sciences and clinical years, to help foster well-rounded physicians.

**Clinical Relevance/Application**
Medical students must be provided with greater exposure to radiology, in order to ensure that they can adequately interpret basic imaging findings.

**Evidence-Based Surveillance Imaging Schedule after Liver Transplantation for Hepatocellular Carcinoma Recurrence**

**Station #3**

**Participants**
Dan Liu, PhD, MSc, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose
Chi Yan A. Chan, MBBS, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose
Daniel Y. Fong, PhD, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose
Chung-Mau Lo, MS, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose
Pek Lan Khong, MBBS, FCRR, Hong Kong, Hong Kong (*Presenter*) Nothing to Disclose

**Purpose**
Here is presently no evidence-based recommendation for surveillance of recurrent hepatocellular carcinoma (HCC) after liver transplantation (LT). We aim to evaluate and develop evidence-based alternate surveillance imaging schedules for post LT HCC patients.

**Method and Materials**
Imaging and pathologic reports for consecutive post-LT patients followed-up by regular surveillance imaging from a single institution's prospective database were evaluated with institutional review board approval. Outcome variable was time to diagnosis...
of first recurrence post-LT by surveillance imaging. Recurrence-free survival times (RFST) from alternative surveillance schedules were compared with the existing schedule (3-monthly) using a parametric frailty model. Expected delay (EpD) in diagnosis compared to the existing schedule was also computed for the alternate surveillance schedules. A p value of less than 0.05 was considered to indicate a significant difference.

RESULTS
One hundred twenty five patients (108 men; 59.4 years ±16.6) underwent 1953 CT and 255 MRI scans. RFST was not significantly different in the first five years after LT when the imaging interval was extended from current 3-monthly to 6-monthly (p=0.786, EpD= 45 days). This alternative schedule incurred ten (50.0%) fewer surveillance scans than the 20 in the original schedule, and a corresponding reduction in radiation dose (if involved) and cost during the 5-year follow-up period.

CONCLUSION
In conclusion, modeled alternative surveillance schedules have the potential to reduce the frequency of scans without compromising surveillance benefits.

CLINICAL RELEVANCE/APPLICATION
Extending imaging surveillance schedules to 6-monthly from 3-monthly offers reduced frequency of scans without compromising surveillance benefits in post-transplant hepatocellular carcinoma patients.

HP229-SD-WEA4 Power to the People: A Multi-institutional United States Survey in Adult and Pediatric Teaching Hospitals on Patient Preferences for Information Before their Radiology Exams

Station #4

Participants
Jay K. Pahade, MD, New Haven, CT (Presenter) Consultant, Precision Imaging Metrics, LLC
Andrew T. Trout, MD, Cincinnati, OH (Abstract Co-Author) Advisory Board, Koninklijke Philips NV; Travel support, Koninklijke Philips NV ; Author, Reed Elsevier; Research Grant, Siemens AG
Bin Zhang, PhD, Cincinnati, OH (Abstract Co-Author) Nothing to Disclose
Victorine V. Muse, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Lisa R. Delaney, MD, Carmel, IN (Abstract Co-Author) Nothing to Disclose
Pradeep G. Bhambhavi, MD, Birmingham, AL (Abstract Co-Author) Nothing to Disclose
Evan J. Zucker, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Pari Pandharipande, MD, MPH, Boston, MA (Abstract Co-Author) Nothing to Disclose
James A. Brink, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Marilyn J. Goske, MD, Cincinnati, OH (Abstract Co-Author) Nothing to Disclose

PURPOSE
To assess what information patients find useful before their imaging exam, who they want the information from, and how preference varies based on demographics and patient specific variables

METHOD AND MATERIALS
A 24 item survey assessing preferences on receiving information prior to an imaging exam, and which specific information was most valued was distributed at 3 pediatric and 3 adult hospitals across the U.S.. Chi-square or Fisher's exact test (categorical variable) and one way ANOVA or two sample t-test (continuous variable) were used for comparison between groups. Multivariate logistic regression with stepwise selection was used to determine the association between survey responses and demographics.

RESULTS
1542/1742 (89%) surveys were at least partially completed. Mean respondent age was 46.4±16.8 years with respondents more frequently female (1025/1506, 68%), Caucasian (1132/1504, 75%) and English speaking (1428/1542, 95%) and 86.5% (1294/1542) having undergone prior imaging. 78% (1117/1438) had received information about their exam (range 64% - 88% across sites), most commonly from the ordering provider (824/1292, 64%). Exam type (p<0.0001) and years of schooling (p=0.0084) predicted whether information was provided and site, race and exam type predicted who provided information (all p<0.0001). The ordering provider was the preferred source of pre-exam information (72.4%, 1005/1388). Half of respondents (52%, 57/1452) had sought exam information themselves, most commonly through the ordering provider (824/1292, 64%). Exam type (p<0.0001) and years of schooling (p=0.0084) predicted whether information was provided and site, race and exam type predicted who provided information (all p<0.0001). The ordering provider was the preferred source of pre-exam information (72.4%, 1005/1388). Half of respondents (52%, 57/1452) had sought exam information themselves, most commonly through the ordering provider (33.6%, 430/1279) and non-radiology websites (31.2%, 399/1279). Respondents assigned the highest importance to information on test preparation (mean Likert 4.2±1.3) and the lowest importance to whether an alternative radiation-free exam could be utilized (mean Likert: 3.6±1.4).

CONCLUSION
More than 20% of patients are not receiving any information prior to radiologic testing. Ordering providers are providing the majority of information and this is the preferred method of receiving information for patients. Patients are most interested in information related to test preparation and least interested in information related to radiation exposure.

CLINICAL RELEVANCE/APPLICATION
This study provides insight into patient preferences regarding pretest information and should help design, improve and implement a more patient-centric model of healthcare delivery in Radiology.

HP230-SD-WEA5 Teaching Radiologists Who Perform Image Guided Interventions Effective Communication Skills through Simulation

Station #5

Participants
Carolynn M. DeBenedectis, MD, Worcester, MA (Presenter) Nothing to Disclose
Max P. Rosen, MD, MPH, Worcester, MA (Abstract Co-Author) Stockholder, Everest Scientific Inc; Consultant, PAREXEL International Corporation; Stockholder, Cynvenio Biosystems, Inc; Medical Advisory Board, Cynvenio Biosystems, Inc

PURPOSE
Communication for Radiologists (RADS) performing interventional procedures (IR) may be challenging, as often patients do not meet the RAD until the day of the procedure, and procedures are often performed with conscious sedation, making effective communication with the patient essential. The purpose of this project was to create a workshop to teach IR RADS to communicate more effectively with the patients during procedures.

METHOD AND MATERIALS

7 attending RADS (in groups of 2 or 3) participated in 3 workshops at our simulation center. All workshops were conducted with professional actor-patients, who had been trained in simulation. Each workshop involved 4 communication scenarios: 1) Obtain informed consent, 2) Discuss the need to change/cancel a procedure, 3) Deal with a combative patient, and 4) Disclosure and apology for an error. One RAD participated in each simulation while the other 1-2 RADS watched (via video monitors) in the debriefing room. A debriefing/teaching session followed, and then another simulation occurred with a different RAD participating in the next simulation. Pre and post simulation surveys were obtained from each RAD.

RESULTS

Prior to and after undergoing the training/simulations, all 7 RADS rated their comfort with the 4 scenarios. 71.4% strongly agreed they felt very comfortable performing informed consent before the workshop vs. 85.7% after (+14.3%). 57.1% strongly agreed they felt very comfortable talking to patients about having to change/cancel a procedure before the workshop vs. 71.4% after (+14.3%). 14.3% strongly agreed they felt very comfortable dealing/communicating with a combative patient before the workshop vs. 57.1% after (+42.8%). 14.3% strongly agreed they felt very comfortable disclosing and apologizing for errors before the workshop vs. 57.1% after (+42.8%).

CONCLUSION

Communication skills simulation workshops can be an important component of Radiologists’ professional development and ongoing training. The participants felt more comfortable in all the scenarios after the workshop with the greatest increase reported in dealing/communicating with combative patients and disclosing and apologizing for errors during IR procedures.

CLINICAL RELEVANCE/APPLICATION

Workshops that teach radiologists’ effective communication skills may increase radiologists’ comfort communicating with patients during image guided procedures.

How to Safely Perform MRI in Patients with Pacemakers/ICDs? - A Primer for Radiologists

Awards
Certificate of Merit

Participants
Fernando U. Kay, MD, Dallas, TX (Abstract Co-Author) Nothing to Disclose
Verghese George, MBBS, Houston, TX (Abstract Co-Author) Nothing to Disclose
Prabhakar Rajiah, MD, FRCR, Dallas, TX (Presenter) Institutional Research Grant, Koninklijke Philips NV; Speaker, Koninklijke Philips NV

TEACHING POINTS

To review the safety aspects of MRI in patients with devices such as pacemakers/ICDs To review the currently available, FDA approved MR conditional pacemakers/ICDs To present a flow-chart on management of this challenging scenario

TABLE OF CONTENTS/OUTLINE

Introduction Safety issues with devices (Static magnetic field- Movement; Activation of reed switch; Gradient and RF fields- Heating, tissue damage, interference with device function) Designing changes in MRI-conditional pacemakers/ICD (Reduced ferromagnetic content, modified Reed switch, lead design changes, improved circuitry, shields, programming) Currently available FDA approved MR conditional pacemakers/ICDs (PM- Revo & Advisa (Medtronic); Entovis, Eluna & Evia (Biotronik); ICD- Evera (Medtronic). Steps for safe MRI- Establish multidisciplinary team; Electrophysiology clearance; Proper selection of patients; Program device to MR mode before the scan; Adequately trained staff in place (radiologist, cardiologist, radiology nurse, electrophysiology nurse, physicist); Scan according to the conditions specified for the device; Continuous monitoring of patient; Maintaining image quality; Checking parameters after scan; Reprogram the device; Follow-up if parameters are changed significantly Management of artifacts during scanning. Specific MR conditions for the different devices MRI in ”MR unsafe” devices.
HP231-SD-WEB

Appropriate Use of CT Pulmonary Angiography - An Analysis of Ordering D-Dimers in the Emergency Department and the Potential for Improvement

Station #1

Participants
James V. Rawson, MD, Augusta, GA (Moderator) Nothing to Disclose

PURPOSE

The symptoms and signs of a pulmonary embolism (PE) are extremely varied and thus a clinical diagnosis of PE can be unreliable. A robust way to stratify a patient’s risk of PE is to use one of the validated clinical decision tools such as the Wells score. Using these tools, a patient can be stratified into a low, moderate or high pretest probability of PE. The addition of a d-dimer test provides a pathway to determine if a patient requires imaging to exclude a PE. The d-dimer is a breakdown product of crosslinked fibrin and occurs coincident with activation of the coagulation cascade. The d-dimer level may be elevated in the presence of a clot that embolises to the lungs causing a pulmonary embolism (PE). The d-dimer level should be used in patients with a low to moderate pretest probability for PE.

METHOD AND MATERIALS

A retrospective audit was performed of patients who underwent CT Pulmonary Angiography (CTPA) for suspected PE from the emergency department in January 2016. IMPAX search parameters: Study Dates = 01/01/2016-01/03/2016.Study Description = "CT Pulm"Request = ED Clinician and/or location ED. Using these studies a more detailed review of the available documentation including d-dimer result, a recent chest x-ray, vital signs and clinical history were used to produce a retrospective Wells PE probability score.

RESULTS

The first 100 CTPAs performed were analyzed. 13% of the patients had a positive CTPA for PE. 98% of patients were of low to moderate pretest probability for PE. 15% of these patients had a d-dimer requested prior. 12 (92%) of the patients who had a confirmed PE were of low or moderate pretest probability. It was noted, one patient with low pretest probability of PE, who had a negative d-dimer, still continued to have a CTPA which was also negative.

CONCLUSION

The positive CTPA rate for PE was 13% - less than the rate recommended by the Royal College of Radiologists of 15.4-37.4%. Only 15% of the low and moderate pretest probability patients had a d-dimer requested. If the d-dimer test was utilized appropriately, it could have conceivably avoided up to 71% of the CTPAs.

CLINICAL RELEVANCE/APPLICATION

Education sessions and emphasis on the diagnostic imaging pathway would save cost, reduce exposure of patients to ionizing radiation, the risk of contrast complications and would improve patient turn over in the emergency department.

HP232-SD-WEB

Diagnostic Errors in Urgent Radiology Reports: The Impact of Time of Day and Teleradiology

Station #2

Participants
Antoni Malet-Munte, MD, Sabadell, Spain (Presenter) Nothing to Disclose
Jordi M. Puig-Domingo, MD, L’arretilla Del Valle, Spain (Abstract Co-Author) Nothing to Disclose
Marta Andreu, MD, Sabadell, Spain (Abstract Co-Author) Nothing to Disclose
Joan Carles Oliva Sr, BS,MS, Sabadell, Spain (Abstract Co-Author) Nothing to Disclose
Eva Ballesteros Gomiz, MD, Mollet del Valles, Spain (Abstract Co-Author) Nothing to Disclose
Marta Sola, MD, Sabadell, Spain (Abstract Co-Author) Nothing to Disclose
Xavier Gallardo, MD, Sabadell, Spain (Abstract Co-Author) Nothing to Disclose
Francesc Novell Teixido, MD, Sabadell, Spain (Abstract Co-Author) Nothing to Disclose
Damian Gil, Sabadell, Spain (Abstract Co-Author) Nothing to Disclose
Joseph M. Mata, MD, PhD, Sabadell, Spain (Abstract Co-Author) Nothing to Disclose
Eva Castaner, MD, Sabadell, Spain (Abstract Co-Author) Nothing to Disclose

PURPOSE

To determine the impact of the time of day and of teleradiology on the rate of errors in reports of urgent abdominal and/or chest CT studies by residents on call.

METHOD AND MATERIALS

Our imaging department covers calls for our university hospital with 500 acute beds and 500 nursing home beds and, by teleradiology, calls for 13 public hospitals with 2,100 acute beds serving a population of 1.8 million. We reviewed 2,016 prospectively
registered reports of urgent abdominal and chest CT studies done between 7/10/2014 and 5/15/2015 at our hospital or the hospitals served by teleradiology that were reported by third- or fourth-year residents on call and then reviewed by subspecialists. Discrepancies with reports by abdominal or thoracic radiologists reviewing the studies later were considered errors. We classified errors in function of whether they could potentially change the urgent management of the patient and cause an adverse event. We also analyzed the difficulty of the findings, the reasons for errors (due to erroneous perception, interpretation, or transmission), and the type of error (false-positives vs. false-negatives).

RESULTS

The overall rate of discrepancies that could potentially lead to changes in the urgent management was 3.8%. The rate was higher in the early hours than at other times (8.1% vs. 3.3%, p=0.001). The rate of discrepancies did not differ between studies done onsite and those reported by teleradiology.

CONCLUSION

The risk of errors that can potentially change the urgent management is higher in the early morning than in the rest of the call period, so only studies that cannot wait until the morning should be done in this period. Teleradiology did not affect the rate of errors.

CLINICAL RELEVANCE/APPLICATION

Radiology reports are crucial for clinical decisions, so it is essential to know what factors can increase diagnostic errors.

HP233-SD-WEB3  Medical Student Perception of Diagnostic Radiology after Implementation of an Evening Emergency Radiology Rotation

Station #3

Awards
Student Travel Stipend Award

Participants
Anuj K. Rajput, MD, Stony Brook, NY (Presenter) Nothing to Disclose
Don N. Nguyen, MD, Pittsburgh, PA (Abstract Co-Author) Nothing to Disclose
Toshiie Abluwalla, MD, Melville, NY (Abstract Co-Author) Nothing to Disclose
Michael Goodman, BA, Stony Brook, NY (Abstract Co-Author) Nothing to Disclose
Rayeed Islam, BS, Antigua Guatemala, Antigua and Barbuda (Abstract Co-Author) Nothing to Disclose
Jared Nesbitt, MD, Stony Brook, NY (Abstract Co-Author) Nothing to Disclose
Dharmesh Tank, MD, Stony Brook, NY (Abstract Co-Author) Nothing to Disclose
Robert Matthews, MD, Stony Brook, NY (Abstract Co-Author) Nothing to Disclose

PURPOSE

Our purpose is to assess if there is a change in medical students’ current perception of diagnostic radiology after the implementation of an evening emergency radiology rotation.

METHOD AND MATERIALS

A questionnaire was given to 80 rotating medical students after a 2-week diagnostic radiology rotation during a 10-month interval. The rotation included time spent in all the specialties with the addition of a new evening ER rotation. The rotation consisted of spending time after hours with a senior resident and an on-call attending during a typical evening ER shift.

RESULTS

Exit responses of the students demonstrated a mean 10% increase in the interest in radiology after the rotation. Perceptions of diagnostic radiology had an average change of 33%. A mean of 2 hours was considered an optimal amount of time spent on a night ER rotation. Majority of students felt there was an insufficient amount of time spent reviewing studies during the ER rotation, however, the number of studies seen was considered to be sufficient in volume.

CONCLUSION

Medical student perception of diagnostic radiology after the implementation of an evening ER rotation has not changed substantially. They demonstrate awareness of the increased workload and expectations of the night ER radiologist, however, appear to be more interested in radiology after this experience.

CLINICAL RELEVANCE/APPLICATION

Implementation of an evening ER radiology rotation during medical school does not substantially change students perception of radiology in lieu of our changing health care climate, which has fostered increase diagnostic imaging and faster turnaround time with accurate interpretation.

HP235-SD-WEB5  Propensity Score Analysis of Lung Cancer Risk in Endemic Area with High Prevalence of Nonsmoking-related Lung Cancer

Station #5

Participants
Hsiu Fu Wu, Kaohsiung City, Taiwan (Presenter) Nothing to Disclose
Fu-Zong Wu, MD, DSc, Kaohsiung, Taiwan (Abstract Co-Author) Nothing to Disclose
Ming-Ting Wu, MD, Kaohsiung, Taiwan (Abstract Co-Author) Nothing to Disclose
Chiung Chen Chuo, Kaohsiung City, Taiwan (Abstract Co-Author) Nothing to Disclose
Wei-Chun Huang, Kaohsiung, Taiwan (Abstract Co-Author) Nothing to Disclose
Pei-Ling Tang, Kaohsiung City, Taiwan (Abstract Co-Author) Nothing to Disclose

PURPOSE

Lung cancer has been the leading cause of cancer-related mortality worldwide among both men and women in recent years.
Smoking is the major risk factor for lung cancer, but an increase in the incidence of nonsmoking-related lung cancer in recent years. The purpose of the present study was to investigate multiple potential risk factors for nonsmoking-related lung cancer among Asian Ethnic Groups.

**METHOD AND MATERIALS**

We retrospectively review the medical record of 1974 asymptomatic healthy subjects (40~80 year old) who voluntarily underwent low-dose chest CT (1083 male, 891 female) from August 2013 to March 2015. Clinical information and nodule characteristics were recorded according to ACR lung-RADS classification. Results of subsequent follow-up and outcome were also recorded. A propensity score-matched cohort analysis using the retrospective was applied to adjust for potential bias and to create two comparable groups according to family history of lung cancer.

**RESULTS**

For our primary analysis, we matched 392 pairs of subjects with family history of lung cancer and subjects without history. Logistic regression showed that female gender and a family history of lung cancer were the two most important predictor of lung cancer in endemic area with high prevalence of nonsmoking-related lung cancer (odds ratio of 11.146, P value = 0.021; odds ratio of 2.831, P value = 0.05, respectively). In addition, the number of nodules was higher in subjects with family history of lung cancer in comparison with subjects without family history of lung cancer.

**CONCLUSION**

In conclusion, Risk-based prediction model based on the family history of lung cancer and female gender can potentially improve efficiency of lung cancer screening programs in Taiwan.

**CLINICAL RELEVANCE/APPLICATION**

Risk-based prediction model based on the family history of lung cancer and female gender can potentially improve efficiency of lung cancer screening programs in Taiwan.

**HP143-ED-WE6**

Contrast Induced Nephropathy in the Light of Residual Renal Function: Stepping Out of the Darkness and into the Renal Realm

Station #6

Participants
Justin White, DO, Little Rock, AR (Presenter) Nothing to Disclose
Narendra B. Gutta, MBBS, MD, Little Rock, AR (Abstract Co-Author) Nothing to Disclose
John C. Faircloth, DO, Sherwood, AR (Abstract Co-Author) Nothing to Disclose
Kedar Jambhekar, MD, Little Rock, AR (Abstract Co-Author) Nothing to Disclose

**TEACHING POINTS**

Describe Residual Renal Function (RRF) and it’s importance. Review contrast induced nephropathy with emphasis on morbidity and mortality in dialysis patients. Present recent literature surrounding CIN, RRF, and hypoalbuminemia in dialysis patients.

**TABLE OF CONTENTS/OUTLINE**

Present data demonstrating residual renal function as key independent risk factor for survival in long term dialysis patients. Review contrast induced nephropathy morbidity and mortality in general and dialysis subset. Discuss studies on rates of contrast induced nephropathy in setting of low serum albumin. Present recent data concerning contrast effect on residual renal function. Propose criteria for managing contrast administration to dialysis patients.
LEARNING OBJECTIVES

1) The potential impact of alternate payment systems, including merit based incentive payment systems, on future radiologic practice. 2) The impact of increasing price transparency on radiology practice. 3) Important common radiology growth models and their impact on radiology/hospital relationships. 4) Key positive and negative aspects of radiology computerized order decision support. 5) A model example of how a streamlined body MRI service can add value to radiology practices in a prospective payment environment.

ABSTRACT

This afternoon interactive seminar will explore the impact of the changing healthcare landscape on radiologic practice. Six speakers will present a wide range of topics such as the impact of price transparency and alternative payment systems including merit based incentive payment systems on radiologic practice. The pros and cons on computer decision support for radiology ordering will be explored, as will future radiology growth models and their impact of radiology hospital relationships. Attendees will also learn about how a streamlined body MRI service can add radiology value in future prospective payments systems.

ABSTRACT

There is a strong pressure in our health care system to extract costs, while moving to shared risk payment models. Advanced imaging technologies, particularly CT and MRI, represent a high total expense and discussion has mostly focused on reduced utilization. In this lecture I will provide an overarching view, and supporting evidence, on how the paradigm must change in order to make optimal policies and payment models. I will discuss the value proposition of optimized advanced imaging technology, focusing on MRI. I will show how MRI may, in areas of proven value, be underutilized and that optimized implementation, coupled with documentation, can lower overall cost of care delivery and lay the foundation for a new care-delivery payment environment.
SPHA41E  Question And Answer

Participants
Ezequiel Silva III, MD, San Antonio, TX (Presenter) Nothing to Disclose
Diego R. Martin, MD, PhD, Tucson, AZ (Presenter) Nothing to Disclose
Richard Weil, PhD, Highland Park, IL (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
View learning objectives under main course title.

SPHA41F  5 Top Radiology Growth Models and their Impact on the Physician/Hospital Partnership

Participants
Patrick D. Free, Clinton Twp, MI (Presenter) Vice President, McKesson Corp.

LEARNING OBJECTIVES
View learning objectives under main course title.

SPHA41G  Price Transparency in Radiology: What Does It Mean for Hospitals and Radiologists?

Participants
Mark D. Hiatt, MD, MBA, Salt Lake City, UT, (mark.hiatt@regence.com) (Presenter) Medical Director, Regence BlueCross BlueShield; Board Member, RadSite; Former Officer, HealthHelp, LLC

LEARNING OBJECTIVES
View learning objectives under main course title.

SPHA41H  Legislation, Computerized Decision-Support and the Transition to Value-Based Healthcare in Radiology

Participants
Mick Brown, Chicago, IL (Presenter) Vice-President, Business Development, National Decision Support Company

LEARNING OBJECTIVES
View learning objectives under main course title.

SPHA41I  Question and Answer

Participants
Mark D. Hiatt, MD, MBA, Salt Lake City, UT, (mark.hiatt@regence.com) (Presenter) Medical Director, Regence BlueCross BlueShield; Board Member, RadSite; Former Officer, HealthHelp, LLC
Mick Brown, Chicago, IL (Presenter) Vice-President, Business Development, National Decision Support Company
Patrick D. Free, Clinton Twp, MI (Presenter) Vice President, McKesson Corp.

LEARNING OBJECTIVES
View learning objectives under main course title.
PURPOSE
The fundamental standards of digital medical data exchange, such as DICOM and HL7, date back to the late 1980s. And although these standards went through countless enhancements, one particular aspect — security — remained virtually untouched. The main purpose of our work was to employ a “big data” approach to reveal the most recent trends in radiology information security.

METHOD AND MATERIALS
DICOM handshake protocol was used to develop a fast, parallel-processing security-probing application. Testing each IP address for its openness to transmit medical data (with no actual PHI data transferred), the application scanned the entire worldwide space of IP addresses in only 4 weeks. Geolocation services were used to map each unsecure IP identified. As a result, we compiled a comprehensive map of open DICOM/HL7 servers worldwide, with different levels of security threats. Repeating this scan for the past three years we were able to compare the state of informational security of radiology imaging networks.

RESULTS
At each run, our scans discovered nearly 3000 DICOM (PACS) servers worldwide, which were left open for external data access. DICOM protocol was used to categorize our findings by different levels of security threats, and geolocation data — by countries and regions. As a result, we compiled DICOM security ratings per country, per capita, and per IT infrastructure. We also built the first map of DICOM adoption worldwide. Finally, we repeated this analysis over the past three years to demonstrate that radiology imaging data still remains under an increased risk of breaching, with no visible improvements in its security ratings.

CONCLUSION
Medical imaging archives, left wide-open to DICOM and HL7 threats, is by far the most common security problem, which needs to be addressed with a robust, standardized, and fully implemented solution. Our results demonstrate the full scope of this problem, and the areas where it needs to be addressed. The fact that radiology security is not improving over the past years is particularly alarming, and should be addressed by the clinical community.

CLINICAL RELEVANCE/APPLICATION
Hospital security breaches have an enormously detrimental impact on clinical operations. Our results and methodology should be used to protect patient clinical records.

PURPOSE
To elucidate factors underlying racial disparities in screening mammography participation for the purpose of designing more effective patient engagement strategies.

METHOD AND MATERIALS
HIPAA-compliant and IRB approved. All women age 50 to 64 who obtained screening mammography (SM) in calendar year 2005 were tracked for 10 years after the index SM to identify women with no “missed opportunities for care” (defined as a two year
RESULTS
12,277 patients were included in the study: 86.2% identified as White, 4.8% Black/African American, 3.5% Hispanic, and 5.4% other. Overall, 32.1% of women had a high level of PCP interaction, including 30.1% (29.2-30.9%) of White women, 41.3% (CI 37.3-45.2%) of Black/African American women, and 42.0% (CI 37.4- 46.7%) of Hispanic women. Black (47.6%, CI 43.6-51.6%) and Hispanic (59.5%, CI 54.9-64.1%) women were more likely than White women (42.1%, CI 41.2- 43.0%) to have a missed opportunity during the study period (p<0.05). Likewise, women with low levels of PCP interaction (47.1%, CI 46.2-48.0%) were more likely than women with high levels of PCP interaction (35.0%, CI 34.2-35.8%) to have a missed opportunity during the study period. Higher level of PCP interaction eliminated the racial disparities in SM participation between White (34.4%, CI33.5-35.3%) and Black/African American (35.9%, CI 32.0-39.8%) women, whereas disparities persisted in Hispanic women (49.2%, CI 44.5- 53.9%) despite this correction.

CONCLUSION
Interventions to increase PCP interactions are likely to reduce racial disparities in participation in screening mammography. Further research is necessary to better understand potential cultural or trust barriers in the Hispanic population that contribute to persistent screening disparities despite high levels of PCP interaction.

CLINICAL RELEVANCE/APPLICATION
Patient engagement strategies to curb racial disparities in screening mammography participation move beyond the issue of provider access to cultural or trust barriers that might be at play.

SSM11-03 USA vs Europe: Who is in the Lead with CT Radiation Doses?

Wednesday, Nov. 30 3:20PM - 3:30PM Room: S102D

Participants
Anushri Parakh, MBBS, MD, Basel, Switzerland (Presenter) Consultant, Bayer AG
Andre Euler, MD, Basel, Switzerland (Abstract Co-Author) Nothing to Disclose
Sebastian T. Schindera, MD, Basel, Switzerland (Abstract Co-Author) Research Grant, Siemens AG; Research Grant, Ulrich GmbH & Co KG; Research Grant, Bayer AG; Speakers Bureau, Bayer AG

PURPOSE
The aim of the study is to assess the difference in diagnostic reference levels (DRLs) for CT between North America (dose-data sourced from American College of Radiology-Dose Index Registry (DIR)) and Europe (a regional CT dose registry in *blinded of review*).

METHOD AND MATERIALS
Dose-data for a regional European CT dose registry was collected from eight CT scanners in six different institutions over a period of two years (January 1st 2014-December 31st 2015). The 75th percentile values (DRL) for volumetric CT dose index (CTDIvol), dose-length product (DLP) and size-specific dose estimate (SSDE) for the registry were gathered using a dose-tracking software (Radimetrics, Bayer Healthcare). DRLs for six protocols (head, thorax, pulmonary-angiogram, abdomen-pelvis, renal-colic and thorax-abdomen-pelvis) were compared with latest ACR-DIR dose-report from July-December 2015.

RESULTS
The total number of scans for six protocols in our regional registry were 40,293. On comparison with our study, the ACR-DIR had higher dose values for 75th percentile CTDiVol and DLP values for all protocols. The largest divergent value for CTDiVol was for CT thorax by 220% (5 mGy vs. 16 mGy). The least difference was for CT abdomen-pelvis, with CTDiVol of 14 mGy in the European registry and 18 mGy for ACR-DIR. On comparison with our study, the ACR-DIR had higher dose values for 75th percentile SSDE values by 100% for thorax, 77% for pulmonary angiogram and 70% for renal-colic. The least difference was for abdomen-pelvis and thorax-abdomen-pelvis (0.06%).

CONCLUSION
Substantial difference exists for CT doses (particular dedicated low-dose protocols) between Europe and US, which is explained by a large transatlantic difference in practice. The large room for optimization in US institutes need to be translated into action.

CLINICAL RELEVANCE/APPLICATION
The monitored ACR data needs to be frequently benchmarked with international data to demonstrate the large potential for dose optimization in US-institutions.

SSM11-04 Repeat CT within One Month of CT in the Emergency Department for Abdominal Pain: A Secondary Analysis of Data from a Prospective, Multicenter Study

Wednesday, Nov. 30 3:30PM - 3:40PM Room: S102D

Participants
Leslie K. Lee, MD, Boston, MA (Presenter) Nothing to Disclose
Andrew T. Reisner, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
William D. Binder, MD, Providence, RI (Abstract Co-Author) Nothing to Disclose
Atif Zaheer, MD, Baltimore, MD (Abstract Co-Author) Nothing to Disclose
Martin L. Gunn, MBChB, Seattle, WA (Abstract Co-Author) Research Grant, Koninklijke Philips NV; Royalties, Cambridge University Press; Spouse, Consultant, Reed Elsevier; Spouse, Consultant, athenahealth, Inc.;
Ken F. Linnau, MD, MS, Seattle, WA (Abstract Co-Author) Royalties, Cambridge University Press; Speaker, Siemens AG
Chad M. Miller, MD, Durham, NC (Abstract Co-Author) Nothing to Disclose
Mauns S. Herring, San Francisco, CA (Abstract Co-Author) Nothing to Disclose
Angela C. Tramontano, MPH, Boston, MA (Abstract Co-Author) Nothing to Disclose
Emily C. Dowling, Boston, MA (Abstract Co-Author) Nothing to Disclose

PURPOSE
Analysis of Data from a Prospective, Multicenter Study

Repeat CT within One Month of CT in the Emergency Department for Abdominal Pain: A Secondary Analysis of Data from a Prospective, Multicenter Study
METHOD AND MATERIALS
We conducted a secondary analysis of data collected from a prospective, multicenter observational study. The parent study included patients who underwent CT for abdominal pain in the EDs of 4 large academic centers (2012-14). These patients constituted our study group; their original ED CT scans were termed “index” scans. We calculated the proportion of patients that underwent repeat abdominal CT in the 1 month following their index CT scan. For each patient, results of their index and repeat CT scans were compared by two abdominal radiologists external to the parent study. Comparisons were categorized as: I) no change; II) same process, improved; III) same process, worse; IV) different process. Disagreements were adjudicated by a third abdominal radiologist. We further calculated the proportion of patients in groups I+II (no change or improved) vs. III+IV (worse or different process). For groups I+II vs. III+IV, we compared: patients’ age and gender; days elapsed between CT scans; and years of professional experience of the ED physician at the time of the index CT request.

RESULTS
The parent study included 544 patients (246 female, 45%; mean age=50 years). In the 1 month after the index CT, 10% of patients (53/544, 95% CI: 7.5-13%) underwent repeat abdominal CT (25 female, 48%; mean age=52 years). The frequency of cases within each specified group was: I) 43% (23/53); II) 26% (14/53); III) 15% (8/53); and IV) 15% (8/53). Inter-rater agreement among the two initial external reviewers was good (κappa= 0.61). New or worse findings were present in 30% of patients (16/53, 95% CI: 19-44%). Comparing groups I+II vs. III+IV, there was no significant difference in patients’ age (p=0.25), gender (p=0.45), days elapsed between CT scans (p=0.80), and years of physician professional experience (p=0.31).

CONCLUSION
A high proportion of patients (10%) that underwent CT for abdominal pain during an ED visit had repeat CT within 1 month. Repeat CT demonstrated new or worse findings in 30% of these patients.

CLINICAL RELEVANCE/APPLICATION
10% of patients who initially underwent CT for abdominal pain in the ED underwent repeat abdominal CT within 1 month. Repeat CT demonstrated new or worse findings in 30% of patients.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Atif Zaheer, MD - 2012 Honored Educator

SSM11-05 Recognizing the Pediatric "No Show": Demographic and Medical Factors Associated with Missed Care Events in Pediatric Radiology

Wednesday, Nov. 30 3:40PM - 3:50PM Room: S102D

Participants
Efren J. Flores, MD, Boston, MA (Presenter) Nothing to Disclose
Vishala Mishra, MBBS, Boston, MA (Abstract Co-Author) Nothing to Disclose
Swati Goyal, Boston, MA (Abstract Co-Author) Nothing to Disclose
Edgar L. Martinez Salazar, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Randheer Shailam, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Garry Choy, MD, MS, Boston, MA (Abstract Co-Author) Nothing to Disclose
Stuart R. Pomerantz, MD, Boston, MA (Abstract Co-Author) Research Grant, General Electric Company
H. Benjamin Harvey, MD, JD, Boston, MA (Abstract Co-Author) Nothing to Disclose

PURPOSE
To understand potential demographic and medical factors associated with imaging missed care events (MCEs) in the pediatric population.

METHOD AND MATERIALS
HIPAA-complaint and IRB approved. All pediatric patients (<18 years) who were scheduled to undergo an outpatient imaging exam at our institution between February 2014 and March 2016 were reviewed to determine the presence of an imaging MCEs (i.e., failure to show up to the scheduled imaging exam). Comparisons were made between patients with and without an MCE based on demographic variables (age, gender, self-reported race and ethnicity, language, insurance status) and a subset of ICD 9 diagnosis codes, including but not limited to child abuse or neglect, missed clinical appointments, history of non-compliance and failure to thrive. Multivariate logistic regression was performed to evaluate the independent relationship between patient characteristics and MCEs.

RESULTS
30,303 pediatric patients were scheduled for 57,493 exams during the study period. 2528 (8.3%) of the patients had at least one MCE. Demographic factors associated with MCEs included primary language other than English (OR: 1.2, p<0.0001), Black/African American ethnicity (OR: 1.7, p<0.0001 relative to White), and Obesity (OR: 2.69, p<0.0001). Multiple ICD9 diagnosis codes, including child abuse or neglect and/or needing observation for the same (OR: 1.8, p<0.001), failure to thrive (OR: 1.6, p<0.0001), having at least one recorded personal history of noncompliance with treatment (OR: 2.2, p<0.001) and missed clinical visit appointments (OR: 1.7, p<0.01), remained significantly associated with MCEs after correcting for potential confounders.

**CONCLUSION**

Certain demographic and medical factors are strongly associated with missed care events in pediatric radiology.

**CLINICAL RELEVANCE/APPLICATION**

Understanding factors associated with pediatric missed care events is fundamental to designing responsive, patient-centered care models that can better support the health maintenance of this vulnerable population.

**SSM11-06 Health Service, Policy and Research Keynote Speaker: Should We Radiologists Own the Closed Loop for Follow-up Recommendations?**

Wednesday, Nov. 30 3:50PM - 4:00PM Room: S102D

Participants

Annette J. Johnson, MD, MS, Winston Salem, NC (Presenter) Nothing to Disclose
Radiology in a New Payment Model Environment

Thursday, Dec. 1 8:30AM - 10:00AM Room: S404AB

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Clifford J. Belden, MD, Philadelphia, PA, (Clifford.belden@tuhs.temple.edu) (Moderator) Nothing to Disclose
Clifford J. Belden, MD, Philadelphia, PA, (Clifford.belden@tuhs.temple.edu) (Coordinator) Nothing to Disclose
David A. Rosman, MD, Boston, MA (Presenter) Nothing to Disclose
Suresh K. Mukherji, MD, Northville, MI (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Identify 7 things radiology can and should own in value based health economy.

ABSTRACT
There numerous "megatrends" that are currently affecting radiology. These trends include declining reimbursements, expanded service expectations, higher productivity and demands for higher quality. The challenge is to determine how we can continue to grow our subspecialty while maintaining our educational and research mission. This presentation will discuss the "current state" of Radiology but will also focus on future reimbursement trends that will define our subspecialty for the next 10 years. The talk will discuss reimbursement trends, population health, and most recent information on the job market. We will discuss the concept of "technological determinism" and the impact on neuroradiology. Finally, we will discuss a growing level of cognitive dissonance and the need to develop more consistent and realistic expectations to help instill more stability in our field.
Payment Reform and Getting Paid: A Focus on Value Activities and Metrics

Thursday, Dec. 1 8:30AM - 10:00AM Room: E350

AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Geraldine B. McGinty, MD, MBA, New York, NY, (gbm9002@med.cornell.edu) (Presenter) Nothing to Disclose
Richard Duszak JR, MD, Atlanta, GA, (richard.duszak@emory.edu) (Presenter) Nothing to Disclose
Giles W. Boland, MD, Boston, MA (Presenter) Principal, Radiology Consulting Group; Royalties, Reed Elsevier

LEARNING OBJECTIVES
1) To understand value-focused healthcare imperatives in the evolution of healthcare delivery systems and how they impact medical imaging. 2) To implement practice changes aligned with Imaging 3.0 so as to maximize the relevance of radiology and radiologists in ongoing health system changes. 3) To improve the delivery of imaging care by focusing on value chain opportunities. (This course is part of the Leadership Track)

ABSTRACT
Although radiology’s dramatic evolution over the last century has profoundly affected patient care for the better, our current system is fragmented with many providers focusing more on technology and physician needs rather than what really matters to patients: better value and outcomes. This latter dynamic is aligned with current national health care reform initiatives and creates both challenges and opportunities for radiologists to find ways to deliver new value for patients. The American College of Radiology has responded to this challenge with the introduction of Imaging 3.0, which represents a call to action to all radiologists to assume leadership roles in shaping America's future health care system through 5 key pillars: imaging appropriateness, quality, safety, efficiency, and satisfaction. That enhanced value will require modulation of imaging work processes best understood through the concept of the imaging value chain, which will be the focus of this course.
Cost Effectiveness Analysis of Monitoring Strategies in the First Year after Cardiac Transplantation

PURPOSE

Development of acute allograft rejection is the primary cause of morbidity in the first year post cardiac transplantation. Endomyocardial biopsy (EMB) combined with echocardiography and cardiac catheterization is considered the gold standard for surveillance of rejection. EMB, however, remains invasive, expensive, carries risk of injury, and is uncomfortable for the patient. Validation of alternative monitoring algorithms combining clinical effectiveness with lower cost and decreased invasiveness remains a strategic priority for physicians and healthcare systems.

METHOD AND MATERIALS

We developed a Markov model using cost, utility of states, sensitivity and specificity of test parameters to assess the comparative effectiveness of various monitoring strategies. We modeled the efficacy based on the utility spent in each Markov state based on reports from the literature. Cost for procedures was estimated based on Medicare reimbursement and validated against institutional data.

RESULTS

Approximately 37% of recipients will experience at least 1 episode of ACR in the first postoperative year. Approximately 80% to 85% of these rejection episodes respond to the initial treatment regimen. There are very few instances of acute transplant rejection leading to re-transplantation in the first year and most occur in the first month post operatively. At a 16 node level of monitoring, all monitoring strategies analyzed were similarly efficacious at 292 QALD. The average cost of invasive monitoring per patient per year is estimated to be $231,795 vs $67,287 for CMR. A mixed strategy of early EMB with subsequent CMR costs $114,573.

CONCLUSION

Continued development and improvement of CMR in rejection surveillance for transplant patients indicates it represents a cost effective alternative to the current gold standard. Further research into combined strategies will determine not only comparative effectiveness but the possibility of improving utility of life post-transplant in the first year. Further dedicated randomized controlled trials will be able to elucidate the effectiveness of MR techniques. In the setting of increasing health care costs, a potential reduction of over $117,000 per patient and $146,000/QALY can result in significant value for society.

CLINICAL RELEVANCE/APPLICATION

New mixed surveillance modalities utilizing CMR represent promising alternatives to invasive monitoring strategies for cardiac rejection in the first year after transplantation.
Recent publications demonstrate an alarming drop in the number of US Allopathic Medical Students (USM) applying for Radiology residency. This may be due to perceived weakness of the job market and lack of job security. Are students fearful that teleradiology—the ability to obtain images in one location, transmit them over a distance, and view them remotely, has decreased the need for radiologists in the hospital setting? Are female USM increasingly unlikely to pursue Radiology training? The aim of this study is to survey USM to determine their reasons for not applying to Radiology.

**METHOD AND MATERIALS**

An IRB-waived prospective cohort cross-sectional study was performed at a single US Allopathic Medical School. 281 USM (response rate 40%) completed the survey. Data was obtained including: demographics, radiology course experience, considered applying to radiology, perception of Radiology Residency, general perception of Radiology, perception of outsourcing, amount of patient interaction relative to ideal job, perceived lifestyle, and fear of radiation. Some basic knowledge of radiation and contrast-agents was assessed. 1-5 Likert scale was used whenever feasible.

**RESULTS**

146 (52%) of respondents were male, 135 (48%) were female. Preliminary results indicate 25/146 (17%) of males were considering/strongly considering radiology; compared to 4/135 (3%) in females. 118/281 (42%) of respondents were Asian, 17/118 (14%) of Asians were considering/strongly considering radiology compared to 12/163 (7%) of non-Asians. 42% of USM agree/strongly agree (A/SG) radiologists are not directly part of patient care, while only 10% disagree/strongly disagree (D/SG). 41% of USM A/SG teleradiologists have decreased the need for radiologists in the hospital setting while only 20% D/SG disagree. USM note there is not enough patient contact in radiology compared to ideal job (69% A/SG vs 11% D/SG).

**CONCLUSION**

Initial data suggest USM see Radiologists not directly part of patient care and can be outsourced due to teleradiology. USM feel radiologists spend too little time with patients compared to the ideal job. Female USM are particularly unlikely to consider Radiology.

**CLINICAL RELEVANCE/APPLICATION**

USM are increasingly not choosing Radiology due to: fear of outsourcing and decreased patient interaction; female USM are particularly unlikely to pursue Radiology.

**HP238-SD-THA3**

**Longitudinal Evaluation of a Lecture Series Based on the American College of Radiology Appropriateness Criteria for Emergency Medicine Providers (A 1 Year Follow-up)**

**Station #3**

**Awards**

Student Travel Stipend Award

**Participants**

Jeff J. Farrell, MD, Cleveland, OH (Presenter) Nothing to Disclose

Christos Kosmas, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose

Peter C. Young, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

In the near future, the United States health care system will transition from a fee-for-service system to a value base system. Implementing evidence-based guidelines and decision support tools will be essential to the field of radiology. The American College of Radiology has developed the American College of Radiology-Appropriateness Criteria (ACR-AC) as well as ACR Select to help provide evidence based guidelines to ordering providers for imaging ordering advice. Despite the ACR efforts, literature states that medical students, residents, and ordering providers are unaware of the ACR-AC or underutilize it. For the 2015-2016 academic year, our institution continued for a second year a lecture series based on the ACR-AC for emergency medicine providers. The purpose of this study was to assess the long term effectiveness of our ACR-AC lecture based series to educate emergency medicine residents. Specifically, we followed the emergency medicine (EM) resident class of 2016 and 2017 to assess their performance on the pre-test results from the ACR-AC lectures from the academic years of 2014-2015 to 2014-2016 to identify long term effectiveness of our lecture based series. In addition, our group evaluated the pre and post-test performance of the emergency residency class of 2016, 2017, and 2018 for the academic year of 2015-2016.

**RESULTS**

The pre-test and post-test scores of the EM resident class of 2016 (current PGY-3) and 2017 (Current PGY 2) for the academic years of 2014-2015 and 2015-2016 for the same four lectures were analyzed. The pre-test score for the academic year of 2014-2015 was 47% and 53% correct for the class of 2017 and 2016 respectively. The pre-test score for the academic year of 2015-2016 was 88% and 88% for the class of 2017 and 2016, respectively. A sample of the means two-tailed t-test was used to determine if there was a significant difference. The respective pre-test scores for the different academic years among the same class were significantly different (p-value <0.05).For the academic year 2015-2016, the class of 2018, 2017, and 2016 pre and post test scores were analyzed. The percentage correct for the pre-test quizzes for the class of 2018, 2017, and 2016 were 52%, 88%, and 88 %, respectively. The percentage correct for the post-test quizzes for the class of 2018, 2017, and 2016 were 94%, 89 % and 90 %, respectively. A two tailed t-test sample of the means was used to compare the pre and post test data to determine if a significant difference exists. The p-value for the class of 2018 was P-value <0.05. The class of 2017 and of 2018 were not significantly different with a p-value > 0.05.

**CONCLUSION**

The class of 2016 and 2017 EM residents at our institution demonstrated significantly improved pre-test scores for the 2015-2016 academic year which suggests that the ACR-AC lectures based series is effective for long term education of non-radiology residents on the ACR-AC. In addition, the class of 2018 which had no previous exposure to the lectures in the academic year of 2014-2015 demonstrated significant improvement on their post-test quiz following the lectures on the ACR-AC for the 2015-2016 academic year. Implementing a continuing lecture series based on the ACR-AC provides an effective long term means of educating non-radiology physicians on the ACR appropriateness criteria. In addition, new residents not exposed to ACR-AC still lack knowledge on the ACR-AC based on the results of class of 2018 pre-test scores. Such a lecture series is an effective tool to educate the
next generation of EM providers on the ACR-AC.

METHODS

During the 2014-2015 academic year, 10 lectures based on the ACR-AC appropriateness criteria were given to EM residents at our institution. The lectures were approximately 20 minutes long with about 10 minutes for questions. All lectures also included information regarding relative radiation dose for the imaging examinations relevant to each topic. Before each lecture, the residents were given a quiz with three questions based on clinical scenarios on the topic of the lecture. The same quiz was given after the lecture. So far for the academic year of 2015-2016, the ACR-AC topics repeated were Small bowel obstruction, Right Lower Quadrant Pain-Rule out Appendicitis, Chest pain-pulmonary embolus, and Aortic Dissection. The remainder of the lectures will be given at later dates before the end of the academic year. There was a total of 7 residents in each EM resident class. The PGY-1, PGY-2, and PGY-3 emergency residency classes participated in each lecture. Thus far, the results of pre-tests from the 2014-2105 and 2015-2016 academic years were analyzed with a two-tailed paired t-test sample for the means for the class of 2016 and 2017. In addition, the pre-test and post-test results for the 2015-2016 academic year from the four lectures were analyzed from the EM resident class of 2018, 2017, and 2016 with a two-tailed paired t-test sample of means tests.

PDF UPLOAD


HP005-EC-THA  Pitfalls of Contrast Reaction Management: How to Avoid Them?
Custom Application Computer Demonstration

Participants
Alexi Otrakji, MD, Boston, MA (Presenter) Nothing to Disclose
Iris M. Otani, MD, San Diego, CA (Abstract Co-Author) Nothing to Disclose
Hillary R. Kelly, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Garry Choy, MD, MS, Boston, MA (Abstract Co-Author) Nothing to Disclose
Sanjay Saini, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Gloria M. Salazar, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Swati Goyal, Boston, MA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

Diagnostic errors in management of anaphylaxis secondary to contrast media administration can lead to life-threatening patient safety events. Effective management for such events depends on recurrent training of staff with didactic educational tools. Given the incidence of errors reported in the literature and our institutional experience with simulation training program, we structured this exhibit to highlight the following points: The most common mistakes in contrast reactions management. The correct methods of contrast reactions management. Best practices to avoid these mistakes.

TABLE OF CONTENTS/OUTLINE

This exhibit will take the participants to a multiple choice questions course and video based tour through the most common errors of contrast reactions treatment reported in the literature and in our institution, in addition to the correct management. We will use interactive software (RadIQ) to go through all of the following pitfalls: Failure to administrate the indicated medicine in anaphylaxis. Failure to administrate epinephrine correctly: the way of using auto-injector, injection period, and the place of injection. Failure to administrate the correct dose of epinephrine: using of pediatric versus adult auto injector, wrong concentration intravenously or intramuscularly. Additional help Delay to institute epinephrine
Health Service, Policy and Research Thursday Poster Discussions

Thursday, Dec. 1 12:45PM - 1:15PM Room: HP Community, Learning Center

AMa PRA Category 1 Credit™: .50

Participants
Jonathan James, BMBS, Nottingham, United Kingdom (Moderator) Nothing to Disclose

Sub-Events

HP239-SD-THB1 Medical Students' Perceptions Regarding the Use of Patient Photographs Integrated with Medical Imaging Studies

Station #1

Participants
Diane Siegel, BA, Atlanta, GA (Presenter) Nothing to Disclose
Ariadne DeSimone, MD, MPH, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
Carson A. Wick, MS, PhD, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
Srini Tridandapani, MD, PhD, Atlanta, GA (Abstract Co-Author) Co-founder, CameRad Technologies, LLC
Kimberly E. Applegate, MD, MS, Zionsville, IN (Abstract Co-Author) Nothing to Disclose

PURPOSE
Integrating patient facial photos with medical imaging may increase detection of misidentified studies, without concomitant increase in interpretation time. We wished to study medical students' perception of this technology.

METHOD AND MATERIALS
607 students were emailed an IRB-approved, SurveyMonkey survey on the use of patient photos in medical imaging in 2015. Associations between students' level of training, radiology exposure, and their perceptions of the technology were studied via multi-linear regression.

RESULTS
223/607 (37%) students responded (mean age 25; 41% male). 96% support the technology if it increases detection of identification errors. 46% predicted more accurate interpretation of images. 65% predicted more accurate interpretation of lines and tubes. 88% predicted more accurate detection of misidentification. 51% predicted more accurate evaluation of patient health status. 62% predicted no difference in image interpretation time. 81% indicated that the use of patients' photos would result in fewer identification errors. Perceived benefits of the technology include: humanization of image interpretation and improved interpretation due to additional clinical context. Student concerns include: introduction of bias in interpretation due to patient appearance, confidentiality, and need for consent. Respondents who left a comment about the use of patient photos were less likely to support use of photos if they reduced errors (P<.001). Students who reported witnessing a wrong-patient error were more likely to comment positively on the technology (P<.01). Students who had not completed a radiology elective were more likely to support the technology if it reduced errors (P<.03). As students advanced in their degree program, they were less likely to consider patient photographs to be of benefit in terms of accuracy, interpretation time and reducing misidentification errors (P<.01).

CONCLUSION
The vast majority of medical students support use of patient photos in imaging to detect identification errors. Their comments suggest photos may humanize and improve image interpretation, but express concern about bias and patient confidentiality. Students not completing a radiology elective and with fewer years in training were more positive.

CLINICAL RELEVANCE/APPLICATION
While the vast majority of medical students support implementation of innovative safety technology, they provide rich feedback regarding advantages and potential pitfalls.

HP240-SD-THB2 Comparison of Temporal Variations in Ultrasound Training in Two Novice Groups of Medical Students

Station #2

Awards
Student Travel Stipend Award

Participants
Anthony P. Trace, MD, PhD, Richmond, VA (Presenter) Nothing to Disclose
Craig W. Goodmurphy, PhD, MSc, Norfolk, VA (Abstract Co-Author) Nothing to Disclose
Carrie Elzie, PhD, Norfolk, VA (Abstract Co-Author) Nothing to Disclose
Sarah C. Shaves, MD, Virginia Beach, VA (Abstract Co-Author) Nothing to Disclose

PURPOSE
Point of care ultrasound continues to expand across many medical specialties over the past decade. As a result, more medical schools are beginning to incorporate ultrasound training into their curricula. Training varies significantly from institution to institution with key differences in the temporal placement of training within the curricula. This research project aimed to determine if the placement and timing of ultrasound training impacted skill acquisition comparing two ultrasound novice groups: 1st year medical students and 4th year medical students.

METHOD AND MATERIALS
While the curricular content was identical for each novice group, the length of training varied from 16 weeks for the first year medical students and 4 weeks for the fourth year medical students. Each group was given a pre-test at the beginning of the course, a pair-matched post-test upon completion that focused on knowledge of ultrasound, physics and appropriateness of ultrasound studies, as well as a course evaluation.

RESULTS

While some variation occurred in the scores on the pre-test, similar results were achieved on the post-test.

CONCLUSION

Data suggests that the same level of proficiency can be achieved regardless if the curriculum is spread out or concentrated and is independent of year of training within medical school. Details of the curriculum will also be presented along with recommendations for implementation of ultrasound training.

CLINICAL RELEVANCE/APPLICATION

This work has implications for the medical educator and those interested in point of care ultrasound.

HP241-SD-THB3  Virtual Exploration of Egyptian Mummies using 256-Slice and Spectral CT: Preliminary Experience

Participants
Etienne Danse, MD, PhD, Brussels, Belgium (Presenter) Nothing to Disclose
Jean-Philippe Hasir, Brussels, Belgium (Abstract Co-Author) Nothing to Disclose
Emmanuel E. Coche, MD, Brussels, Belgium (Abstract Co-Author) Nothing to Disclose
Alain Vlassenbroek, PhD, Brussels, Belgium (Abstract Co-Author) Employee, Koninklijke Philips NV
Luc Delvaux, Brussels, Belgium (Abstract Co-Author) Nothing to Disclose
Caroline Tilleux, Louvain La Neuve, Belgium (Abstract Co-Author) Nothing to Disclose

PURPOSE

Background : Since the discovery of William Roentgen, imaging was used for the investigation of egyptian mummies. The advent of computed tomography was revolutionary but until now, the technical background was relatively scarce and sparse because of different generations of CT scanners used for this purpose. Objective : to report our experience in the exploration of human, animal mummies and art objects from old Egypt collection from the Cinquantenary Museum using the state-of-the art CT technology and define the contribution of 256-slice and spectral CT in this field.

METHOD AND MATERIALS

Hospital hygiene and safety precautions were taken before the imaging investigation of 27 mummies (6 humans, 12 animals, 7 human body fragments and 2 art objects, coming from the Old Egypt collection of the Cinquantenary Museum). All the examinations were performed with a 256-slice CT scan (ICT, Philips Healthcare, Eindhoven, The Netherlands) using the following parameters: at 80 and 140 kv consecutively, slice thickness 128 X 0.625mm, 0.9 mm slice reconstruction, overlap of 0.45 mm, matrix 768 X 768. For two human mummies, examinations were performed on a dual-layer CT (IQON, Philips Healthcare, Eindhoven, The Netherlands) using the same parameters except for the kv (120 kV). Post-processing was performed on a dedicated MX View workstation (MX view, Philips Healthcare, Eindhoven, The Netherlands) by a CT technologist.

RESULTS

Using 256-slice CT scan, the following items were analysed :1/ for the human bodies and human parts: - analysis of the head, chest and abdomen residues: analysis of the way of evisceration (brain and body) - bone and ligaments (bone integrity, diseases and traumatisms): - estimation of age and sex: - identification of mummies damages and presence of parasites 2/ for animals: - identification of the type of animal: - art objects: - estimation of the composition in all the cases, analysis of the composition and configuration of the wrapped enveloppes. Using Spectral CT, the HU attenuation of the different tissue composition of the selected human, animal and objects were compared to the data of single energy CT.

CONCLUSION

256-slice CT scan is helpful for a better understanding of egyptian mummies. The tissue composition analysis is improved by using spectral CT [C1].

CLINICAL RELEVANCE/APPLICATION

The most recent CT techniques are relevant for archeologic non destructive investigations.

HP006-EC-THB  Interactive Tool to Teach Management of Contrast Media Reactions

Participants
Alexi Otrakji, MD, Boston, MA (Presenter) Nothing to Disclose
Iris M. Otani, MD, San Diego, CA (Abstract Co-Author) Nothing to Disclose
Hillary R. Kelly, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Garry Choy, MD, MS, Boston, MA (Abstract Co-Author) Nothing to Disclose
Sanjay Saini, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Gloria M. Salazar, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Swati Goyal, Boston, MA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

The symptoms of contrast reaction fluctuate from mild to severe (anaphylactic) reactions. In addition, the symptoms of contrast reaction are classified to allergic like and physiologic reactions. Recognizing these symptoms and their severity is the cornerstone of the proper clinical management. Learning the symptoms and management of contrast reactions through video-based course that simulate the real environment of imaging exam room could be more efficient than conventional lectures. After review of video
interactive cases participants will be familiar to: Recognize contrast reaction symptoms severity Understand the different reactions pathway (allergic vs physiologic) Treat contrast reactions.

TABLE OF CONTENTS/OUTLINE
Interactive software (RadIQ) will be used to allow the participants practice through many clinical scenarios of contrast reactions based on American College of Radiology manual. Multiple choice questions evaluate the knowledge and gaps as well. Clinical scenarios include: Mild allergic-like symptoms: Hives, Itching, sneezing Moderate allergic-like symptoms: Bronchospasm Severe allergic-like reactions: laryngeal edema Anaphylaxis: Hypotension, tachycardia Physiologic reaction: Hypotension with Bradycardia
Clinical Decision Support and Utilization Management: Preparing for the New CMS Mandate

Thursday, Dec. 1 4:30PM - 6:00PM Room: E451A

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Keith J. Dreyer, DO, PhD, Boston, MA (Moderator) Medical Advisory Board, IBM Corporation
Keith J. Dreyer, DO, PhD, Boston, MA (Coordinator) Medical Advisory Board, IBM Corporation
Mark D. Hiatt, MD, MBA, Salt Lake City, UT, (mark.hiatt@regence.com) (Presenter) Medical Director, Regence BlueCross BlueShield; Board Member, RadSite; Former Officer, HealthHelp, LLC
Daniel Durand, MD, Baltimore, MD (Presenter) Consultant, National Decision Support Company;
Bob Cooke, Redding, CT (Presenter) Vice President, National Decision Support Company

LEARNING OBJECTIVES
1) Explain the need for assuring the appropriateness of ordered exams. 2) Know the role of utilization management in reducing inappropriate and unnecessary tests. 3) Identify the advantages and limitations of clinical decision support. 4) Recognize how payers are considering meeting the CMS mandate for pre-order decision support.

ABSTRACT
This course will discuss the 2017 CMS mandate for pre-order decision support for MRI, CT, and PET, including the need for assuring the appropriateness of ordered exams, the roles of utilization management and clinical decision support in reducing inappropriate and unnecessary tests, the advantages and limitations of methods to manage utilization, and how payers are considering meeting the CMS mandate for pre-order decision support.
Educating and Developing Tomorrow’s Imaging Health Services: Researchers and Policy Experts

Friday, Dec. 2 8:30AM - 10:00AM Room: E261

AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credit: 0

Participants
Richard Duszak JR, MD, Atlanta, GA (Moderator) Nothing to Disclose
Andrew B. Rosenkrantz, MD, New York, NY, (Andrew.Rosenkrantz@nyumc.org) (Moderator) Nothing to Disclose

LEARNING OBJECTIVES

1) Define the key attributes of a successful health policy educational curriculum. 2) Describe training strategies that radiologists may pursue to enhance their skills in health services research. 3) Identify potential data sources and other research-related resources to assist radiologists pursuing health services research.

ABSTRACT

Health services research investigates the quality, cost, and value of health care. Health services research is now more critical than ever before in the current era of healthcare reform and increasing focus on transparency and value-driven care. It is essential that radiologists be properly trained in the conduct of high-quality health services research in order to optimally impact ongoing policy decisions and to ensure that their unique perspectives are considered in evolving practice models. A spectrum of opportunities exist for developing skills in health services research and initiating relevant research projects, though greater dissemination and awareness of such resources may help encourage deeper involvement by radiologists in such research the early stages of their careers. Thus, this session will address core aspects of promoting robust health services research by radiologists. Addressed topics will include the implementation of a health policy educational curriculum for junior radiologists, additional training opportunities in health services research that radiologists may pursue, as well as possible data and other resources available to radiologists in pursuing health services research. It is anticipated that at the conclusion of the session, participants will have an understanding of an array of resources and approaches that may be useful in becoming a successful radiology health services researcher.

Sub-Events

RC802A  Creating a Health Policy Educational Curriculum for Radiologists

Participants
Margaret Fleming, MD, Atlanta, GA (Presenter) Nothing to Disclose

RC802B  Training Resources for Radiologists Pursuing Health Services Research

Participants
Pari Pandharipande, MD, MPH, Boston, MA (Presenter) Nothing to Disclose

RC802C  Data and Research Resources for Radiologists Pursuing HSR

Participants
Andrew B. Rosenkrantz, MD, New York, NY, (Andrew.Rosenkrantz@nyumc.org) (Presenter) Nothing to Disclose