

2013 RSNA (Filtered Schedule)

**Sunday, December 01, 2013**

- 10:30-11:30 AM • **MSRA11** • Room: S402AB • Patient Assessment: Requirements, Reimbursement and Radiology Procedures (An Interactive Session)  
11:45-12:45 PM • **MSRA12** • Room: S402AB • Patient Radiation Dose: Reduction and Recording (An Interactive Session)  
12:30-01:00 PM • **LL-HPS-SUA** • Room: Lakeside Learning Center • Health Services - Sunday Posters and Exhibits (12:30pm - 1:00pm)  
01:00-01:30 PM • **LL-HPS-SUB** • Room: Lakeside Learning Center • Health Services - Sunday Posters and Exhibits (1:00pm - 1:30pm)  
02:00-03:30 PM • **RC127** • Room: E351 • The Future of Radiology: What Are the Threats and How to Respond to Them  
02:00-03:30 PM • **RC132** • Room: S502AB • What Is Driving Health Care Reform and How It Is Changing Your Radiology Practice

**Monday, December 02, 2013**

- 08:30-10:00 AM • **RC202** • Room: S502AB • Teaching Leadership Strategies to Residents for Future Health Care Challenges  
08:30-10:00 AM • **RC227** • Room: N226 • Changing Role of Radiology in the U.S. Health Care System  
08:30-10:00 AM • **RC229** • Room: S402AB • Should I Scan That Patient? A Very Interactive Session on MR Safety and Regulations (An Interactive Session)  
10:30-12:00 PM • **SSC08** • Room: S102D • ISP: Health Service, Policy and Research (Radiology Education)  
12:15-12:45 PM • **LL-HPS-MOA** • Room: Lakeside Learning Center • Health Services - Monday Posters and Exhibits (12:15pm - 12:45pm)  
12:45-01:15 PM • **LL-HPS-MOB** • Room: Lakeside Learning Center • Health Services - Monday Posters and Exhibits (12:45pm - 1:15pm)  
03:00-04:00 PM • **SSE06** • Room: N227 • Emergency Radiology (ER Practice and Utilization)  
03:00-04:00 PM • **SSE12** • Room: S102D • ISP: Health Service, Policy and Research (Practice and Medical Management)  
03:30-05:00 PM • **MSAS24** • Room: S105AB • Maximizing Space Planning in an Era of Diminishing Resources (Sponsored by the Associated Sciences Consortium)...  
04:30-06:00 PM • **SPSI23** • Room: N228 • Special Interest Session: Planning for the Future Radiology Workforce: Too Many or Too Few?

**Tuesday, December 03, 2013**

- 08:30-10:00 AM • **RC327** • Room: S403A • Hot Topics in Malpractice Litigation 2013: Communication of Radiologic Findings and Common Medicolegal Issues ...  
10:30-12:00 PM • **SSG07** • Room: S102D • ISP: Health Service, Policy and Research (Economic Analyses and Utilities)  
12:15-12:45 PM • **LL-HPS-TUA** • Room: Lakeside Learning Center • Health Services - Tuesday Posters and Exhibits (12:15pm - 12:45pm)  
12:45-01:15 PM • **LL-HPS-TUB** • Room: Lakeside Learning Center • Health Services - Tuesday Posters and Exhibits (12:45pm - 1:15pm)  
03:00-04:00 PM • **SSJ13** • Room: S102D • ISP: Health Service, Policy and Research (Evidence, Guidelines and Outcomes)  
04:30-06:00 PM • **RC427** • Room: S104A • Aligning Incentives between the Physician Practice and the Hospital: Finding the Win:Win  
04:30-06:00 PM • **RC430** • Room: S403A • Impact of Legislative Policy and Regulations on Imaging Informatics  
04:30-06:00 PM • **RC432** • Room: S504AB • Value-Added Initiatives for a Healthcare System

**Wednesday, December 04, 2013**

- 08:30-10:00 AM • **MSAS41** • Room: S105AB • Navigating the Regulatory, Reimbursement, and Compliance Landscape or Land Mines!  
(Sponsored by the Associated...)  
08:30-10:00 AM • **RC527** • Room: S404CD • Critical Issues Facing the Profession of Radiology: An ACR Leadership Perspective (In Conjunction with the Ame...  
10:30-12:00 PM • **SSK10** • Room: S102D • ISP: Health Service, Policy and Research (Quality and Reporting)  
12:15-12:45 PM • **LL-HPS-WEA** • Room: Lakeside Learning Center • Health Services - Wednesday Posters and Exhibits (12:15pm - 12:45pm)  
12:45-01:15 PM • **LL-HPS-WEB** • Room: Lakeside Learning Center • Health Services - Wednesday Posters and Exhibits (12:45pm - 1:15pm)  
01:30-05:30 PM • **SPHA41** • Room: S103AB • Hospital Administrators Symposium  
03:00-04:00 PM • **SSM10** • Room: S102D • ISP: Health Service, Policy and Research (Medicolegal and Ethics)  
04:30-06:00 PM • **SPSC41** • Room: E450A • Controversy Session: Lung Cancer Screening: Conflict of 'Dollars and Sense?'

**Thursday, December 05, 2013**

- 08:00-09:00 AM • **MSRT51** • Room: N230 • ASRT@RSNA 2013: Moving Towards Best Practice: Developing National Guidelines through a Collaborative Approach  
08:30-10:00 AM • **RC602** • Room: S404AB • How To Evaluate Resident Milestones Effectively and Efficiently: Practical Ideas Will Help Program Directors a...  
08:30-10:00 AM • **RC627** • Room: S504AB • Health Policy Initiatives in Medical Imaging: Promoting Value and Relevancy in Evolving Healthcare Delivery an...  
12:15-12:45 PM • **LL-HPS-THA** • Room: Lakeside Learning Center • Health Services - Thursday Posters and Exhibits (12:15pm - 12:45pm)  
12:45-01:15 PM • **LL-HPS-THB** • Room: Lakeside Learning Center • Health Services - Thursday Posters and Exhibits (12:45pm - 1:15pm)  
04:30-06:00 PM • **RC727** • Room: S103CD • From Research to Reimbursement: The Story of CT Colonography and What It Teaches Us about Healthcare Payment P...

**Friday, December 06, 2013**

- 08:30-10:00 AM • **RC827** • Room: S504AB • Consumerism and Radiology

**Hospital Readmissions: A Penalty That Will Affect Interventional Radiologists**

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**LL-HPE1071**

**Anand M Prabhakar**, MD  
**H. B Harvey**, MD, JD  
**Rahmi Oklu**, MD, PhD

**PURPOSE/AIM**

In order to control exploding healthcare expenses, Medicare has instituted a financial penalty to hospitals that excessively readmit patients when compared to national averages. This penalty has cost hospitals nearly \$300 million in 2012, and will continue to grow as the penalty increases to 3% of Medicare Payments in 2015. The purpose of this educational exhibit is to explain how interventional radiologists will be affected by this rule and to propose a model to reduce readmission rates.

**CONTENT ORGANIZATION**

1. We will review the reasons why Medicare has chosen hospital readmissions as a quality metric and has imposed financial penalties to enforce it. 2. We will describe the possible ways that interventional radiologists will be affected by this mandate. 3. We will propose a model for interventional radiologists to follow to reduce the risk of a patient being readmitted.

**SUMMARY**

Interventional radiologists must be prepared to reduce readmissions of their patients. This exhibit will serve as a guide to allow compliance with this new provision of the Affordable Care Act.

**Mock Call Safety Exercise**

**LL-HPE1074**

**Grayson W Hooper** , DO  
**Augustah J Poutre** , MD

**PURPOSE/AIM**

In their first year of radiology residency training, first year residents (R1) are expected to assimilate a complex skill set within the context of the ACGME Core Competencies. These newly assigned duties include resource allocation, image interpretation, interdisciplinary collaboration, and effective communication. The Mock Call Safety Exercise (MCSE) is one of many metrics used by our residency program to gauge whether an R1 is on course to safely represent the Radiology Department autonomously during call shifts. The MCSE also serves as an early warning system to identify unsafe residents or residents not in compliance with the ACGME core competencies.

**CONTENT ORGANIZATION**

**Introduction:** Purpose/aim

**Methods:** Suggestions and recommendations for implementing Mock Call Safety Exercises at any institution

**Results:** Junior resident feedback and survey data

**Discussion:** Thorough and thoughtful appraisal of the value of the Mock Call Safety Exercise in the context of the ACGME core competencies

**SUMMARY**

Preliminary data from resident surveys support the hypothesis that residents who undergo the Mock Call Safety Exercise demonstrate improved performance on call, which includes timely recognition and management of time sensitive imaging finding.

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**Professionalism Training for Radiology Residents**
[Back to Top](#)**LL-HPE1077**

**Faramarz Edalat** , MD  
**Bruce J Barron** , MD \*

**PURPOSE/AIM**

Radiology residents come across a unique set of ethical issues not experienced by other physician trainees. As part of the Accreditation Council for Graduate Medical Education residency program requirement, professional conduct guidelines are often non-resident specific. The purpose of this educational exhibit is to outline professionalism issues pertaining to radiology residents.

**CONTENT ORGANIZATION**

The list of professionalism issues to be discussed with clinical vignettes are: basic medical ethics concepts, professionalism, reporting of errors and problems, identifying an error in an attending's report, harassment, conflicts of interest, end-of-life issues including do-not-resuscitate guidelines and advanced directives, ethics consults, confidentiality, resident-patient relationship, interpersonal relationships with attendings, and delivering bad news to patients.

**SUMMARY**

The complex and distinctive range of ethical issues in radiology residency calls for a detailed examination from a resident's perspective. In this educational exhibit, a list of professional issues that radiology residents are most likely to encounter is discussed. This will serve as a beneficial tool to assist future radiology residency programs in their professionalism training and function as a convenient go-to-source for residents when an attending is not available.

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**Evidence Based Radiology: A Multiple Choice Question Approach**
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**Athanasios N Chalazonitis** , MD, MPH  
**George Tsimitselis** , MD  
**Ioanna Tzovara** , MD  
**Olga Giouvri**  
**Zoi Antoniou** , BMedSc  
**Andromachi Zourla**

**PURPOSE/AIM**

1. To highlight the main principles of Evidence-based Radiology (EBR).
2. To help radiologists who have no postgraduate special training concerning research appraisal; to become familiar with Evidence-based Medicine (EBM).

**CONTENT ORGANIZATION**

In a multiple choice educative question model, participants will find how EBR can change their every-day radiology practice, by accessing and applying valid and relevant summaries of guidelines and systematic reviews. The five tools of EBM will be in details analyzed. Simple and advanced EBM searching strategies will be shown. A complimentary list of reference and targeted engines, dedicated for radiologists, as well other tools for the most thorough search will be also provided. Finally EBR limitations will be presented.

**SUMMARY**

EBM integrates clinical experience and patient values with the best available research information in order to provide sensible answers concerning medical questions in clinical decision making. EBR as the integration of evolving sciences and technology evaluation into radiological practice will hold an important role in transforming education and practice of the next generation radiologists.

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**Radiation Accident and Disaster Management-How to Draft and Implement an Incident Command System for Your Institution**
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**Marcus M Kessler** , MD  
**Mickaila J Johnston** , MD  
**James E McDonald** , MD \*

**PURPOSE/AIM**

Large scale incidents involving radiation or radioactive materials are uncommon, but when they do occur, necessitate mobilization of all available resources, best performed according to a predefined but flexible plan, which is best achieved in conformance with the FEMA Incident Command System structure. This Educational Exhibit will demonstrate how Radiologists and Nuclear Medicine physicians may contribute in handling such incidents and which key roles they fulfill, considering their knowledge base and availability in medical facilities. On completion of this module, learners will be able to explain and apply: a) relevant guidelines on the topic for one's facility and patient demographic b) which training should be performed c) how to implement an Incident Command System (ICS) d) which vital role imagers take in the ICS.

**CONTENT ORGANIZATION**

- 1) Demonstration of the structure of an ICS. 2) List of relevant guidelines with details on their target audience. 3) List of training resources and who should complete which training. 4) Instructions on how to draft, implement, activate ICS plan. 5) Detailed explanation and instruction which role imagers fulfill.

**SUMMARY**

Completion of this educational module will allow any Radiologist or Nuclear Physician to increase the capability of their medical facility in handling any size of Radiological Incident.

## Why Radiologists Should Think Beyond Sensitivity and Specificity

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### LL-HPE1082

**Gilat Grunau** , PhD  
**Shai Linn**  
**Jonathan A Leipsic** , MD \*

#### PURPOSE/AIM

Diagnostic tests are most often evaluated in the literature and in clinical practice using solely sensitivity (SN) or specificity (SP) of a test, likelihood ratio (LR), and the Receiver Operating characteristic (ROC) curve. Bayes Theorem takes into account pre-test probabilities and yields positive and negative predictive values (PPV, NPV). It could be said that physicians are all Bayesian scientists in practice and such calculations are often done unconsciously by each physician when choosing and interpreting a diagnostic test.

#### CONTENT ORGANIZATION

- Review the calculations and limitations of SN, SP, LR, ROC, and Youden Index.
- To present the clinical relevance of the use of PPV and NPV, the importance of pre-test probabilities using examples from coronary CTA.
- To describe the Predictive Summary Index as an innovative summary measure of the error-free diagnostic capabilities of a test, and the novel measures of positive and negative predictive ratios.

#### SUMMARY

In the clinical setting radiologists must take into consideration pre-test probabilities, PPV and NPV when choosing or interpreting a diagnostic test. Furthermore, the novel Predictive Summary Index could be a useful summary measure to show the net gain in information (for positive and negative test result) obtained by the diagnostic test beyond the prevalence of the disease.

## The Expanding Scope of Legal Liability for Accountable Care Organizations Pursuing Cost Containment Strategies

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### LL-HPE1083

**Sam T Boland**  
**Anand M Prabhakar** , MD  
**Rahmi Oklu** , MD, PhD  
**H. B Harvey** , MD, JD

#### PURPOSE/AIM

This educational exhibit is intended to provide a comprehensive overview of new theories of institutional legal liability that arise when health care institutions assume a role of cost containment, such as in the accountable care organization (ACO) model.

#### CONTENT ORGANIZATION

- Present a background of the ACO model of care, focusing on shared-risk contracts and the cost containment role that these contracts force onto health systems.
- Review the liability challenges faced by managed care organizations (MCOs) in the 1990s when they allowed cost containment to play a role in medical decision-making.
- Consider similarities and differences between ACOs and MCOs, highlighting the lack of comparable preemption protection for ACOs.
- Describe examples of ACO cost containment strategies that involve radiology and identify potential liability pitfalls.
- Consider self-help strategies and federal legislative action that could be taken to lessen the liability exposure of ACOs.

#### SUMMARY

This exhibit will demonstrate: 1) potential new liability exposure for health systems adopting the ACO model; 2) how the liability experience of the MCO era might inform ACOs; 3) the potential chilling effect of liability on ACOs in the absence of federal liability protections; and 4) steps that can be taken at the institutional and governmental levels to address these liability concerns.

## How to Create a Web-based Radiology Department Alumni Portal: A Primer

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### LL-HPE1084

**Ajay D Wadgaonkar** , MD  
**Lukasz Babiartz** , MD, MBA  
**Karen M Horton** , MD  
**Jonathan S Lewin** , MD

#### PURPOSE/AIM

A robust radiology department alumni network provides tremendous educational, mentorship, and professional opportunities for its members. However, few departments maintain an updated, content-rich, accessible online platform for their alumni. This exhibit describes a framework for the creation of an internet-based portal for improved communication and collaboration with department alumni.

#### CONTENT ORGANIZATION

The benefits, challenges, and implementation of an online alumni portal will be presented. Benefits to current trainees include enhanced networking for future job placement, alumni donations/sponsorship, and facilitation of alumni guest speaker conferences. For the alumni, the portal may provide access to CME, department newsletters, research collaboration, and other internal resources. The portal can also assist in organizing reunions and other department-specific meetings. For effective platform design, close partnership with departmental IT members is essential. Advertisement and membership growth are important for success.

#### SUMMARY

The creation of an online radiology department alumni portal is an invaluable but frequently overlooked opportunity to strengthen the alumni network. After viewing this exhibit, radiologists will learn the basic steps for creation of similar alumni portals at their home institutions.

## The Magnificent 7: Quality Tools Every Radiologist Should Know

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### LL-HPE1085

**Bo Li** , MD  
**Nolan J Kagetsu** , MD \*

#### PURPOSE/AIM

1. To review 7 basic quality tools, the "Magnificent 7," which radiologists can use for quality improvement. These tools can be used for a practice quality improvement (PQI) project that can also be used to fulfill ACGME or ABR MOC requirements.
2. To discuss the importance of using quality tools in the changing world of radiology, where there has been a demand for increasing efficiency and minimizing costs. In addition, with these tools, the radiologist can become fluent in the language of quality. This will allow more meaningful participation in hospital and ACO quality initiatives.

#### CONTENT ORGANIZATION

\*The Magnificent 7

1. Histograms: Tabulated frequencies

2. Control Charts: Process monitoring
3. Pareto Analysis: 80/20 rule
4. Cause and Effect diagrams: Process diversion
5. Check Sheets: To do list
6. Scatter Plots: Visual analysis
7. Stratification: Breaking down data

\*The Future of the 7

#### SUMMARY

Originally used as tools that promised companies better profits and higher quality, the Magnificent 7 can be used by radiologists to improve work efficiency and outcomes. These 7 quality tools can empower radiologists to perform required quality activities, succeed as a member of interdisciplinary quality teams, and shape our future.

### Proposed Changes in Radiology to Prevent Feeding Down Misplaced Naso-gastric Tubes: A Never Event

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#### LL-HPE1086

**Gohar Ayub** , MBCh  
**Amjad N Mohammed** , MBBS  
**Damian J Tolan** , MBCh, FRCR \*

#### PURPOSE/AIM

The aim is to suggest possible new changes to the current practice of nasogastric tube (NGT) position checks using chest radiographs to improve patient safety, to raise awareness of the national and local guidelines regarding NGT safe placement and discuss common difficulties encountered with interpretation of chest radiographs.

#### CONTENT ORGANIZATION

- Summary of the current guidelines recommended by the National Patient Safety Agency and hospital guidelines.
- Reminder of the normal radiographic appearances of an accurately sited NGT
- Discuss the current difficulties and issues surrounding safe NGT site confirmation.
- Examples of various difficult chest radiographs and complications.
- Proposed new strategy, involving trained radiographers interpreting the chest radiographs and providing provisional reports, and misplaced NGT tubes to be removed in the radiology department at time of imaging.

#### SUMMARY

The proposed changes to current clinical practice will help streamline patient care, provide timely feedback to the clinical team and put patient safety at the forefront. • Awareness of the national and local guidelines relating to NGT safety.  
 • Common issues relating to current practice and difficulties in interpretation of chest radiographs.

### Demonstration of a Pictographic Model of Image Interpretation to Improve Radiology Reporting

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#### LL-HPE1088

**Andrew J Dwyer** , MD  
**Les R Folio** , DO, MPH

#### PURPOSE/AIM

To improve radiologists' reports through a graphical image interpretation model that provides a pictographic template to represent and communicate results and the use of a Bayesian probability scheme to indicate levels of certainty of interpretative statements.

#### CONTENT ORGANIZATION

Pictorial depiction of image interpretation as a sequence of three levels of inference: spatioanatomic localization, lesion characterization, and etiopathologic diagnosis. Demonstration of the capacity of predicate logic combined with Bayesian probability notation to express the anatomic complexity and level of certainty of interpretative statements. Demonstration of directed graphs to express etiopathologic interpretations including a chain of related disease processes and their relation to the image findings. Tabulation of the language commonly used to indicate levels of certainty in diagnostic reports and their relation to ranges of probabilities and logic truth levels.

#### SUMMARY

A pictographic model of image interpretation is presented that clarifies its levels, provides a language/template for communicating results and directs/facilitates the use of the spatial information of images and use of Bayesian concepts to express the level of certainty and logic of interpretative statements.

### 'Give You A Lift': Safe Patient Handling in the Radiology Department

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#### LL-HPE2001

**Perry S Gerard** , MD  
**Brian Rigney** , MD  
**Adele Brudnicki** , MD  
**Zvi Lefkowitz** , MD

#### PURPOSE/AIM

Safe and effective patient handling techniques and operation is important in the radiology department. There is a lot of lifting involved daily in a radiology department – transferring patients on scanner beds and X-ray tables, lifting patients up a bed in order to put an X-ray plate behind them.

Training sessions consist of safe techniques, making use of the patients to help themselves to move, the use of aids such as hoists, and recognition of which lifts are dangerous to the patient and healthcare team.

#### CONTENT ORGANIZATION

We discuss how job-related injuries and chronic pain are pervasive among hospital nurses and radiology technicians. We discuss how nurses and radiology technicians report that they have suffered job-related chronic pain or on-the-job injuries resulting from lifting, moving, or repositioning patients. We show how the use of patient-moving equipment appears to reduce the risk of injury and chronic pain.

#### SUMMARY

Lifting and transferring of patients are some the most commonly reported causes of back pain and knee and shoulder injury among radiology healthcare workers. Most programs for the prevention of back and joint injury to healthcare personnel tend to focus on proper lifting techniques, body mechanics and back care. We discuss safe and effective patient handling techniques and operation and its important in the radiology department.

### 'Opportunity for Improvement': The Concepts and Utilization of 'Six Sigma' in the Radiology Department

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#### LL-HPE2002

**Perry S Gerard** , MD  
**Egil V Nilsen** , MS  
**Christopher Song** , MD  
**Zvi Lefkowitz** , MD

#### PURPOSE/AIM

We discuss six sigma as a quality improvement method as it applies to radiology that helps to measure and reduce variation in processes. Six Sigma concepts and methods enable a healthcare organization to offer improved healthcare services to patients by streamlining business processes. We discuss and show examples how this tool can help in achieving clinical excellence, patient safety, financial results, patient satisfaction and physician/staff satisfaction.

#### CONTENT ORGANIZATION

We discuss how six sigma can be utilized in radiology to help identify problems and provide solutions. We discuss how utilization of six sigma concepts can improve process and safety in the radiology department, improve patient throughput, improve process and safety, improve scheduling and quality of care and satisfaction of families. We discuss the importance to provide the requisite training to staff. We discuss and show examples of methods of utilization in radiology.

#### SUMMARY

Six Sigma methods aim at improving overall quality by eliminating defects and achieving near perfection by restricting the number of possible defects to less than 3.4 defects per million. We show with various examples the concepts and methodologies of 6-Sigma in radiology, how they improve the quality of services rendered, increase efficiency, and eliminate human errors that can often prove fatal.

### Everything You Always Wanted to Know About a Collaborative Radiology Utilization Management (UM) Program but Were Afraid to Ask: Seven Year Experience of An Academic Radiology Department

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#### LL-HPE2003

**David P Friedman** , MD  
**Nancy Smith**

#### PURPOSE/AIM

The purpose of this exhibit is to: (1) Describe the methodology of a collaborative radiology UM program. (2) Summarize the seven year experience of an academic radiology department in this program, with emphasis on the radiologists' activities, as well as the impact on the performance of expensive outpatient imaging studies. (3) Discuss the sentinel effect.

#### CONTENT ORGANIZATION

Organization of the UM Program - Screening of appropriateness of imaging studies (Levels 1, 2, 3) - Possible outcomes of cases reviewed by radiologists - Administrative withdrawals due to 'no callback' by the provider - Quality assurance activities Departmental Experience - Withdrawal rates by radiologists after collaboration with the provider - Administrative withdrawals (sentinel effect) - Comparison of radiologists' performances - Overall impact of the UM program Sentinel Effect - Definition - Role the sentinel effect plays in a UM program

#### SUMMARY

The major teaching points of this exhibit are: (1) Show the striking impact of provider-radiologist collaboration, together with the sentinel effect, in reducing the utilization of inappropriate or unnecessary, expensive outpatient imaging studies (2) Results achieved without using denials (3) Discuss reasons for variability in radiologists' performances

### Understanding the Medicolegal Issues Associated with Communicating Radiologic Findings to Patients

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#### LL-HPE2004

**Ian Amber** , MD  
**Hima Prabhakar** , MD

#### PURPOSE/AIM

1) Review potential areas of malpractice associated with radiologist-patient communication.  
2) Review the legal, radiology, and emergency medicine literature to explain how we can use established precedents to anticipate and counter vulnerabilities arising from radiologic-patient communication.

#### CONTENT ORGANIZATION

We will discuss the potential legal vulnerabilities for radiologist-patient communications, including prior areas of successful suit regarding communication. After establishing areas of vulnerability, we will use the emergency medicine literature as a template to show how another specialty addresses the issue of communication lawsuits by specifically discussing cases, follow-up, and contributory negligence. We will then look at communication based lawsuits within radiology by examining mammography and citing literature showing the lack of lawsuits based on patient communication. We will conclude with a summary of take home points to ensure radiologists are prepared to counter any perceived legal vulnerability from radiologist-patient disclosure.

#### SUMMARY

1) Communication based lawsuits are a negligible percentage of the total lawsuits in radiology.  
2) Disclosing findings to patients is not likely to substantially increase radiologist liability; therefore, potential lawsuits should not be a reason to avoid disclosing findings to patients.

### Practical Strategies for Implementing and Running an Effective Radiology Quality and Safety Program in Private Practice

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#### LL-HPE2005

**Jonathan B Kruskal** , MD, PhD \*  
**Harold E Longmaid** , MD  
**Peter H Gordon** , MD  
**Bettina Siewert** , MD

#### PURPOSE/AIM

Like their larger counterparts, community and small hospital-based radiology practices must adhere to continuous performance improvement, physician peer review and increasing numbers of safety and regulatory requirements. Without IT, informatics and human expertise and resources, it may be challenging to meet these requirements. Based on the successful implementation of several radiology QA programs in community and hospital sites, this exhibit illustrates the essential elements, strategies and small steps that can be taken to implement a radiology-specific QA program where traditional resources may not be readily available.

#### CONTENT ORGANIZATION

Quality team composition

Tips for securing resources to achieve success

Safety programs: achieving compliance with changing NPSG's, fall risk reduction, dose reduction, preventing/managing contrast reactions/extravasation

Customer service: measuring and managing what your administrators want; referring physician and patient feedback surveys

Practice improvement: safety audits, simple technical QA, choosing and managing practice-specific key performance indicators

Professional improvement: practical group peer review, PQI for MOC, procedure outcomes, adverse event analysis

#### SUMMARY

This exhibit will allow the viewer to implement a basic and effective quality and safety program in a small radiology practice.

### Methodology to Decrease Patient's Hospital Stay: Radiology's Contribution in a Busy Community Hospital

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#### LL-HPE2006

**Natalia Marks , MD**  
**Mark A Flyer , MD**

#### PURPOSE/AIM

In today's Era of Healthcare Reform, hospitals view the average length of stay as an indicator of efficiency. A shorter length of stay translates to a decreased cost for the hospital and shifts patient care from inpatient to the less expensive outpatient setting. Our objective is to present strategies implemented by our Radiology Department to facilitate patient care and reduce length of stay.

#### CONTENT ORGANIZATION

1. Brief description of our Department 2. Discussion of direct/indirect processes implemented • Reorganization of radiology staff shift hours to align with caseload in the ED • Implementation of Imaging Appropriateness Algorithms to ensure proper modality selection and avoidance of unnecessary/redundant imaging • Notification of the Referring Physician of Final Read availability via e-mail • Expansion of MRI availability to 24/7 • Optimization strategies to improve turn-around time from order placement to completion and study completion to signed final report

#### SUMMARY

Improved imaging efficiency translates to a decrease in patient's hospital stay and leads to timely diagnosis/management, elimination of redundant imaging, and decrease in radiation exposure. We hope to provide other departments with valuable insight to improve their efficiency which ultimately decreases the overall cost per patient to the hospital.

### **Error Disclosure in Radiology: An Important Element in Patient-Centered Care**

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#### **LL-HPE2007**

**Jeffrey Y Shyu , MD**  
**Thomas H Gallagher , MD**  
**Stephen D Brown , MD**

#### PURPOSE/AIM

Patient safety experts, ethicists, and the AMA support disclosure to patients of harmful medical errors. Radiology lacks practical recommendations and educational resources needed to implement disclosure processes effectively. This computerized educational exhibit will permit learners to: 1. Explain why radiologists should directly disclose their errors to patients. 2. Define types of errors in radiology, causes, and resultant harms. 3. Describe barriers to, and solutions for implementing error disclosure processes in radiology. 4. Discuss legal considerations relevant to error disclosure.

#### CONTENT ORGANIZATION

1. Introduction: a) Why radiologists should disclose errors to patients. b) Normative expectations. c) Recent developments in institutional policies and legislation regarding disclosures, apologies, and compensation offers. 2. Relevant Terminology: a) Types of error in radiology. b) Causes of error. c) Harms. 3. Disclosure Process: a) How to disclose? b) Who should be involved? c) When is apology appropriate? d) Should compensation be offered? e) How to support the "second victim" – the physician. 4. Legal considerations: Malpractice issues relevant to error disclosure.

#### SUMMARY

Learners will be able to: 1. Explain the rationale for error disclosure. 2. Describe emerging practice standards and legal considerations.

### **Something Went Very Wrong! A Practical Approach for Performing a Root Cause Analysis and Managing a Sentinel Event in a Radiology Department**

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#### **LL-HPE2008**

**Olga R Brook , MD \***  
**Bettina Siewert , MD**  
**Jonathan B Kruskal , MD, PhD \***

#### PURPOSE/AIM

The Joint Commission requires that a root cause analysis be performed for all sentinel events. The process is useful for identifying and weighing different factors that may contribute to an adverse event, and to determine and prioritize what corrective actions can and should be implemented to prevent future occurrence. The purpose of this exhibit is to use the events surrounding a sentinel event (Epi-pen misadministration; wrong dose, poor outcome) to illustrate the sequential steps and applicable tools that are used when performing a root cause analysis.

#### CONTENT ORGANIZATION

Manage adverse event Brainstorming: define problem and impact: what, where, when, how, how much, who? Eindhoven classification of error domain relative to radiology operations Gather all relevant data according to a timeline, and link steps to what should have happened Ask the 5 "why's". What happened to cause the effect? RCA tools: Fishbone and Pareto chart, scatter diagrams, flow, control and run charts Classify causes: causal and root causes. The cause map. Identify corrective actions; the decision tree tool Identify solutions that will prevent recurrence, then implement, observe and monitor

#### SUMMARY

To meet TJC requirements, the viewer will be able to manage an adverse event and perform a root cause analysis to identify contributors and to implement corrective actions.

### **The Role for Radiology within ACOs: Sample Scenarios Where Imaging Specialists Can Add Value**

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#### **LL-HPE2009**

**Andrew J Del Gaizo , MD**  
**Kurt A Schoppe , MD**

#### PURPOSE/AIM

To provide a simplified overview of Accountable Care Organizations To highlight opportunities for Radiologists to add value within the ACO model by navigating through specific ACO scenarios

#### CONTENT ORGANIZATION

Background on ACOs

- What, When, and Why Payment structures between ACOs and Medicare
  - Fee-for service (FFS)
  - Capitated models
  - Tradeoffs between financial risk and reward Payment structures between ACOs and Radiologists
  - FFS
  - Capitated
  - Salaried
  - Dividing the shared savings bonus (in a FFS model)
  - Dividing the budget (in a capitated model) Specific Scenarios
  - Scenario 1: Conservative Scenario with the original Medicare FFS program
  - Scenarios 2/3: Loss risk Scenarios where quality measures are/are not reached
  - Scenarios 4/5: Loss risk Scenarios where overall costs are/are not controlled Where Radiology Can Add Value
  - Become Imaging Specialists
  - Examples for each specific scenario
1. Utilization management: number of studies performed

2. Utilization management: appropriateness of studies ordered
3. Safety Metrics
4. Patient Management: Mammography/Special Procedures
5. Technology leadership

#### SUMMARY

ACOs pose significant changes to the current FFS model

There will be winners and losers in the ACO model

There are opportunities for informed Radiologists to Add Value

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## Meaningful Use of IT for the Radiologist

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### LL-HPE2010

**Amilcare Gentili** , MD  
**Paolo Y Gentili**

#### PURPOSE/AIM

The purpose of this exhibit is to review the significance of Meaningful Use for the radiologist.

#### CONTENT ORGANIZATION

What is Meaningful Use?

Who qualifies for Meaningful Use?

How do Meaningful Use criteria work?

What are the incentive for participating and future penalties for not participating?

How to participate?

What are the stages of Meaningful Use?

Is it too late to participate?

#### SUMMARY

This exhibit reviews what Meaningful Use of Information Technology is and why radiologists should be participating in this program. It explains how radiologists can participate in the program to receive bonuses now and avoid penalties in the future.

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## Fellowship in Patient Safety and Quality

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### LL-HPE2011

**Amilcare Gentili** , MD  
**Anatoliy Nekoz** , DO  
**Tudor H Hughes** , MD

#### PURPOSE/AIM

1. To illustrate the rationale for creating a year long fellowship in patient safety and quality.

2. To describe the goal and objectives of such a fellowship.

#### CONTENT ORGANIZATION

Rationale for a fellowship in patient safety and quality:

- ACGME requirements
- ABR requirements for MOC
- Changes in healthcare from fee for service to pay for performance
- Increasing exposure of the US population to ionizing radiation due to over-utilization medical imaging
- Increasing healthcare costs due to imaging
- Overuse and inappropriate use of imaging

Goals of the fellowship include learning about and teaching: 1. Performance Improvement:

- evidence based medicine
- systems redesign
- peer review and utilization management

2. Risk Management:

- administrative tort claims
- disclosure of adverse events
- credentialing and privileging

3. Patient Safety:

- radiation dose reduction
- utilization management
- appropriateness of imaging studies
- national patient safety goals
- patient event reporting and event review
- root cause analysis
- healthcare failure mode and effects
- aggregate reviews
- patient safety alerts.

#### SUMMARY

This exhibit reviews the need for a fellowship in patient safety and quality and summarize the goals of such a fellowship.

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## Metrics for Radiologists in Value Based Health Care Delivery

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### LL-HPE2012

**Ammar Sarwar** , MD  
**Jonathan B Kruskal** , MD, PhD \*

#### PURPOSE/AIM

Our future reimbursement will be inextricably tied to performance metrics which currently remain vaguely defined, challenging to comply with and tend not to drive improved performance or value. Using the value definition we categorize current metrics to affect either outcomes or cost. The purpose of this exhibit is to:

1. Describe the importance of metrics in value based health care delivery models such as ACOs.
2. Categorize metrics as affecting outcomes or cost, the main factors in the value equation.
3. Define and describe key sub-types of each of the different types of metrics.

#### CONTENT ORGANIZATION

- #### Metrics
- Type of Metric: Outcomes, Continuous Performance improvement, Quality, Safety, Professional improvement and Patient Satisfaction
  - Key sub-types of each Metric (ACO metrics.jpg)

- Examples of each sub-type.
- Discussion on the pros and cons of each metric Promises and Pitfalls • Discuss pros and cons of each metric for the radiologist relative to providing value and improving performance. Personnel
- Key responsible personnel (radiologist, technologist, referring physician, nurse) for each metric

#### SUMMARY

We discuss a comprehensive list of metrics and their effects on outcomes or cost to help the reader decide, which metrics will help the radiologist provide optimal care in their local environments.

### Department-wide Training for Contrast Reaction Management: Proposal for a New Paradigm

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#### LL-HPE2013

**Sandra L Moore**, MD \*  
**Jill E Jacobs**, MD  
**Amy N Melsaether**, MD  
**Patrick C Malloy**, MD \*  
**Sarah S Milla**, MD  
**Kristine M Pysarenko**, MD  
**Kristin Elias**, MD  
**Divya Sridhar**, MD  
**Robin J Mitnick**, MD  
**Georgeann McGuinness**, MD

#### PURPOSE/AIM

Serious reactions to contrast are rare, however complacency in maintaining/refreshing management skills is risky, as adverse contrast events are unpredictable. We discuss department-wide participation in training for managing contrast reactions.

#### CONTENT ORGANIZATION

9 radiologist trainers conduct small group sessions at our institution's Simulation Center. Each session consists of a quiz assessing baseline knowledge of reactions and their management, and participant confidence levels for managing 5 reactions of increasing severity. This is followed by an interactive lecture, and participation in scenarios using programmable manikins with dynamic vital signs and responses to intervention. The scenarios are followed by supportive "debriefing". We urge review of a training powerpoint and the ACR Contrast Media Manual. Training is required for residents, encouraged for fellows, at the discretion of each attending. To date 48 residents, 14 fellows, and 15 attendings have undergone training. Test results are anonymized. Residents re-quizzed one year post training showed significant increases in confidence levels.

#### SUMMARY

All radiologists are expected to be conversant in the management of contrast reactions. Radiologists at all levels can become confident and competent in managing reactions, enabled by simulation training in a supportive setting

### Checklists in Radiology - Safety and Efficiency Improvement Tool

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#### LL-HPE2014

**Olga R Brook**, MD \*  
**Bettina Siewert**, MD  
**Ronald L Eisenberg**, MD, JD  
**Felipe B Collares**, MD  
**Jonathan B Kruskal**, MD, PhD \*

#### PURPOSE/AIM

Checklists are tools to overcome human limitations in attention and memory and to ensure consistency and completeness of outcomes. Surgical checklists designed to improve team communication and care consistency have reduced morbidity and mortality. Checklists have been implemented in Radiology to prevent errors in reporting and procedures and to improve overall safety of patients and staff. The purpose of this exhibit is to familiarize the viewer with the process of checklists development in Radiology, available media and types of checklists currently in use.

#### CONTENT ORGANIZATION

Checklists development, management, monitoring and improvement process.

Mandatory vs. recommended checklists.

Checklists media: electronic lists, belt badges, wall posters.

Types of checklists:

- Exam checklists: CT and MRI scanning protocol, MR safety, NSF precautions, pregnant patient in CT and MR, contrast allergy reaction management and prevention.
- Report checklists: structured reporting, follow up recommendations, communication of critical results.
- Procedure checklists: universal protocol, post procedure close out, adverse event reporting.
- Organizational checklists: sentinel event management, Joint Commission preparedness.

#### SUMMARY

Development process of Radiology checklists to improve safety, efficiency and patient care is presented.

### Pre and Post Rotation Quizzes: Can Radiology Resident Progress on the Virtual Body MRI Rotation Be Documented Quantitatively?

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#### LL-HPE2015

**Alexander C Kagen**, MD \*  
**Franklin Nwoke**, MD \*  
**Michael Starc**, MD  
**James E Silberzweig**, MD  
**Michael M Abiri**, MD

#### PURPOSE/AIM

To support the idea of pre-and post rotation quizzes as an adjunct tool to standard ACGME requirements for summative evaluation of radiology resident progression on the virtual Body MRI rotation.

#### CONTENT ORGANIZATION

1) Overview of the Body MRI rotation:

- Goals and objectives
- Rotation checklist
- Rotation key
- Digital and hard copy resources

2) Quiz Format

- MR contrast and safety

- MR artifacts
- Normal variants
- Pathology

### 3) Pre and Post Rotation Quiz - Utility

- Online resources for designing, collecting and analyzing results
- Upload anonymized images from PACS
- Variable answer options

- Benefits in addition to ACGME requirements

- Accurately judge resident progress on virtual rotation
- Direct faculty-resident review of quizzes
- Help residents prepare for Exam of the Future
- Document resident progress with Milestones

#### SUMMARY

Pre and Post rotation quizzes can help ensure resident progress on the Body MRI rotation, document resident Milestones, and potentially assist in preparing residents for the Exam of the Future. They can be used as an adjunct tool for enhanced radiology resident education in the virtual teaching environment utilizing goals and objectives, expectations, policies, guidelines, literature and web-links to assist faculty in more effective teaching practices.

## Applicability of a Peer-review System in the Evaluation of Performance and Processes in Radiology Practice

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### LL-HPE2016

**Luis Donoso-Bach** , MD  
**Laura Oleaga**  
**Rosa Gilabert** , MD  
**Immaculada Gotsens**  
**Maribel Grau**

#### PURPOSE/AIM

To validate a peer-review evaluation tool designed to assess the performance and processes in the radiology practice

#### CONTENT ORGANIZATION

The evidence based system for evaluation the performance and processes in the radiologist practice includes: 1) checking of demographic and security data; 2) appropriateness of the study indication; 3) accuracy of diagnostic interpretation; 4) concordance with final diagnosis, 5) impact of radiologist misdiagnosis in patient management

#### SUMMARY

Peer-review involves de fair and transparent evaluation by a physician's peers to identify opportunities to go forward in knowledge, error reduction and self improvement.

The gathering of relevant information can be standardized in a simple evaluation tool for peer-reviewing of radiologist performance in order to facilitate continuous improvement in safety, performance and outcomes

## Implementation of a Comprehensive Resident Practice Quality Improvement Program

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### LL-HPE2017

**Justin W Kung** , MD  
**Priscilla J Slanetz** , MD, MPH \*  
**Ronald L Eisenberg** , MD, JD  
**Bettina Siewert** , MD  
**Jonathan B Kruskal** , MD, PhD \*

#### PURPOSE/AIM

The ACGME and American Board of Radiology mandate practice quality improvement (PQI) as a component for residency and ongoing maintenance of certification. To meet these requirements and to fully prepare our residents for their future PQI participation, we have implemented a comprehensive resident PQI training program. The purpose of this exhibit is to illustrate the practical aspects, curriculum and specific components of a radiology resident PQI training program.

#### CONTENT ORGANIZATION

Chief resident for Quality and Safety

Resident role in quality team and committees at department, hospital and national level

PQI projects: practical steps for successful completion as individual or team Curriculum:

- Patient safety: reporting, root cause analysis, sentinel event management, NPSG and compliance audits
- Process improvement: Resident PQI Ideas program (Lean training)
- Customer relations: multisource feedback, survey analysis
- Assessment of physician performance: peer review, errors classification
- Education: residency quality elective program, mentored outcomes projects, quality rounds, section quality presentations

#### SUMMARY

After viewing this exhibit, the reader will be able to implement a practical PQI training program for residents that will prepare them for lifelong participation in the PQI process.

## Microbiology for Dummies: A Radiologist's Guide to Handling Infectious Materials

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### LL-HPE2018

**Sobia Mirza** , MD  
**Tyson Tragon** , BS  
**Melanie B Fukui** , MD  
**Matthew S Hartman** , MD  
**Amy Hartman**

#### PURPOSE/AIM

To identify potential exposures to infectious material for the radiologist/trainee, delineate safe methods of infection containment in patient interaction and define safe methods of specimen handling for radiologic procedures.

#### CONTENT ORGANIZATION

Overview of infection containment precautions Pertinent organisms, modes of transmission, personal protective equipment (PPE), safe handling of specimens obtained during radiologic procedures and decontamination of work surfaces/instruments in each of the following categories: Standard precautions, Contact precautions, Droplet precautions, Airborne precautions, Prion precautions Appropriate management of needle sticks Resources for more information Interactive assessment

#### SUMMARY

1. An understanding of basic principles for the containment of infection, safe handling of pathologic/fluid specimens, and the decontamination of work surfaces/instruments is critical for the radiologist/trainee.
2. Needle sticks must be reported to the institution's Employee Health Services (or Emergency Department during non-business hours), where the appropriate screening for infection exposure will take place.
3. Each institution's Infection Control department should be consulted for infection containment inquiries. The Environmental Services/Housekeeping department should be notified for special decontamination needs.

## Navigating the Sea of Organized Radiology: A Resident, Fellow, and Junior Faculty Primer on Opportunities for 'Setting Sail'

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### LL-HPE2019

**Jonathan A Flug** , MD, MBA  
**Alana Fruauff**  
**C. Matthew Hawkins** , MD  
**Grace S Mitchell** , MD  
**Douglas S Katz** , MD  
**Richard B Gunderman** , MD, PhD

#### PURPOSE/AIM

There are greater than 55 national radiology-related organizations in the U.S. alone, numerous local organizations, and national organizations such as the AMA, which impact radiologists. Learning to navigate through this chaotic and complex catalogue can be difficult for junior radiologists, potentially leaving them unaware of leadership opportunities for their level, and unaware of member services that these organizations provide. The purpose of this exhibit is to provide navigational charts for the junior radiologist for this confusing sea of organized radiology.

#### CONTENT ORGANIZATION

This exhibit will: 1) review a brief history of organized radiology; 2) describe radiology organizations with information of relevance to radiology residents, fellows, and junior faculty on membership, opportunities for participation in development programs (e.g. AUR junior faculty development program; ACR Resident and Fellow Section; intro. to academic radiology program), with specific deadlines, website information, and brief summaries; 3) provide practical advice for radiologists who are learning to navigate the multitude of existing organized radiological societies; 4) inspire early career involvement in these organizations and programs.

#### SUMMARY

This exhibit will assist and hopefully inspire junior radiologists in identifying and pursuing opportunities for involvement in numerous radiology organizations.

## Incidental and Unanticipated Colonic Polyps and Malignancies on Routine Abdominal and Pelvic CT: Lessons Learned

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### LL-HPE2020

**John J Hines** , MD  
**Douglas S Katz** , MD  
**Jonathan A Flug** , MD, MBA  
**Perry J Pickhardt** , MD \*  
**Rani J Modayil** , MD  
**Maher A Abbas** , MD  
**Puneet Bhargava** , MD  
**Ahmed Fadl** , MD  
**James Grendell**

#### PURPOSE/AIM

To demonstrate, with numerous cases examples from several institutions, the spectrum of incidental and unanticipated colonic polyps and malignancies seen on 'routine' abdominal and pelvic CT (i.e. A/P CT done for unrelated reasons, with oral and/or IV contrast, or no contrast, but not CT colonography to show false-positive and false-negative prospective interpretations; to explain strategies to reduce such incorrect interpretations; and to review the limited literature on this specific topic.

#### CONTENT ORGANIZATION

The exhibit will demonstrate and discuss CT examples of: - correct and incorrect prospective CT interpretation of colonic polyps and malignancies, with emphasis on lung windows and routine search of the colon on all 'routine' A/P CT exams/use of coronal reformats - mimics and pitfalls: retained stool, underdistended colon, the problematic ileocecal valve, incomplete oral contrast opacification producing pseudomasses, subtle increased focal enhancement with IV contrast, distinguishing from diverticulitis - unexpected acute presentations: local and regional metastatic disease; perforation; obstruction/intussusception; superinfection (C. septicum)

#### SUMMARY

Interpretation of the colon on 'routine' abdominal and pelvic CT is fraught with pitfalls. On review of this exhibit, the radiologist will become more aware of this important quality assurance issue.

## How to Coexist with RECIST

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### LL-HPE2021

**Heidi Coy**  
**Michael Douek** , MD  
**Daniel J Margolis** , MD \*  
**Maitraya K Patel** , MD  
**Cheryce M Poon** , MD  
**Antonio J Gutierrez** , MD  
**Steven S Raman** , MD  
**Jonathan G Goldin** , MBChB, PhD

#### PURPOSE/AIM

To present the limitations of RECIST 1.1 by assessing potential pitfalls within the entire imaging chain.

#### CONTENT ORGANIZATION

1. Examples of how lesion measurement may be affected by scanning protocols.
2. Review of the use and timing of IV contrast, and how optimization of these can best differentiate a lesion from surrounding tissue.
3. Demonstrate why follow-up scans should be consistent with the baseline exam with regard to modality, scanner platform, and protocol.
4. Examples of how target and non-target lesions should be those that are likely to show overall progression or response, and are in the "landing zone" of the primary cancer.
5. Evaluate disease response in the setting of the therapy being administered. This includes illustrating antiangiogenic treatment effects such as tumor cavitation or necrosis without a significant change in tumor size.
6. Review the definition of meaningful change in non-measurable disease, and what constitutes a true new lesion on follow up examinations.

#### SUMMARY

The major teaching points of this exhibit are:

1. Standardization of reads within the oncology trial setting and dual reader paradigm by learning how to minimize limitations of RECIST 1.1.
2. How to use RECIST 1.1 effectively in Phase III clinical trials where tumor progression is the primary endpoint and not all patients have measurable disease.

**LL-HPE2022**

**Gi Won Jang**  
**Seung Eun Jung** , MD  
**Ki Hwan Hong**  
**Won-Chan Choi**  
**Jong Hyun Yoo**  
**Sang Hyun Paik** , MD

**PURPOSE/AIM**

Quality management of medical imaging facilities is important, but there are many limitations to self-regulation. Therefore Korean Institute for Accreditation of Medical Imaging was established in 2004 to evaluate the quality of medical images and implement a national accreditation to improve medical image quality and the national health. We introduced the accreditation system at RSNA 2010, and now we present an update on system improvements and results after 8 years of experience.

**CONTENT ORGANIZATION**

1. Regulations and accreditation process
  - Integration with medical reimbursement and national health insurance
2. Results of implementing the accreditation program
  - Pass and failure rate trends
  - Segmenting of results by unit manufactured date, used or not, personal and staffing
3. Improvement and update to the national accreditation system
  - Accreditation standards
  - Process
  - Expansion of target equipment
4. Role of radiologist
  - In practice
  - In policy management and changing program

**SUMMARY**

An obligatory national medical imaging accreditation program is effective for improving medical imaging quality and national health care. Radiologists have an important role in imaging accreditation programs. Results and experience of Korean national medical imaging accreditation program will help other countries implement similar programs.

**E-mail Basics for Healthcare Professionals****LL-HPE2023**

**Pallavi Cherukuri**  
**Dayna M Williams** , MD  
**Rhonda P Osborne** , MD  
**Deborah L Reede** , MD

**PURPOSE/AIM**

1. Review guidelines for Health Insurance Portability and Accountability Act (HIPAA) compliance in e-mail communications
2. Learn legal issues regarding sending and receiving e-mail in the workplace
3. Discuss basic principles of e-mail etiquette

**CONTENT ORGANIZATION**

E-mail is a major form of communication used in all aspects of healthcare. There are many issues regarding the exchange of information unique to the healthcare environment. HIPAA guidelines should be followed when sending and receiving e-mail that contains patient health information (PHI). E-mail may be part of an organizational record and should be considered institutional property that can be accessed and used in a court of law. Information is presented using case scenarios to emphasize measures to safeguard PHI and limit legal exposure. The following topics are discussed: HIPAA, how to ensure compliance, penalties for non-compliance, legal issues regarding sending and receiving e-mail in the workplace, and basic rules of etiquette regarding the use of e-mail in the workplace.

**SUMMARY**

There are many issues regarding the electronic exchange of information which are unique to the healthcare environment. This module reviews current literature on professional e-mail. Guidelines are presented to assist the user in constructing appropriate and effective professional electronic communications.

**Improving Patient Safety in Image Guided Procedures by Enforcing the Timeout Process and Transitioning to an Electronic Timeout Process!****LL-HPE2024**

**Nikhil B Amesur** , MD \*  
**Zachary Nuffer** , BS  
**Kevin Ching** , MD  
**Mitchell E Tublin** , MD  
**Richard L Simmons** , MD  
**Kyongtae T Bae** , MD, PhD \*  
**Marlon Johnson** , RN  
**Terri Martin** , MS

**PURPOSE/AIM**

The time out process in procedures has become an integral part of the procedure. We herein describe our implementation and enforcement of the time out process. Initially we began using a paper form for the time out process in image guided procedures. We subsequently transitioned to an electronic checklist and documentation of this critical process.

**CONTENT ORGANIZATION**

- Introduction of the timeout process - routine use of checklists in the Operating Room
- Introduction of the time out process for image guided procedures in the radiology department and at patient bedside
- Documentation of the timeout process in the medical chart
- Enforcing the use of the timeout process by the department
- Transitioning to an electronic timeout process

**SUMMARY**

Given patient safety concerns and national focus on this topic, it is vital that a proper patient timeout process is in place for all image guided procedures. Enforcing this process especially in training programs can be challenging to the department. Furthermore maintaining documentation in the patient chart is important and transitioning to an electronic checklist just goes with the times!

**Common Discrepancy Patterns in Radiology Resident Preliminary CT Reports: Tips and Tricks to Improve Resident Performance****LL-HPE2025**

**Bippan Sangha** , MD

**Nicolas J Bilbey** , BSc, MD  
**Bruce B Forster** , MD \*  
**Gordon T Andrews** , MD

#### PURPOSE/AIM

In order to provide an educational tool to enhance resident performance, we evaluated 251 cases of acute on-call discrepant CT interpretations submitted by residents at a major Canadian teaching hospital. The most common discrepant diagnoses are presented in this review to help identify common patterns of discrepancy.

#### CONTENT ORGANIZATION

1. Summarize the radiology and clinical literature regarding after-hours resident discrepancies. 2. Describe the quality assurance program for resident after-hours CT interpretation at a major Canadian teaching center. 3. Present the most common discrepant diagnoses in:

##### A Neuroradiology

- Occipital condyle fractures
- Infarcts
- Hemorrhage B Chest
- Acute aortic syndromes
- Pulmonary embolism

##### C Abdomen

- Appendicitis
  - Cholecystitis
  - Bowel Obstruction
  - Venous thrombosis (Portal, systemic, pulmonary)
4. Review the literature to identify potential interventions to improve the quality and accuracy of resident preliminary reports.

#### SUMMARY

- 1.The radiology literature differs significantly from the clinical literature regarding discrepancies made by residents in after-hours studies.
- 2.Common patterns of discrepancies are made by residents after hours.
- 3.Missed case conferences led by senior residents and staff radiologists show promise in helping improve resident diagnostic performance.

## Understanding Matrix of Treatment Response Assessment Criteria for GI/GU Malignancies: Practical Approaches and Pitfalls

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### LL-HPE2026

**Seyed Mahdi Abtahi** , MD  
**Azadeh Elmi** , MD  
**Sandeep S Hedgire** , MD  
**Shaunagh McDermott** , FFRRCSI  
**Alpana M Harisinghani** , DMRD \*  
**Mukesh G Harisinghani** , MD

#### PURPOSE/AIM

Oncologic imaging and reporting are an important part of every day practice and have to be performed according to standardized criteria that help to convert radiologic imaging observations into a quantitative assessment of a tumor's response to therapy. The purpose of this exhibit is to depict cancer-specific tumor response assessment criteria in GI/GU malignancies used in practice, with illustrative case examples, and to discuss future directions toward "personalized" tumor response assessment.

#### CONTENT ORGANIZATION

- 1) Hepatocellular carcinoma: Comparing RECIST 1.0, 1.1, and modified RECIST, WHO criteria, with LI-RADS
- 2) Pancreatic cancer: WHO versus RECIST criteria
- 3) Gastrointestinal stroma tumors: Choi criteria
- 4) Malignant lymphoma: Comparing Cheson with RECIST criteria
- 5) Renal cell carcinoma: MASS Criteria, RECIST, and SACT criteria
- 6) Ovarian cancer and endometrial cancer: RECIST and GCIG criteria
- 7) Prostate cancer: PiRADS
- 8) Future directions in development of personalized" tumor response assessment

#### SUMMARY

This exhibit encompasses essential aspects of current and emerging response assessment criteria for common GI/GU malignancies with pertinent illustrations. This exhibit will provide the viewer with technical considerations and examples of such criteria along with evidences to support conclusion.

## The Physician Payment Sunshine Act: Significance and Coping Strategies for This New Law

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### LL-HPE2027

**Nogah Haramati** , MD \*  
**Judah Burns** , MD  
**Judah Goldschmiedt** , MD  
**Erin Fitzgerald** , MD  
**Todd S Miller** , MD

#### PURPOSE/AIM

In 2010, the Physician Payments Sunshine Act (PPSA) was enacted as US Federal law. The intent of the law is ensuring greater transparency between physicians/teaching hospitals and industry, including: healthcare drug, medical device and biological manufacturers and suppliers. The law includes very specific reporting criteria of benefits received by physicians, both directly and indirectly. Physicians should become familiar with the details of these rules. As of August 1, 2013 applicable vendors will be required to report to the Federal Government transfers of value starting as low as \$10 to US physicians and/or teaching hospitals, with that data being entered in a publicly searchable database. This exhibit reviews this regulation and its impact on radiologists. Strategies for avoiding running afoul of this new law are detailed.

#### CONTENT ORGANIZATION

PPSA Overview What is considered a transfer of value? Will that cup of coffee put you in the spotlight? Third party transfers – Can someone else receive the gift/meal/trip instead of you? What's the catch? Will the CME program trigger a listing for your institution? How do I make sure that I stay off the database?

#### SUMMARY

PPSA will necessitate both physicians and teaching institutions to make changes in the way they interact with industry. The first step is understanding these new rules.

## Pathophysiology of Contrast Extravasation and Prevention Strategy Using a Scoring System, While Performing Contrast MDCT Using Automated Pressure Injector

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### LL-HPE2028

**Sharad Maheshwari** , MD  
**Pankaj Chhatrala** , MBBS  
**Abhijit A Raut** , MD  
**Parul Penkar** , MBBS  
**Garry Choy** , MD, MS

#### PURPOSE/AIM

Modern radiology departments employ automated power injectors for remote delivery of iodinated contrast agents. During this process, there is a chance of contrast extravasation. This abstract aims at explaining the pathophysiology of contrast extravasation. Authors also describe an objective scoring system, which can be used by the technologist and nursing staff to determine which patients are at risk of contrast extravasation. Based on the score if a patient is at high risk for extravasation, appropriate action can be taken to prevent it.

#### CONTENT ORGANIZATION

1. Pathophysiology of extravasation. 2. Extravasation and adverse effects. 3. Risk factors 4. Objective scoring system. 5. Prevention strategy.

#### SUMMARY

An objective scoring system may eliminate subjective errors in identifying high risk patients for contrast extravasation. This reduces patient morbidity and saves costs of management after contrast extravasation. A little attention to few details prior to the exam goes a long way in maintaining patient scan quality and reducing morbidity. It also ensures smooth function of busy CT departments.

## Clinical Decision Rules: How and Why to Implement Evidence-based Medicine into Radiology Practice

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### LL-HPE2029

**Kulveer S Parhar**

**Paul I Mallinson**, MBChB

**George Papachristopoulos**, MD

**Savvas Nicolaou**, MD

#### PURPOSE/AIM

Clinical decision rules (CDR) strive to incorporate evidence-based medicine (EBM) into the practice of radiology. The purpose of this exhibit is to discuss EBM in radiology using already established CDR, examine the factors involved in measuring the efficacy of CDR, highlight emerging CDR, and for viewers to gain an awareness of the importance and challenges for the use of EBM in radiology.

#### CONTENT ORGANIZATION

- Highlight the criteria that determine the efficacy of CDR for diagnostic imaging.
- Review established clinical decision rules, including the Ottawa Ankle Rule, Ottawa Knee Rule, Canadian C-Spine Rule, Nexus C-spine criteria and the Canadian CT head rules, in practice and the literature regarding their effectiveness.
- Discuss the importance of clinical decision rules in imaging, for both referring physicians and radiologists, and the challenges present.
- Review the factors involved in developing CDR using EBM.
- Discuss emerging CDR in radiology practice.
- Highlight resources available providing guidelines for diagnostic imaging.

#### SUMMARY

CDR guide radiologists and referring physicians towards EBM which results in improved outcomes for both the patient and the healthcare system. While challenges exist in their development and implementation and further research is required, the field of radiology should strive to integrate EBM where possible.

## Quantifying the Teaching Contribution to Academic RVUs: A Mathematical Algorithm for Radiologists

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### LL-HPE2030

**Thi Som Mai Le**, MD

**Gillian B Lieberman**, MD

**Alexander A Bankier**, MD, PhD \*

#### PURPOSE/AIM

The teaching contribution to academic productivity as determined by academic Relative Value Units (aRVUs) is difficult to quantify, notably in centers with complex and multilayered teaching and mentoring missions serving different and diverse groups of students, residents, and fellows, including teaching during and through the clinical activities. This presentation will provide radiologists with a handy but comprehensive spreadsheet-based algorithm to fulfill this task.

#### CONTENT ORGANIZATION

- 1) The basic spreadsheet functions to quantify teaching contributions to aRVUs will be laid out, and a simple system will be provided to transform multiple scoring systems into a single uniform score.
- 2) Practical calculation examples will show the implications of different weights given to the overall hours of teaching, the quality of teaching, and the scores attributed to teachers.
- 3) The impact of increased teaching contributions to the overall aRVUs, including research and community activities, will be demonstrated.

#### SUMMARY

With the presented spreadsheet-based algorithm, the quantification of the teaching contribution to academic RVUs becomes a straightforward and transparent task, regardless of the respective weight that individual academic programs will give to overall hours of teaching, quality of teaching, or scores attributed to their teachers.

## Preventing Contrast Induced Nephropathy: The Role of the Radiologist

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### LL-HPE2031

**Archana T Laroia**, MD

**Sandeep T Laroia**, MD

#### PURPOSE/AIM

The radiologist must be familiar with prevention strategies to minimize the contrast-induced nephropathy (CIN). In this exhibit we will

1. Review clinical relevance CIN
2. Screening and risk stratification for CIN
3. Role of the radiologist in the preventive measures for renal protection.

#### CONTENT ORGANIZATION

CIN is the third most common cause of hospital-acquired renal failure. The role of the radiologist in screening for risk factors and strategies for renal protection, including choosing an alternative test, hydration before and after the IV contrast, withholding of nephrotoxic medication and limiting the contrast volume will be discussed. The role of sodium bicarbonate and N-acetylcysteine will also be addressed. A summary of recommendations will be outlined.

#### SUMMARY

This review will be a practical guide to contrast-induced nephropathy. The major risk factor for developing CIN is preexisting renal dysfunction, particularly in association with diabetes. Role of the radiologist starts risk stratification and reevaluation for need of IV contrast. If contrast is necessary, IV hydration with normal saline, withholding of nephrotoxic medications, limiting the volume of IV contrast can be considered. Use of sodium bicarbonate and NAC will be discussed.

## Unified Reporting of Oncologic Imaging Studies in the Abdomen: Steps to Simplify and Improve Report Quality while Maintaining Efficiency

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### LL-HPE2032

**Keyur Parekh**, MD \*

**Adeel R Seyal**, MD \*

**Fernanda D Gonzalez Guindalini** , MD \*  
**Frank H Miller** , MD  
**Riad Salem** , MD, MBA \*  
**Vahid Yaghmai** , MD

#### PURPOSE/AIM

Oncologic imaging studies usually represent a significant percentage of the workload in many radiology departments. Reports for these studies may be issued at the time of diagnosis or after therapy to assess response. The aim of this exhibit is to review the important aspects of an oncologic report relevant to abdominal radiologists and discuss the experience of our tertiary center in unifying and improving these reports while maintaining efficiency.

#### CONTENT ORGANIZATION

#### SUMMARY

The number of oncologic studies is increasing and a unified method of reporting could be useful to facilitate future comparisons, reduce mistakes and, consequently, benefit the patient.

## What Does the Fiscal Cliff Compromise and Sequestration Really Mean: How will Imaging be Affected?

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### LL-HPE2033

**Bhavya Rehani** , MD  
**Javier M Romero** , MD  
**Joshua A Hirsch** , MD \*  
**Pamela W Schaefer** , MD  
**Ramon G Gonzalez** , MD, PhD  
**David A Rosman** , MD \*

#### PURPOSE/AIM

In January 2013, the fiscal cliff was averted and sequestration was delayed by the American Taxpayer Relief Act of 2012 (ATRA). Sequestration related reductions in reimbursement were scheduled to begin on April 1, 2013 triggered by the Budget Control Act of 2011 (BCA) but were postponed temporarily for 2 months by the ATRA. Our aim was to answer physician questions on sequestration.

#### CONTENT ORGANIZATION

What was the imaging reduction in reimbursement and what was imaging's share of total reductions in the ATRA?

What is the target deficit reduction which sequestration aims to achieve?

How long will the federal spending be subject to sequestration?

What reductions will imaging see in Medicare parts A and B?

What is the impact on Graduate Medical Education (GME) funding?

How much would the National Institutes of Health (NIH) be affected by sequestration?

Are there further broad reductions on the horizon?

#### SUMMARY

30 million newly insured Americans are entering our health care system by 2014 and there is a projected national shortage of 90,000 physicians by 2020. Thus there is a need of increased investment rather than reductions by federal government in GME funding and increased Medicare support. Since sequestration reductions will continue to have a direct impact on radiology for some time to come, knowledge of these is of paramount importance.

## Quantification in Imaging Re-imagined: Evidence-based Approach in Exploring Imaging Biomarkers

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### LL-HPE2034

**Amir Imanzadeh** , MD  
**Anand K Singh** , MD  
**Garry Choy** , MD, MS  
**Sanjay Saini** , MD  
**Gordon J Harris** , PhD \*

#### PURPOSE/AIM

1. Discuss the imaging pre-requisites for volumetry and computer-aided detection (CAD).
2. Explain about differential tumor component quantification in oncology with evidence-based support.
3. Explain about detection and volume estimation of markers for pathological disease processes with evidence-based support.

#### CONTENT ORGANIZATION

1. Principles and prerequisites of volumetry.

2. Differential quantification of tumor sub-components with evidence-based approach. E.g. Soft tissue tumors, liver tumors.

3. Brain tumors, lung tumors and renal tumors post treatment: Update on quantification of imaging biomarkers.

4. Pathological estimates and volumetry: Differential estimates of clinical markers on imaging in interstitial lung disease, chronic renal failure, renal stones and pelvic imaging.

5. Emerging concepts in CAD and present limitations.

#### SUMMARY

With the advances in scanner technology and availability of near-isotropic voxel resolution scan data, differential quantification of tumor subcomponents and biomarkers of various disease processes may be possible. This exhibit reviews emerging trends in CAD volumetry as an imaging biomarker with evidence based support and provides updates and visions where such quantification of tissue and organ subcomponents may prove valuable in clinical decision-making.

## Process Mapping - The New Audit Tool

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### LL-HPE2035

**Ranbir Sandhu** , MBBS, MRCS  
**Vineet Prakash** , MBBS

#### PURPOSE/AIM

Inefficiencies were perceived in the patient thoroughfare for our departments' myocardial perfusions scan service. This was involving ineffective use of the scanner, mistakes and lengthy patient waiting times causing safety concerns and patient dissatisfaction leading to poor attendance for follow-up.

#### CONTENT ORGANIZATION

Process mapping was carried out to analyze the various 13 steps involved when a patient has a myocardial perfusion scan. Out of 13 steps, 10 were identified as value steps. We identified several bottlenecks and areas of waste and were able to eliminate unnecessary wasteful steps maximising the efficiency of the service and improving patient safety and satisfaction. A repeat process map used to identify the effects of the planned changes to the systems and process involved followed by data interpretation using SWOT analysis. Process mapping followed by process modification and review has enabled the departmental thoroughfare to be simplified and standardised to control variation, minimise mistakes, patient waiting and provide a useful baseline.

#### SUMMARY

The lessons learnt include the value of involving national improvement services at an early stage in project improvement planning, especially the value of process mapping in highlighting inefficiencies and investigating concerns in patient safety.

**LL-HPE2036**

**Bhavya Rehani** , MD  
**Sanjay Saini** , MD  
**Giles W Boland** , MD  
**Garry Choy** , MD, MS

**PURPOSE/AIM**

- To summarize the experience and initiatives of an academic medical center (MGH Department of Radiology) in international outreach
- Special emphasis on learning points that are beneficial for radiologists who aim to make an impact in international outreach
- Summarize the opportunities and challenges in imaging outreach

**CONTENT ORGANIZATION**

- Goals of humanitarian teleradiology and global health programs
- Rationale for formalized global health program
- Summary of various initiatives of radiologists in Haiti, Africa (Rwanda, Malawi, Kenya, and Uganda), Cambodia, India and China
- Strategically focusing via programs in clinical service, research, technology transfer, education and training, organizational and institutional development
- Challenges and considerations in global health activities in radiology
- How radiologists and practices can establish their own global health efforts

**SUMMARY**

There is a need to address unmet imaging needs for vulnerable and crisis affected population. These examples of range of global outreach initiatives can benefit radiologists in developing their own international outreach programs and view global health through a broad lens.

**RA: Radiologist Assistant as Physician Extender in Radiology Practice****LL-HPE2037**

**Randall Czajkowski**  
**Michael Delvecchio** , BS, RT  
**Francine L Jacobson** , MD, MPH

**PURPOSE/AIM**

To provide a vision for the Radiologist Assistant (RA) as a physician extender in the 21st century radiology department. Strategies for increasing efficiency and cost containment will be emphasized.

**CONTENT ORGANIZATION**

The RA is trained to independently perform bedside and image guided procedures including UGI, BE, arthrography, thoracentesis and paracentesis. The RA can relieve the radiologist of common burdens that decrease productivity. The RA assists with the ordering of advanced imaging protocols, using specialized contrast agents, and can communicate with ordering physicians and patients. The performance of procedures by the RA benefits from the specialized technologist training in surface anatomy and radiation technologies through which the RA can reduce patient exposure to radiation.

**SUMMARY**

An RA has completed a Master of Science course that emphasizes the independent performance of specialized procedures in radiology along with advanced courses in anatomy, physiology and patient management. The early adoption of the RA as a physician extender, not unlike the physician assistant (PA) in clinical practices, has lagged due to limitations regarding billing for services. The efficiency gained can be worthwhile, however, Congressional attention to billing in 2013, will likely open the door to further use of the RA as a physician extender in radiology.

**Monitoring Patient Radiation Exposure in a Busy Academic Practice; Opportunities and Challenges of Introducing Commercial Software****LL-HPE2038**

**Yasir Andrabi** , MD, MPH  
**Oleg S Pinykh**  
**Aditya Yadavalli** , BS  
**Dushyant V Sahani** , MD

**PURPOSE/AIM**

Radiation dose tracking and management from imaging studies is a legitimate patient safety concern. This is especially critical for each CT exam and the cumulative exposure from multiple exams. Lack of validated software solutions have been a major impediment along with radiation biology complexity. However, this process of dose monitoring is highly desired from referring physicians, patients as well as The challenges are magnified in a busy sub specialty practice with diverse technology.

**CONTENT ORGANIZATION**

1. Need for Radiation dose monitoring.
2. Introduction to commercially available software for dose monitoring and management.
3. Advantages of this software.
4. Challenges of introducing this software.

**SUMMARY**

Now with the availability of commercial softwares, these efforts of dose tracking are feasible however it entails relevant IT needs, requires validation for its feasibility in specific practices and work flow.

There are opportunities for CT QA assessment, for improving the process and technologist education.

The outcome of these software is Influenced by how exams are segmented, how scouts are obtained and patient position in the scanner (prone, decubitus or lateral).

**Patient Assessment: Requirements, Reimbursement and Radiology Procedures (An Interactive Session)**

**Sunday, 10:30 AM - 11:30 AM • S402AB**



**MSRA11** • AMA PRA Category 1 Credit™:1 • ARRT Category A+ Credit:1  
**Joy J Renner** , MA, RT(R) \*

**LEARNING OBJECTIVES**

This course will review the organizations and agencies who play a role in determining patient assessment requirements. The link between reimbursement and documented assessment will be addressed in various patient scenarios. The last segment of this session will review and highlight the focused patient assessments most common to radiology procedures.

**Patient Radiation Dose: Reduction and Recording (An Interactive Session)**

**Sunday, 11:45 AM - 12:45 PM • S402AB**



**MSRA12 • AMA PRA Category 1 Credit™:1 • ARRT Category A+ Credit:1**  
**Douglas E Pfeiffer , MS\***

#### LEARNING OBJECTIVES

This session will include a discussion of current methods and trends toward reducing patient radiation dose with highlights of areas where there is particular concern or new data. The remainder of the session will include the ethical, legal, and policy-driven practices related to recording patient radiation dose.

### Health Services - Sunday Posters and Exhibits (12:30pm - 1:00pm)

**Sunday, 12:30 PM - 01:00 PM • Lakeside Learning Center**

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**LL-HPS-SUA • AMA PRA Category 1 Credit™:0.5**

#### Host

**Aine M Kelly , MD**

#### Host

**Paul P Cronin , MD,MS**

**LL-HPS-SU1A • The Practicality of Radiology Fellowships: A Mayo Clinic Perspective**

**Nathan C Hull MD (Presenter) ; Kristen B Thomas MD ; Chad J Fleming MD ; Tara L Henrichsen MD ; Timothy Welch MD**

#### PURPOSE

To evaluate the influencing factors in the decision to pursue a radiology fellowship, and if this additional training translates to practical benefits like securing employment, job satisfaction, and use of subspecialty knowledge.

#### METHOD AND MATERIALS

A short questionnaire was sent via an online survey service to fellowship trained radiologists who completed some training (residency and/or fellowship) at Mayo Clinic in the last 15 years to evaluate their perspectives on job satisfaction, use of subspecialty knowledge, and factors in selecting a fellowship. Percentages were calculated from the collected responses.

#### RESULTS

Survey response rate was 65% (142/218). 92.2% felt prepared to make a decision about fellowship with 52.5% reporting that sometime during the 4th year of radiology residency training was the best time to decide on fellowship training. The most important selection factors were personal interest in a particular field (99.3%), and to help secure employment (77.7%), with influence of mentors (68.6%), lifestyle (63.3%), and geography (55.0%) also ranked highly. 78.9% felt they could have not secured the same employment without fellowship training. 95.6% felt more confident in their practice after fellowship. 93.5% report use of their fellowship training on a regular basis in their respective practices. 97.0% are pleased they chose to complete fellowship training. The average overall job satisfaction was 89.3%.

#### CONCLUSION

Most residents feel prepared to choose a fellowship by sometime between the third and fourth year of residency. The most important selection factors are personal interest in a particular field and to help secure employment. Fellowship has many practical applications including: to secure employment, daily use of advanced training, high job satisfaction, and increased knowledge and confidence at initial employment. With initiation of the new ABR exams, it remains to be seen if practice groups will hire residents straight out of residency who are only board eligible and not board certified. This could increase the number of residents seeking fellowship training in the future.

#### CLINICAL RELEVANCE/APPLICATION

Radiology fellowship training is a practical means of increasing a radiologist's marketability, job satisfaction, initial confidence, and use of subspecialty knowledge.

**LL-HPS-SU2A • Study Habits of High-Score Achievers in the American College of Radiology In-Training Exam (DXIT)**

**Fadi Toonsi MBBS (Presenter) ; Jeffrey Chankowsky MD**

#### PURPOSE

Residency training programs must ensure that candidates have attained certain benchmarks before they take a board certification examination, The American College of Radiology Diagnostic Radiology In-Training examination (DXIT) is widely used by many programs across Canada for this purpose.

Radiology residents, on the other hand, use different study habits to acquire radiology material. We aim to identify these habits and investigate which ones, if any, correlate with higher DXIT scores.

#### METHOD AND MATERIALS

A questionnaire-based cross sectional survey focusing on seven aspects of study related habits. The study population was second to fourth year radiology residents at McGill University. Responses were correlated with participants' 2012 DXIT scores. Fisher's Exact test, Spearman's Rho and Pearson Chi-Square tests were used.

#### RESULTS

23 residents completed the questionnaire (79% response rate). Almost half of the responders (52%) study 5 or less hours per week. Reference textbooks were the top ranked source for radiology reading, followed by case-based format books. All residents consider the journal *Radiographics* an important source for their reading. A significant correlation exists between higher DXIT scores and 1) higher residency levels ( $p=0.048$ ) 2) reading from textbooks ( $p=0.006$ ), 3) less reading from the radiological journal 'Radiology' ( $p=0.004$ ) and 4) less frequent use of highlighter pens ( $p=0.040$ ). A nearly significant correlation was found between higher scores and 1) spending more money on textbooks ( $p=0.051$ ) and 2) less preference for the differential diagnosis based lecturing format ( $p=0.074$ ).

#### CONCLUSION

Radiology residents use different study habits, some of which correlate with higher in-training exam scores. The results could inform both low performing residents and residency programs with the aim of improving exam scores and performance.

#### CLINICAL RELEVANCE/APPLICATION

Higher residency levels, reading form textbooks and journals focusing on educational material more than scientific research and less frequent use of highlighter pens relate to higher DXIT scores.

**LL-HPS-SU3A • Redesigning the Medical Student Radiology Elective: A More Clinically-oriented and Active Learning Approach**

**R. J Weinfurtnner MD (Presenter) ; Indravadan J Patel MD ; Raj M Paspulati MD ; Mark R Robbin MD**

#### PURPOSE

The current radiology elective at our institution and at many institutions involves medical students shadowing residents and attendings and listening to readout sessions in a largely passive role. Our goal was to redesign the medical student curriculum to make it more interactive between the students, residents, and staff in an effort to improve teaching and learning.

## METHOD AND MATERIALS

An anonymous, voluntary, needs-assessment, subjective survey was emailed to medical students who took the elective in the current form over the past 6 months. Results indicated areas of strength and weakness of the current elective. The new curriculum was then introduced based around a 'case of the day' model in which each student was assigned a case to present each day. The medical student would gather clinical information on the patient and, in some instances, see the patient on the medical ward. The medical student would then go over the radiology study with the resident and, finally, present the entire case to the attending. Discussion of the case would then follow. Survey data collection following implementation of the new curriculum was then performed.

## RESULTS

Only a small minority of medical students surveyed after the 'traditional' radiology elective felt like an active part of the radiology team (22%). After implementation of the new curriculum to address this need, 91% felt like an active part of the team. This result was statistically significant (p

## CONCLUSION

The results of our study demonstrate that the implementation of a medical student radiology elective based around a case of the day model leads to improvement in medical student perception as active members of the radiology team. It is hoped that this improvement in medical student active learning will translate into improvement in radiologic competency. Positive evaluation of the new elective was demonstrated with a trend toward statistical significance in improved perception of radiology as a career choice as well as increased likelihood of recommending the elective to a fellow classmate.

## CLINICAL RELEVANCE/APPLICATION

Implementation of a medical student radiology elective based around a case of the day model leads to improvement in medical student perception as active team members.

### LL-HPE-SU4A • Medical Imaging in Pregnant Patients: Current Recommendations

**Alexandre M Silva MD (Presenter) ; Gustavo S Meirelles MD, PhD**

#### PURPOSE/AIM

The purpose of this exhibit is: To demonstrate the facts about the risks to the fetus of the imaging methods most commonly performed, of contrast media used in these tests, as well as update about the recommendations relating to these diagnostic procedures.

#### CONTENT ORGANIZATION

1. Introduction 2. Fetal risks related to ionizing radiation a. Stochastic effects b. Deterministic effects 3. Fetal risks related to magnetic resonance imaging (MRI) 4. Risks of using iodinated contrast media 5. Risks of using gadolinium (MRI) 6. Breast-feeding recommendations

#### SUMMARY

Fetal risks are minimal when radiological examinations are performed with proper technique, with proper indications and following the recommendations presented.

### LL-HPE-SU5A • A Multicenter Analysis of the Quality of Transfer Image Reporting

**Richard B Ruchman MD ; Robert Schiff MD (Presenter) ; Andrew C Schiff BS ; Kirsten Windos**

#### PURPOSE

The Emergency Medical Treatment and Active Labor Act outlines the necessity of medical records accompanying individuals transferring to another hospital. No studies to date have methodically analyzed the quality of radiologic reports received by tertiary facilities at the time of patient transfers. The objective of our study is to review the quality of transferred patients' radiology reports received from three outside institutions.

#### METHODS

All patients transferred from three outside facilities to Monmouth Medical Center from 1/1/2012 to 9/31/2012 were considered. Patients excluded were those with long term acute care or psychiatric admitting diagnoses, inpatient transfers and those without radiologic studies. Three independent observers reviewed the patients' medical records. Radiologic reports were analyzed according to a modified Likert scale with scores ranging from 1 to 5, representing studies wherein no information was provided versus studies with a complete report, respectively. The data was analyzed with respect to average reader scores, scores according to imaging modality and variance among observers.

#### RESULTS

Of the initial 447 transfer patients, 111 without imaging were excluded and 53 inpatient transfers were excluded. Of the 283 patients included, the overall modified Likert scale score resulted at 3.43. Per institution, the average scores were 2.92, 3.08 and 4.31. The overall distribution of scores for all institutions across three readers was as follows: 1 - 17.4% (n = 131), 2 - 22.3% (n = 168), 3 - 13.0% (n = 98), 4 - 13.4% (n = 101), 5 - 33.8% (n = 254). Computed tomography (CT) accounted for the majority of studies at 49.6% (n = 140); plain film radiography (XR) was second at 44.7% (n = 126), followed by ultrasonography (US) at 5.7% (n = 16). Within the CT modality, 52.1% (n = 201) of reports were rated as a 5, with 27.1% (n = 108) being rated as a 2 or less; within the XR modality, only 12.4% (n = 40) were rated as a 5, with 54.7% (n = 176) being rated as a 2 or less. By modality, the following variance among observers was seen: US - 0.39, CT - 0.19 and XR - 0.33.

#### CONCLUSION

The modified Likert scale score average of 3.43 reveals that most patients arrive with reports entailing only a primary diagnosis and minimal supporting information. Overall, nearly one in three patients in our study arrived with a complete report; more than one third of the patients arrived with an unsupported diagnosis or with no radiology report at all. A more formalized approach to the process of transferring radiologic reports is warranted.

### LL-HPE1075-SUA • Biostatistical Considerations in Diagnostic Imaging

**Vivian Bishay MD (Presenter) ; Chenchan Huang MD ; Grace C Lo MD ; Thomas J Ward MD ; Serge Sicular MD ; Michael A Kadoch MD**

#### PURPOSE/AIM

The purpose of this exhibit is to:

1. Review the major biostatistical considerations in diagnostic imaging.
2. To apply these concepts to the everyday clinical practice of the radiologist: diagnostic testing, screening, and radiation risk.
3. To apply fundamental biostatistical concepts to aspects of radiology research.
4. To provide the busy radiologist with a free and easy to access online reference for use whenever these concepts may be encountered.

#### CONTENT ORGANIZATION

Biostatistical considerations in diagnostic testing

- Specificity and sensitivity
- Positive and negative predictive values
- Receiver operating characteristic (ROC) curve

Biostatistical considerations in screening

- Relative risk reduction, absolute risk reduction, number needed to screen, and survival (disease-specific and all-cause mortality)
- False positives and false negatives
- Pseudodisease and overdiagnosis

Biostatistical considerations in radiation biology

#### SUMMARY

The major teaching points of this exhibit are:

1. To review the major biostatistical considerations in diagnostic imaging.
2. To provide the busy radiologist with a free and easy to access online reference for use whenever these concepts may be encountered.

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### Health Services - Sunday Posters and Exhibits (1:00pm - 1:30pm)

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**Sunday, 01:00 PM - 01:30 PM • Lakeside Learning Center**

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**LL-HPS-SUB • AMA PRA Category 1 Credit™:0.5**

#### **LL-HPS-SU1B • The Value of a Medical Student Radiology Triage Program in Enhancing Clinical Education and Skills**

**Jim Y Chen MD (Presenter) ; Petra J Lewis MD \***

##### PURPOSE

The Medical Student Radiology Triage Program (MSRTP) at the authors' institution recruits third and fourth year medical students to streamline imaging workflow for on call radiology residents. We sought to evaluate the benefit of this program for improving medical student education.

##### METHOD AND MATERIALS

Members of the program were surveyed anonymously from 2010 to 2012 using a web-based survey. The survey asked the students to rate the program in several categories from 1 (very poor) to 5 (very good). Students also marked if they are learning any of the selected skills.

##### RESULTS

Thirty of 54 (56%) former and current members responded to the survey. Support from on call residents (mean rating 4.7) and interactions with residents (mean rating 4.7) were rated the highest of the categories. Students ranked training provided (4.2), interactions with technologists (4.2), and interactions with clinicians (4.1) the lowest. The medical training experience and overall experience were graded with means of 4.4 and 4.5, respectively. Ninety-six percent of students felt they acquired triaging skills while 92% of students responded to learning communication skills. Sixty-nine percent and 62% of students stated that they gained radiological knowledge and general medical knowledge, respectively. Sixty-five percent of students and 50% of students responded to learning imaging appropriateness criteria and image interpretation skills, respectively. The most popular reason for joining the program was for financial compensation, followed by exposure to radiology, radiology education, and clinical exposure. Major strengths of the program included interactions with residents, learning experience, and triaging of workflow. Students listed the top two problems with the program as CT technologists and clinicians not wanting to speak to students. MSRTP is continuing strong with 33 current members as of April 2013. Students have covered 296 out of 312 (95%) possible shifts for the year of 2012.

##### CONCLUSION

The Medical Student Radiology Triage Program serves as a valuable clinical learning experience. Participants of MSRTP gain clinical skills that they will use during residency.

##### CLINICAL RELEVANCE/APPLICATION

The Medical Student Radiology Triage Program provides medical students with valuable clinical and radiological experience.

#### **LL-HPS-SU2B • Personalized Technologist Education to Reduce Excess Z-Axis Scanning: Quality Assurance and Radiation Dose Reduction**

**Stuart L Cohen MD (Presenter) ; Thomas J Ward MD ; Adam Jacobi MD ; Mary M Salvatore MD ; Matthew D Cham MD**

##### PURPOSE

To implement a personalized method for monitoring and decreasing technologist specific excess Z-axis scanning, and to assess its effect on radiation dose reduction.

##### METHOD AND MATERIALS

Noncontrast chest CTs were evaluated for excess Z-axis scan length (ES). ES was defined as the scanned distance superior or inferior to the lung parenchyma and was calculated to determine each technologist's average ES above and below the lungs. This data was used to implement personalized technologist education to reduce ES. From February 2012 to July 2012, three months of consecutive noncontrast chest CTs before and after technologist education was analyzed to determine the impact of the education protocol on ES and radiation dose reduction. Two tailed t-tests were performed to evaluate the differences in ES.

##### RESULTS

1120 total consecutive noncontrast CTs were evaluated. Each technologist's ES for 677 patients before the education were compared to their ES for the 626 patients after the education. The average excess Z-axis scan length superior to the lung (ESS) decreased by 19% (p

##### CONCLUSION

Excess Z-axis scan length on chest CT contributes to clinically unnecessary patient radiation. Personalized technologist education significantly reduces (p

##### CLINICAL RELEVANCE/APPLICATION

Personalized feedback based on each technologist's excess Z-axis scan length should be an essential part of quality assurance and can result in up to 59% reduction in excess radiation dose.

#### **LL-HPS-SU3B • Ordering Imaging: Enhancing Medical Student Education and Communication with Non-radiologist Physician Providers**

**Cherng Chao MD, JD (Presenter) ; Mazen Zawaideh BS**

##### PURPOSE

Communication between radiologists and referring providers is critical for interpretation of medical imaging and patient care. A shared background and understanding of radiology is an important component for communication. However, medical education of non-radiologists on radiology topics such as ordering imaging including indications for imaging and contrast guidelines may be lacking. We proposed, developed and implemented a lecture on ordering imaging and evaluated the utility of the lecture and satisfaction with current radiology education.

##### METHOD AND MATERIALS

A powerpoint lecture on ordering imaging was provided to the entire fourth year medical student class. The lecture discussed indications for imaging modalities and studies, the radiologist protocol process, ideal descriptive indications and intravenous and oral contrast guidelines including renal function and allergies. An anonymous electronic survey was sent to the entire class after the lecture. We surveyed the students for their impression of the amount and adequacy of their radiology education to date. We also tested their

knowledge on basic ordering imaging topics such as best study for an indication and about intravenous contrast guidelines. We also queried their impressions of the ordering imaging lecture.

#### RESULTS

We received 34 completed surveys. The vast majority, 85%, had taken a radiology elective/course. Only 15% of those surveyed reported that they knew all the information in the lecture. Although the percentage of correct responses to questions regarding the correct study for a reported indication ranged from 79% to 94%, the percentage of correct responses regarding intravenous contrast guidelines range from 47% to 76%. Over 76% of the participants thought that current radiology education could be improved. Over 97% thought that the lecture on ordering imaging was useful and recommended the lecture to other individuals.

#### CONCLUSION

Although the majority of nearly graduating medical students received some type of radiology education, the vast majority thought radiology education could be improved and that the lecture on ordering imaging was useful and recommended it.

#### CLINICAL RELEVANCE/APPLICATION

Education on ordering imaging may enhance medical student education and, hopefully, communication with non-radiologist physicians.

### LL-HPE-SU4B • Top Ten Commonly Misordered Diagnostic Imaging Studies by Primary Care Physicians

**Zachary Nuffer** BS (Presenter) ; **Nikhil B Amesur** MD \*

#### PURPOSE/AIM

The purpose of this exhibit is: 1. To emphasize that choosing the wrong imaging study leads to unnecessary costs, side effects, and a delay in diagnosis. 2. To emphasize that despite the availability of the American College of Radiology Appropriateness Criteria, many well-trained and experienced primary care providers remain unsure of the appropriate imaging work up of certain clinical presentations 3. To list and discuss ten clinical presentations that can result in result in the wrong imaging studies being ordered.

#### CONTENT ORGANIZATION

Present a list based on published expert opinion and a survey of the University of Pittsburgh Medical Center radiology department of ten commonly misordered diagnostic imaging studies Discuss each presentation (for example, non-thyroid neck mass of unknown origin) for which these studies were ordered and what the proper imaging workup would have been, if any.

#### SUMMARY

From this exhibit, the viewer should learn: 1. Ten clinical presentations that often result in misordered tests 2. The proper imaging workup of these ten clinical presentations. 3. Radiologists are available to help health care providers choose the appropriate study.

### LL-HPE-SU5B • How to Explain Effects of Radiation Dose to Children, Those with Special Needs, and Those with Limited Mental Capacity (....Even Orthopedists...)

**Brian M Rodgers** MD (Presenter) ; **Eduard V Kotlyarov** MD, PhD

#### PURPOSE/AIM

Explaining radiation dose effects can be difficult even in the best of circumstances. Several case scenarios provide a framework to approach this subject with children, the mildly mentally handicapped, and even difficult to teach adults. For those who do not have the ability or interest to understand the true details of radiation dose effects or the concept of risk vs benefit analysis, these will provide a usable approximation. This can be part of making medical imaging 'people friendly'.

#### CONTENT ORGANIZATION

Case scenarios are provided to help explain dose effects from medical imaging studies to:

- children
- mildly mentally handicapped adults
- adults who only want the briefest and most simplistic explanations

#### SUMMARY

Explaining radiation dose effects from medical imaging exams can be very difficult. Using a fairy tale or comic book type approach can be very useful for children. Emphasizing how the test can help them feel better soon is also important. Parents will likely desire a more complete explanation. Engage the mentally handicapped in conversation. For other adults who only want the fastest answers, providing equivalents in harm done by smoking some cigarettes or comparable time from background radiation dose should suffice. This also provides Imaging Physicians a unique and valuable means for patient education and even to market the practice.

### LL-HPE1078-SUB • Essentials of Statistical Methods for Assessing Reliability and Agreement in Quantitative Imaging

**Arash Anvari** MD (Presenter) ; **Anthony E Samir** MD ; **Elkan F Halpern** PhD \*

#### PURPOSE/AIM

This exhibit will provide a review of the statistical methods for assessing measurement reproducibility in quantitative imaging.

#### CONTENT ORGANIZATION

1. Definition of reliability(reproducibility) and measurement error.
2. The difference between reliability and validity.
3. Describing sources of measurement variability, with a special focus on intra- and inter-observer variability
4. Considerations when designing reliability and agreement studies
5. Statistical methods for analyzing reliability of quantitative measurement, including Standard Error of measurement and coefficient of variation (CV), Intraclass Correlation Coefficient (ICC), and Bland-Altman Analysis.
6. Guidelines for reporting reliability and agreement studies (GRRAS).
7. Why Pearson's Correlation Coefficient should not be used to assess reliability.
8. Role of reliability in generalizability and clinical decision studies.
9. Strategies for reducing variability.

#### SUMMARY

Quantitative imaging has a promising role in diagnosis and the prediction of clinical outcomes. We emphasize core statistical concepts by providing practical examples of reliability assessment in imaging studies.

## The Future of Radiology: What Are the Threats and How to Respond to Them

Sunday, 02:00 PM - 03:30 PM • E351



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**RC127** • AMA PRA Category 1 Credit™:1.5

**Vijay M Rao**, MD

**David C Levin**, MD \*

**Jonathan W Berlin**, MD \*

LEARNING OBJECTIVES

- 1) Understand the threats facing individual radiology practices.
- 2) Understand the more global threats to the radiology community at large.
- 3) Become aware of steps radiologists can take to protect their practices.
- 4) Consider actions the radiology community and its major organizations can take to deal with some of the external threats.

#### ABSTRACT

There are numerous threats facing the radiology community and individual radiology practices. These range from declining reimbursements to reduced procedure volumes to predatory corporations to the perception that imaging is being overused to aggressive hospital administrations to overstated concerns about radiation, and others. We will discuss these threats. But this is not a time to give in to pessimism. There are many steps radiologists and the organizations representing them can take to assure the future of the specialty. These steps will be presented in detail.

## What Is Driving Health Care Reform and How It Is Changing Your Radiology Practice

Sunday, 02:00 PM - 03:30 PM • S502AB

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RC132 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

### RC132A • A Brief History of Health Care Reform

**Bernard F King MD** (Presenter)

#### LEARNING OBJECTIVES

- 1) Understand the historical drivers of healthcare reform.
- 2) Understand the important milestones in healthcare Reform over the last 100 years.
- 3) Understand the major goals of the Affordable Care Act (ACA).

#### ABSTRACT

This refresher course will review three major aspects of Healthcare Reform: 1) Historical drivers and milestones of healthcare Reform over the last 100 years, 2) The major implications of the Affordable Care Act (ACA) on Radiology and 3) Contemporary examples of how this is being carried out in the state of Massachusetts. The historical drivers and milestones in healthcare reform over the last 100 years is important to understand current changes and vehicles involved in payment schemes that exist today. The major implications of the Affordable Care Act on radiology are key in understanding how current and future healthcare reforms will reshape medicine and radiology. Finally, current practices occurring in Massachusetts are the most revealing and telling picture of how all these healthcare reforms will affect the practice of medicine and radiology in the United States for many years to come.

### RC132B • Impact of Health Care Reform on Radiology: Intended and Unintended

**Lawrence R Muroff MD** (Presenter)

#### LEARNING OBJECTIVES

- 1) Discuss the key elements of health reform as they impact radiology.
- 2) Develop strategies to deal with the intended and unintended consequences of health care reform.
- 3) Describe some of the alternative payment mechanisms that will be competing with fee-for-service, and discuss how radiologists will fit into these new compensation dynamics.

#### ABSTRACT

## Teaching Leadership Strategies to Residents for Future Health Care Challenges

Monday, 08:30 AM - 10:00 AM • S502AB

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RC202 • AMA PRA Category 1 Credit™:1.5

**Vijay M Rao**, MD  
**Richard E Sharpe**, MD, MBA  
**Carol M Rumack**, MD

#### LEARNING OBJECTIVES

- 1) Describe specific ways that residents can participate in important radiology leadership and advocacy opportunities in order to enhance the future of radiology.
- 2) Appreciate the potential power of leveraging technology to provide leadership and further the specialty of radiology.
- 3) Understand relevant leadership skills that radiology residents must learn in order to address emerging challenges in the current and future practice of radiology.
- 4) Develop an appreciation for the role of organized radiology as a means to shape the future of our specialty.
- 5) Articulate the challenges facing radiology as a specialty in the era of new healthcare delivery models and healthcare reform.

#### ABSTRACT

Leadership skills will be essential to the successful careers of all radiology residents and fellows. Ten key points aimed at improving your success in academic medicine will help you in planning your career and gaining effective mentoring as you start your career.

## Changing Role of Radiology in the U.S. Health Care System

Monday, 08:30 AM - 10:00 AM • N226

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RC227 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

**James V Rawson**, MD  
**Marta E Heilbrun**, MD  
**Alexander M Norbash**, MD \*

#### LEARNING OBJECTIVES

- 1) Discuss barriers and tools for incorporating guidelines and evidence based recommendations into radiology practice.
- 2) Review both the systemic shortfalls and benefits delivered to the citizens of Massachusetts during that state's implementation of universal health care.
- 3) Learn to identify alignment of incentives across multiple stake holders in the evolving landscape of US healthcare.

#### ABSTRACT

As the U.S. Health Care system continues to evolve, the role of the Radiologists will also change. The Radiologist will likely play a role in managing issues such as incorporation of evidence based guidelines into clinical practice, access to care, alignment of stakeholders and clinical outcomes.

## Should I Scan That Patient? A Very Interactive Session on MR Safety and Regulations (An Interactive Session)

Monday, 08:30 AM - 10:00 AM • S402AB



**RC229** • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

**Jeffrey C Weinreb**, MD \*  
**Emanuel Kanal**, MD \*

#### LEARNING OBJECTIVES

1) Recognize a spectrum of common MR safety issues and regulations. 2) Assess the benefits and limitations of ferromagnetic detector technology. 3) Formulate policies for contrast administration and MR imaging of pregnant patients. 4) Compare current approaches to MR scanning of patients with pacemakers and other implanted cardiac devices.

### ISP: Health Service, Policy and Research (Radiology Education)

**Monday, 10:30 AM - 12:00 PM • S102D**



**SSC08** • AMA PRA Category 1 Credit™:1.5

**Moderator**  
**Paul P Cronin**, MD,MS  
**Moderator**  
**Pia Maly Sundgren**, MD \*

#### SSC08-01 • Health Service, Policy and Research Keynote Speaker: Radiology Education

**Paul P Cronin** MD,MS (Presenter)

#### SSC08-02 • Radiation Safety Knowledge and Perception among Residents: A Potential Improvement Opportunity for Graduate Medical Education in the United States

**Gelareh Sadigh** MD (Presenter) ; **Michael T Kassin** MD ; **Ramsha Khan** ; **Kimberly E Applegate** MD, MS

#### PURPOSE

To investigate residents' knowledge and perception of ionizing radiation adverse effects, frequency of their education on radiation safety and their use of radio-protective equipment.

#### METHOD AND MATERIALS

Residents from 15 residency programs at Emory University received an invitation email to complete Resident Radiation Safety Survey through SurveyMonkey in September 2012. The associations between residents' knowledge and use of radio-protective equipment with residents' specialty and year of training were investigated.

#### RESULTS

173/532 residents responded to the survey (response rate of 32%). 39% reported radiation safety is discussed in their residency curriculum at least every six months. This rate was significantly higher among Radiology residents (84% vs. 20% in Medicine, 19% in Surgery and 30% in OB/GYN; P

#### CONCLUSION

A large proportion of residents are unaware of the adverse effects of ionizing radiation, especially during pregnancy and childhood.

#### CLINICAL RELEVANCE/APPLICATION

Increased education of non-radiology residents by Radiology faculties on radiation safety may lead to more informed ordering of imaging tests and commitment to use of radio-protective equipment.

#### Arguing Your Way to an Education: An Effective Method of Teaching Residents Health Economics" class="eventlink" id="13043866"> SSC08-03 • Arguing Your Way to an Education: An Effective Method of Teaching Residents Health Economics

**Stephen J Hunt** (Presenter) ; **Saurabh Jha** MD

#### PURPOSE

The study compares a new method of teaching residents health policy and economics, using faculty-moderated point-counterpoint resident debates, with traditional didactic lectures.

#### METHOD AND MATERIALS

A new method of resident-driven conference comprising an Oxford-style debate moderated by faculty was employed for the curriculum in economics and health policy. The debate involves a motion that highlights a basic principle of economics with one resident arguing for the motion and the other against, with questions thrown to the wider audience. The residents then vote for or against the motion. In concluding, the moderator summarizes the key issues of economics and policy and the points of tension. The study compares the resident ratings of the debates to traditional lectures in the economics and policy curriculum. Residents assign a score for all lectures on a point scale ranging from (1) to (5) with a score of 5 expressing maximum effectiveness and a score of 1 the least.

#### RESULTS

In 2012, 285 lectures received mean rating of 4.49 +/- 0.02. Each lecture was, on average, rated by 16 residents. Amongst the nine subspecialties, there was essentially a bimodal distribution with the highest garnering mean ratings of 4.64 +/- 0.06 and the lowest a mean of 4.26 +/- 0.12. The mean score of the didactic economics and health policy lectures in 2011 was 4.0 +/- 0.38, placing it below the lowest of the subspecialty. In 2012 there were ten lectures in the economics and health policy curriculum, with six delivered in the traditional didactic format, and four utilizing debates. The didactic lectures in 2012 received a mean rating of 3.94 +/- 0.12 (N=90). The moderated debates demonstrated a 20% higher mean rating, with an average of 4.71 +/- 0.07 (N=60), scoring higher on average than any of the nine clinical subspecialty. There was statistical significance in the difference in ratings between the new format and both the concurrent 2012 didactic lectures and historic 2011 lectures.

#### CONCLUSION

The moderated point-counterpoint debate is an effective adjunct to didactic lectures in teaching radiology residents issues in health economics and health policy. We make a case for this model to be adopted by other residency programs.

#### CLINICAL RELEVANCE/APPLICATION

Literacy in economics, often dubbed as the dismal science, is becoming increasingly important to optimally manage finite healthcare resources to increase net health benefits.

#### SSC08-04 • Emergency Department Musculoskeletal Study Interpretation: Can Performance on a Musculoskeletal Curriculum Predict Error Frequency When on Call?

**Kevin B Hoover** MD, PhD (Presenter) \*

#### PURPOSE

Errors in initial radiologic interpretation can significantly effect patient management in the emergency department (ED). This retrospective study investigated test results and work parameters that could be helpful in predicting resident errors.

#### METHOD AND MATERIALS

A curriculum for residents during their first and second musculoskeletal radiology (MSK) rotations was began in July 2010. During both rotations, textbook reading, chapter specific slide presentations and chapter specific quizzes were assigned. The quiz results for each resident were placed into quartiles, based on the results so far obtained. The number of studies interpreted by a resident on service was also calculated and compared to like postgraduate year (PGY) residents and placed in a quartile. ABR written exam results and ACR inservice results for MSK were also tabulated for the residents in quartiles. Correlation between the percentage of minor and significant discrepancies on MSK studies when on call and the quartile of the above parameters was interrogated. Significant discrepancies were defined as those that could cause an important change in patient management.

#### RESULTS

A total of 13,296 adult MSK studies were reviewed by 23 PGY3-5 residents out of which there were 458 discrepancies (3.4%), 380 of which were minor (2.8%) and 78 significant (0.6%). Out of these 23 residents, 15 completed the ABR written exam, 22 completed the ACR inservice at least once, 17 completed the curriculum and the number of cases per interpreted per day on service was calculated in 21 residents. Out of these variables, the only result to correlate with the minor and significant discrepancies was the quartile score on the curriculum. The quartiles for the first and second rotation curriculum together were negatively correlated with minor discrepancies (Spearman's rho coefficient  $-0.511$ ,  $p$  CONCLUSION

Residents rotating through MSK have an assigned curriculum that guides them through the basics of orthopedic radiology including MRI. The resident performance on the curriculum was the only parameter investigated that correlated retrospectively with the number of errors in the emergency department on MSK studies.

#### CLINICAL RELEVANCE/APPLICATION

Resident performance in a novel MSK curriculum demonstrated correlation with the frequency of errors when interpreting MSK studies on call and may be a predictor of performance.

### **SSC08-05 • What Makes a Great Radiology Review Course Lecture? The Ottawa Radiology Resident Review Course Experience**

**Lily Cao MD, PhD (Presenter) ; Matthew D McInnes MD, FRCPC ; John G Ryan MD**

#### PURPOSE

To objectively determine qualities of radiology review course lectures that are associated with positive audience evaluation.

#### METHOD AND MATERIALS

57 presentations from the Ottawa Resident Review Course (2012) were analyzed by a PGY4 radiology resident blinded to the result of audience evaluation. Objective data extracted were: slides per minute, lines of text per text slide, words per text slide, cases per minute, images per minute, images per case, number of audience laughs, number of questions posed to the audience, number of summaries, inclusion of learning objectives, ending on time, use of pre/post test and use of special effects. Subjective data extracted were: speaker spontaneity, speaker tone and image quality. Mean audience evaluation scores for each talk from daily audience evaluations (up to 60 per talk) were standardized out of 100. Correlation coefficient was calculated between continuous variables and audience evaluation scores. Student T test was performed on categorical variables and audience evaluation scores.

#### RESULTS

Strongest positive association with audience evaluation scores was for image quality ( $r=0.57$ ), followed by the speaker tone ( $r=0.47$ ) and number of times the audience laughed ( $r=0.3$ ). Strongest negative association was between images per case and audience scores ( $r=-0.25$ ). Talks with special effects were rated better (mean score 94.3 vs. 87.1,  $p$  CONCLUSION

Many factors go into making a great review course lecture. At the University of Ottawa Resident Review Course, high quality images, dynamic speaker tone, use of special effects, use of pre/post-test and humor were most strongly associated with high audience evaluation scores. High image volume per case may be negatively associated with audience evaluation scores.

#### CLINICAL RELEVANCE/APPLICATION

Resident review course lectures are challenging to give; this study identifies several strategies to improve these lectures and better educate residents.

### **SSC08-06 • The Role of Radiologists in Breast Cancer Medical Education: A Systematic Review of the Literature**

**Faezeh Sodagari MD ; Pedram Golnari MD (Presenter) ; Hamid R Baradaran MD, PhD**

#### PURPOSE

To determine the role of radiologists in medical education research in the field of breast cancer

#### METHOD AND MATERIALS

A systematic search in bibliographic databases was performed using a sensitive search strategy with **breast cancer** and **medical education** as key words (from January 1 2000 to May 20 2011) without any language and/or methodological limitation. Medical education research was defined as any research study pertaining to the medical students, residents, fellows, faculty members, curriculum development, or program evaluation. Information regarding type of study, outcomes, and sample size (if applicable) were extracted using a checklist designed according to the coding sheet of Best Evidence in Medical Education (BEME) Collaboration. All citations stored and managed by EndNote X3. Descriptive data were produced by SPSS ver. 17 and also were qualitatively synthesized and reported.

#### RESULTS

The search strategy yielded 691 citations that 394 citations published after 2000 were reviewed. By title and abstract reviewing by two independent reviewers, 183 citations were excluded. Full-text articles for 211 citations were reviewed. Out of 161 studies in the field of breast cancer medical education, only 19 articles had radiologists as their subjects and were included in the review. The majority of the included studies (17 out of 19 studies), aimed to assess the capability of residents and radiologists in reading mammograms. Sample size of studies ranged from 3 to 364 with the median of 207 subjects. Only one study had an interventional design and most of studies (16 out of 19) were prospective cross-sectional studies. The majority of studies (15 out of 19 studies) assessed knowledge or skill of the participants. None of the studies considered a clinical outcome as an outcome of the medical education research.

#### CONCLUSION

Despite the paramount importance of radiology in screening, diagnosis and follow up of breast cancer, and different existing modalities and technologies, educational effort and evidence in the field of breast cancer seems lacking and is limited to interpreting mammography. Larger studies and experiments using controlled designs, and clinically relevant outcomes are needed.

#### CLINICAL RELEVANCE/APPLICATION

Radiologists should actively participate in improving medical education research activities in the field of breast cancer to play an active role in the future of diagnosis and management of this disease

### **SSC08-07 • Prevalence of Flawed Multiple-choice Questions in Major Radiology Journals' Continuing Medical Education**

**Andres R Ayoob MD ; Lindsay E Williams MD (Presenter) ; David J Disantis MD**

#### PURPOSE

Maintenance of Certification (MOC) requirements, the advent of all-computer-based Board examinations, and the ubiquity of CME-offering platforms make multiple choice questions (MCQs) an inescapable part of contemporary radiology, and indeed all medical disciplines. The result has been a burgeoning demand for well-constructed MCQs. The purpose of this study was to determine whether the CME MCQs in 3 major radiology journals comport with standard question-writing principles.

#### METHOD AND MATERIALS

CME questions from the January 2013 editions of the American Journal of Roentgenology (AJR), RadioGraphics, and Radiology were evaluated. The month was chosen at random, based solely on the current CME offerings at the time of manuscript preparation. The journals offered 181 print or on-line multiple choice items for their 22 CME-designated articles. Each question was analyzed by three radiologists to assess its adherence to question writing guidelines; disagreements were settled by consensus. From 31 validated MCQ-writing guidelines, we chose the seven previously identified as frequent flaws in medical CME questions. Example flaws included unfocused questions, negatively worded questions and options, and heterogeneous options.

#### RESULTS

78 of the 181 questions contained flaws (43%). 45 questions had one flaw, while 24 questions had two, eight questions had three, and one had four. Specific flaws varied widely in prevalence, but an unfocused question and heterogeneous options were the two most frequently violated writing principles.

#### CONCLUSION

Nearly half of CME questions from three major radiology journals violated standard MCQ item writing principles.

#### CLINICAL RELEVANCE/APPLICATION

The high prevalence of flawed CME questions in three major radiology journals puts learners at risk of failing for reasons unrelated to their knowledge of the topic.

### **SSC08-08 • Potential Impact the American Board of Radiology's New Core Examination Will Have on Resident Training: Resident and Faculty Perspectives**

**Brian J Clark MD (Presenter) ; Hima Prabhakar MD**

#### PURPOSE

Assess radiology resident and faculty perspectives on the potential impact the ABR's new core exam will have on resident training. Factors assessed include resident call schedule, protected time, fourth year focused training, and entering fellowship.

#### METHOD AND MATERIALS

A 5-point Likert scale survey was given to radiology residents and faculty at an academically-affiliated hospital radiology residency program. Question responses were: 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree. Faculty and resident responses were compared using the student's t-test and summary statistics were generated.

#### RESULTS

Most surveyed were undecided or disagreed if the new exam format would better prepare residents for practice (89%, rating =4) and all thought it would shift to the third year (100%, rating >=4). Most surveyed agreed third year residents should have protected study time (94%, rating >=4) and 69% thought 6 to 8 weeks or more was adequate. All surveyed agreed that residents should be relieved from call duties before the core exam (100%, rating >=4) and 50% thought 6 to 8 weeks appropriate. 63% surveyed disagreed with the APDR's recommendation of no time off from clinical duties before the core exam (rating =4). Residents agreed they were likely to pursue research during fourth year subspecialty training (mean=4, p=0.01) and faculty were undecided if this would occur. Most surveyed thought that residents would continue to pursue fellowship training (93%, rating >=4). Residents disagreed (mean=2.1, p=0.04) that the new exam format would affect fellowship choice while faculty were undecided.

#### CONCLUSION

Residents and faculty have similar views regarding the new board exam and were uncertain if it would better prepare residents. Board frenzy will likely shift to third year and most think 8 weeks of protected study time appropriate with fourth year residents taking more call to fill the gap. Residents are likely to pursue research during the fourth year and to continue to enter fellowships.

#### CLINICAL RELEVANCE/APPLICATION

With the ABR's new core examination, board frenzy will probably shift to third year and residency programs should address rotation scheduling and consider time off call duties prior to the exam.

### **SSC08-09 • Quality Improvement of Radiological Image Interpretation Skills Assessment through Digital MPR Images in Medical Education**

**Cecile Ravesloot MD ; Anouk Van Der Gijp MD, PhD (Presenter) ; Marieke Van Der Schaaf ; Olle Ten Cate ; Jan P Van Schaik MD, PhD ; Christian Mol MSc ; Corinne Tipker ; Mario Maas MD, PhD ; Koen L Vincken PhD**

#### PURPOSE

Current radiology practice has become increasingly based on the digital interpretation of volumetric multi-planar-reconstruction images (MPR-images). Nevertheless, assessment of radiological image interpretation skills in medical education and postgraduate radiology training is still mainly based on two-dimensional (2D) images (only one or two slices of a stack are presented). Consequently, the assessment lacks authenticity, which negatively impacts its quality. We hypothesized that using MPR images increases the assessment quality as reflected in its validity (the test assesses what it is intended to measure) and reliability (the accuracy of the test results, its reproducibility and little measurement error). Our aim was to evaluate differences in validity and reliability of assessment with 2D image questions versus MPR image questions.

#### METHOD AND MATERIALS

In 2012, 246 medical students, trained with MPR images, took a digital radiology test. There were two versions (A and B), both containing twenty 2D and twenty MPR image questions, concerning anatomy on CT-scans. Participants filled out a questionnaire to judge the authenticity of the assessment as an indication of validity. They also gave their opinion on the difficulty of 2D and MPR image questions. Mean scores and reliabilities (estimated with Cronbach's alpha) of the 2D and MPR image subtests were compared.

#### RESULTS

Cronbach's alphas on 2D image questions were .49 (A), and .65 (B), and alphas of MPR image questions were .65 (A), and .71 (B). Scores on MPR image questions (M 15.6, SD 2.6; M 14.9, SD 2.9) were lower than scores on 2D image questions (M 15.8, SD 2.2; M 16.8, SD 2.4). This difference between 2D and MPR scores was significant for version B. Assessment based on MPR images was considered more authentic (t (56) = -7.1, p < .001), and less difficult (t (58) = -4.2, p < .001) by the participants.

#### CONCLUSION

According to the participants, assessment with MPR images increases authenticity, which can contribute to validity. MPR image questions showed higher reliability than 2D image questions. Scores on MPR image questions in one version were significantly lower, but considered less difficult by participants.

#### CLINICAL RELEVANCE/APPLICATION

Valid and reliable assessments of image interpretation skills of radiology trainees, adds to patient safety. MPR image assessment seems to contribute to its validity and to its reliability.

**Health Services - Monday Posters and Exhibits (12:15pm - 12:45pm)**

**Monday, 12:15 PM - 12:45 PM • Lakeside Learning Center**

Host  
**Annette J Johnson**, MD, MS  
Host  
**Aine M Kelly**, MD

### LL-HPS-MO1A • Reducing Radiation Exposure from CT through Utilization Management

**Mark D Hiatt** MD, MBA (Presenter) \*

#### PURPOSE

To evaluate the efficacy of utilization management (UM) in reducing unnecessary medical radiation through assuring that exams that irradiate patients are not performed inappropriately or unnecessarily.

#### METHOD AND MATERIALS

The results of a UM program administered by a radiology benefit management company for a national health insurance plan for nearly 5 million subscribers across the country were examined for two recent consecutive years. The radiation averted by avoiding inappropriate or unnecessary CT was expressed in terms of posteroanterior chest x-ray equivalents (CXREs) using a consistent conversion factor relating the radiation from CT to CXREs. The number of CTs avoided each year was derived from the sum of the number of CTs requested that were withdrawn and the number of CTs requested that were changed to a more appropriate modality (such as MRI or ultrasound).

#### RESULTS

In the first year, 8,628 CTs were withdrawn and 2,412 were changed to a different modality, sparing approximately 3.3 million CXREs. In the second year, 10,635 CTs were withdrawn and 2,643 were changed to a different modality, sparing approximately 4.0 million CXREs. In total, approximately 7.3 million CXREs were spared.

#### CONCLUSION

Oversight to assure the judicious use of CT averted unnecessary radiation exposure equivalent to over 7 million chest x-rays over 2 years for one health plan.

#### CLINICAL RELEVANCE/APPLICATION

UM may be successful in reducing unnecessary radiation by limiting inappropriate and unnecessary CT.

### LL-HPS-MO2A • Timely Critical Results Reporting for Emergent Nuclear Medicine Studies

**Moazzem Kazi** MD (Presenter) ; **Donna Handy** ; **Karsten Grabski** MD

#### PURPOSE

Timely reporting of results from an emergent (stat, critical) radiology study can have a considerable impact on patient care. A critical result, whether positive or negative, is considered to indicate a life-threatening situation and/or may alter the treatment plan of a patient. The division of Nuclear Medicine is required by our hospital policy to verbally communicate results to the primary team of a patient undergoing an emergent study within 4 hours of the study being ordered. This time is to allow for preparation of the radiotracer, scanning the patient, and interpretation of the images by a radiologist. We wanted to investigate how frequently the 4-hour time requirement was met.

#### METHOD AND MATERIALS

The written reports of all in-patient emergent Nuclear Medicine studies performed from January 1, 2012 through December 31, 2012 were identified in our department's computer database. The time the study was ordered and the time the results were verbally communicated to the primary team were recorded. Studies were categorized by whether or not the results were verbally communicated within 4 hours of the study being ordered. Studies without clear documentation of verbal communication were considered to have not met the time requirement. Data was sorted by month and the frequency of meeting the 4-hour time requirement was calculated as the number of studies that met the requirement compared to the total number of emergent studies performed.

#### RESULTS

During our investigation period,  $9.7 \pm 2.8$  emergent studies were performed per month and 73% had documentation that results were verbally communicated within 4 hours. The monthly frequency of meeting the 4-hour time requirement ranged from 50-100%. Of the emergent studies that exceeded the time requirement, 55% lacked clear documentation that any results were verbally communicated.

#### CONCLUSION

Our data suggest that during certain months, only half (50%) of emergent study results were verbally communicated within the 4-hour time requirement. In addition, lack of documentation was quite high (55%) when the time requirement was exceeded. Finally, the monthly frequency of timely verbal communication (73%) fell far below an ideal communication frequency of 100%.

#### CLINICAL RELEVANCE/APPLICATION

Our analysis suggests that efforts need to be made to increase timely verbal communication with careful documentation for emergent (stat, critical) Nuclear Medicine study results.

### LL-HPS-MO4A • Differences between In-network and Out-of-Network Motivators of Referral Patterns

**David A Rosman** MD (Presenter) \* ; **Jose Gutierrez** ; **William Barron** ; **Brian Cerroni** ; **Kristen L Dean** ; **Giles W Boland** MD ; **Michelle H Dean** ; **Natalie Egan** ; **Thomas Rizzo** ; **Garry Choy** MD, MS

#### PURPOSE

Provision of imaging services remains highly competitive. Understanding what drives referrals to an imaging facility is critical to successfully recruiting volume. We sought to characterize referring physicians' motivations for referring to a particular imaging facility. We also evaluated for any differences between in-network and out-of-network referrers.

#### METHOD AND MATERIALS

We deployed a 17-question survey to 4130 referring physicians to ascertain what factors drive referrals. The surveys were completed either by the physician, other health-services personnel or their secretarial staff. Responses were accepted via an electronic survey, fax or handout. Data was analyzed by in-network and out-of-network referrer to determine mean values for importance and performance in each category.

#### RESULTS

We received 677 responses from in-network and 141 from out-of-network (total 20% of those solicited). The top three factors driving patient referrals for in-network physicians were: quality of radiology reports, ease of scheduling an appointment and electronic access to radiology reports/images. The top three factors for out-of-network physicians included the quality of reports, ease of scheduling and the quality of images produced. In-network more than out-of-network referrers valued subspecialized fellowship-trained radiologists and electronic access to radiology reports. The helpfulness of the desk staff ranked in the top 50% for out-of-network referrers but in the bottom quintile for in-network referrers.

#### CONCLUSION

The quality of images and reports are equally important to in and out-of-network referrers when choosing an imaging facility. However, in-network providers are more focused on subspecialty reports whereas out-of-network referrers consider accessibility factors (reception staff /ease of scheduling an appointment) more important.

#### CLINICAL RELEVANCE/APPLICATION

Difference in drivers of in-network versus out-of network referrals is critical for optimizing customer satisfaction and thus revenue for imaging facilities.

### LL-HPS-MO5A • Evaluating Radiology Resident Education Using Emergency Department Musculoskeletal Study Interpretation: The Correlation of Year of Training with Error Frequency and Type

**Kevin B Hoover MD, PhD (Presenter) \***

#### PURPOSE

Radiology residents at my institution generate preliminary reports at night that are reviewed in the morning by subspecialty trained radiologists. These reports are an important source of data to identify their strengths and weaknesses.

#### METHOD AND MATERIALS

During the 2011-2012 academic year, 13,296 adult musculoskeletal (MSK) studies were reviewed on call by 23 postgraduate year (PGY) 3-5 residents. Nearly all were overread by radiologists with subspecialty training in MSK. Overreads not in agreement were identified as having a significant discrepancy, when an error could significantly effect patient management, and having a minor discrepancy when an error was not thought to significantly effect patient management. Discrepancy frequencies were analyzed by resident, PGY, site of injury, error type, and imaging modality.

#### RESULTS

Of the 458 (3.4%) discrepancies documented 380 were minor (2.8%) and 78 significant (0.6%). The mean resident discrepancy percentage was 3.3% (SD 1.4%) for minor and 0.6% (0.9%) for significant. Number of studies interpreted by the resident was negatively correlated with minor discrepancies (Spearman's rho coefficient -.535, p

#### CONCLUSION

This study indicates the residents are learning with error rates that compare well with the literature. Early identification and remediation of those residents accounting for significant numbers of discrepancies could improve overall residency performance.

#### CLINICAL RELEVANCE/APPLICATION

Systematic analysis of the preliminary reports of residents early in training can identify recurrent error types and help focus remediation on those responsible for the majority of errors.

### LL-HPE1079-MOA • Nonparametric Tests in Radiology Clinical Research

**Arash Anvari MD (Presenter) ; Anthony E Samir MD ; Elkan F Halpern PhD \***

#### PURPOSE/AIM

This exhibit provides a practical review of nonparametric statistical tests for clinical radiology researchers. The description of each statistical test will be accompanied by a clinical question that the statistical test would address.

#### CONTENT ORGANIZATION

1. What are nonparametric tests?
2. Parametric tests vs. nonparametric tests, advantages and limitations
3. Why are nonparametric tests popular in radiology research?
4. One Sample with Two Paired Measurements
  - a. Dichotomous scale: McNemar test
  - b. Ordinal scale: Sign test
5. Comparing Two Related Samples: Wilcoxon Signed Rank Test
6. Comparing Two Unrelated Samples:
  - a. Categorical data: The Chi-Square and Fisher Exact tests
  - b. Continuous data with an interval/rational Scale: Wilcoxon rank sum test (Mann-Whitney U-Test)
7. Comparing More Than Two Related Samples:
  - a. Categorical data with dichotomous scale: Cochran Q test
  - b. Categorical data with ordinal scale OR Continuous data with an interval/rational Scale : Two-way ANOVA (The Friedman Test)
8. Comparing More than Two Unrelated Samples:
  - a. Categorical with nominal or ordinal scale: Chi-Square
  - b. Continuous with Interval /rational Scale: One-Way Rank ANOVA (The Kruskal-Wallis-Test)
9. Spearman Rank Correlation test

#### SUMMARY

We review the common nonparametric tests used in radiology research with practical examples.

### Health Services - Monday Posters and Exhibits (12:45pm - 1:15pm)

**Monday, 12:45 PM - 01:15 PM • Lakeside Learning Center**



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**LL-HPS-MOB • AMA PRA Category 1 Credit™:0.5**

### LL-HPS-MO1B • Peer-to-Peer Escalation of Advanced Diagnostic Imaging Requests in a Utilization Management Program by Facility Rural-Urban Commuting Area: Rural Providers May Need Guidance More Frequently

**Kevin D Hiatt BS (Presenter) ; Jeffrey D Robinson MD \* ; Daniel S Hippe MS \* ; Timothy R Johnstad MBA \* ; Brock A Oxford MPH \* ; Mark D Hiatt MD, MBA \***

#### PURPOSE

Utilization management subjects provider requests for procedures to tiered evaluation with progressively greater clinical input at each level, with peer-to-peer consultation at the highest tier. The purpose of this study was to determine the difference in escalation rates to this ultimate tier between rural providers and urban ones in a prior authorization process for advanced diagnostic imaging (ADI).

#### METHOD AND MATERIALS

All ADI requests received by HealthHelp, a radiology benefit management (RBM) company, between January 1, 2012 and December 31, 2012 from providers for the nearly 5 million commercial, Medicare, and Medicaid subscribers to multiple health plans in all 50 states were reviewed to ascertain the rates of escalation to peer-to-peer consultation, categorized by the rural-urban commuting area (RUCA) code of the provider's facility as rural (codes 7-10), suburban (4-6), or urban (1-3). Rates of escalation were averaged within each group, weighted by the total volume of ADI requests from each provider, and compared using linear regression.

#### RESULTS

943,596 ADI requests were included in the data set. Of these, 46,642 exams (5%) were ordered by providers in rural areas; 114,010 (12%) by suburban providers; and 782,944 (83%) by urban providers. The mean rates of escalation were  $3.16 \pm 0.22\%$  (95% CI),  $2.80 \pm 0.14\%$ , and  $2.88 \pm 0.05\%$  for rural, suburban, and urban providers, respectively. The mean rate for rural providers was significantly greater than for suburban ( $p=0.007$ ) or urban providers ( $p=0.02$ ), while mean rates were not significantly different between suburban and urban providers ( $p=0.3$ ). The mean rate was 10% higher for rural providers than urban providers.

#### CONCLUSION

Rural providers experience a significantly higher rate of escalation of their requests for ADI to the highest tier of peer-to-peer consultation in the process of seeking prior authorization, which may reflect a greater need for clinical guidance.

#### CLINICAL RELEVANCE/APPLICATION

Rural providers, presumably with generally fewer resources and a lesser degree of subspecialization, may have greater need for the guidance provided by RBM companies.

### LL-HPS-MO2B • Reduction of Turnaround Time of Radiologic Reports by Dedicated Communication Methods

**Christoph Stern** BA, MD (Presenter) ; **Nadine Kawel-Boehm** MD ; **Klemens Wittig** \* ; **Thomas Boehm** MD

#### PURPOSE

With the introduction of diagnosis related groups (DRGs), there is an upcoming need to shorten the turnaround time of radiologic reports in order to contribute to the economic success of a hospital. This important key-performance indicator is frequently not available. The majority of hospitals are controlled and managed by financial indicators, while process orientated indicators are commonly not in use. The purpose of our study was to define turnaround time of radiologic reports in our institution and to evaluate the influence of dedicated communication methods on the turnaround time.

#### METHOD AND MATERIALS

The turnaround time of a radiologic report is defined as the time from confirmation of an exam till its approval. For our study purposes it was extracted and calculated from the Radiology Information System (RIS) of our institution by a self-developed calculation tool within the Software RadCentre Analyzer (Transact GmbH, Hamburg, Germany). The average turnaround time over all radiologic exams and the average turnaround time for each modality ♦ CT, MRI, x-ray and ultrasound ♦ were calculated per month for the period between October 2012 and March 2013. Systematic and regular communication of turnaround times amongst staff radiologists was introduced in late December 2012.

#### RESULTS

From October till December 2012 the average turnaround time over all radiologic exams (3 month average) was 33:40:18 (hh:mm:ss), from January till March 2013 it was 25:56:44. The introduction of systematic and regular notification of the turnaround time for radiologic reports resulted in a decrease of the turnaround time over all exams by an average of 7:43:33 (-22,9%) per month during this 3 months follow up period. The largest decrease of turnaround time occurred in reports of ultrasound (-29,5%) and x-ray exams (-27,5%), while differences were smaller for reports of MRI (-3,2%) and CT exams (-2,2%).

#### CONCLUSION

Dedicated communication methods are effective to reduce the turnaround time of radiologic reports, however the impact on each modality varies substantially. A longer follow up period is necessary to evaluate the long term effectiveness of communication methods.

#### CLINICAL RELEVANCE/APPLICATION

By reducing turnaround time of radiologic reports, important clinical information will be available earlier to clinicians, facilitating immediate initiation of treatment.

### LL-HPS-MO3B • Effects of Using a Policy for Handling Secondary Interpretations of Outside Studies at an Academic Medical Center on Reimbursement Rates

**Robert Morgan** BA (Presenter) ; **Carlos J Sivit** MD ; **Bart Stovicek** ; **Pablo R Ros** MD, PhD \*

#### PURPOSE

To evaluate the reimbursement rates for secondary interpretations of outside imaging studies that were requested for medical necessity by the treating physician.

#### METHOD AND MATERIALS

The policy we employed at our institution for rendering diagnostic readings of outside examinations requires that the treating physician submit a requisition stating medical necessity for a secondary interpretation and that the study be less than 90 days old and in digital format. Outside images are uploaded into a PACS, labeled as Outside Examinations, identified as a secondary interpretation in the dictation, and coded with a '-77' modifier in addition to the original CPT code. The total percentage of gross charges reimbursed by payers, including Commercial insurance, Medicare, Medicaid, Worker's Compensation and Self-pay patients for the professional component of primary interpretations performed at our institution and for secondary interpretations were compared. Data were reviewed for examinations performed between January 1, 2012 and October 31, 2012.

#### RESULTS

For primary interpretations the percent of gross charges reimbursed was 28.8%. For secondary interpretations the percent of gross charges reimbursed was 32.3%.

#### CONCLUSION

Using a policy for handling secondary interpretations of outside imaging studies can result in reimbursement rates comparable to primary interpretations.

#### CLINICAL RELEVANCE/APPLICATION

Secondary interpretation of outside studies is often required for medical necessity. As reimbursements decline, it is imperative for institutions to receive appropriate compensation for such work.

### LL-HPS-MO4B • One CT is Enough-Contrast Enhanced Ultrasound is Adequate for Blunt Abdominal Trauma Follow Up

**Demosthenes D Cokkinos** MD (Presenter) ; **Eleni Antypa** ; **Dimitrios Tsiolias** MD ; **Dimitrios Tomais** ; **Stylianos V Benakis** MD ; **Ploutarhos A Piperopoulos** MD, PhD

#### PURPOSE

To evaluate the ability of contrast enhanced ultrasound (CEUS) for imaging follow up of hospitalised patients who suffered blunt abdominal trauma (BAT), after initial imaging on the day of injury with contrast enhanced computed tomography (CECT). To compare subsequent CEUS findings to those of the initial CECT.

#### METHOD AND MATERIALS

32 patients (18 men-14 women, aged 17-84 years) were imaged on an emergency basis with CECT due to BAT. CECT detected 35 solid abdominal organ (liver, kidneys, spleen, adrenals) injuries (3 patients had injuries in 2 organs). All patients were admitted to the Hospital and treated conservatively. In order to minimise radiation exposure, imaging follow up was performed 3-6 days later with CEUS post injection of contrast agent SonoVue (2.4 ml). No additional CT was performed. CEUS findings were compared to the initial CECT to assess improvement of solid abdominal organ injuries.

#### RESULTS

CEUS showed reduction in size of 26 injuries in 24 patients. 9 injuries in 8 patients showed complete resolution. All patients were discharged from the Hospital in the following days with no additional imaging performed.

#### CONCLUSION

In all cases CEUS answered the question of following up BAT injuries with no additional CECT performed. Patients admitted for BAT following an uneventful course can be subsequently imaged with CEUS.

#### CLINICAL RELEVANCE/APPLICATION

This practice can decrease the number of CEET, reducing patient radiation exposure, CT scanner workload and imaging cost.

### LL-HPS-MO5B • Radiological Anatomy: Evaluation of Integrative Education in Radiology

**Sabine Dettmer ; Timm D Kirchoff MD, PhD (Presenter) ; Andreas Schmiedl ; Simone Meyer ; Anja Giesemann ; Reinhard Pabst ; Juergen Weidemann MD ; Frank K Wacker MD \***

#### PURPOSE

Evaluation and analysis of the integrative course ♦Radiological Anatomy♦ established since 2007 in comparison with conventional education.

#### METHOD AND MATERIALS

Anatomy and radiology are usually taught separately with a considerable time lag. Interdisciplinary teaching of these associated subjects seems logical for several reasons. Therefore, the integrative course ♦Radiological Anatomy♦ was established in the second year of medical education, combining these two closely related subjects. The participating students had already passed the dissection course in the previous year. This interdisciplinary course was retrospectively evaluated a student questionnaire and staff observations. The advantages and disadvantages of integrative teaching in medical education are discussed.

#### RESULTS

The course ratings were excellent (mean 1.4 on a scale of 1 to 6, n=94). This is significantly (p

#### CONCLUSION

Integrative teaching of anatomy and radiology was well received by the students. Both, anatomical and radiological comprehension and the motivation to learn were improved. However, it should be considered, that the amount of work and time required by the teaching staff is considerably increased compared to traditional teaching.

#### CLINICAL RELEVANCE/APPLICATION

Integrative teaching of anatomy and radiology can help to improve anatomical and radiological comprehension and the motivation to learn.

### Emergency Radiology (ER Practice and Utilization)

**Monday, 03:00 PM - 04:00 PM • N227**



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**SSE06 • AMA PRA Category 1 Credit™:1**

#### Moderator

**Stephen Ledbetter , MD**

#### Moderator

**Garry Choy , MD, MS**

**SSE06-01 • Uncompensated Emergency Department Imaging: An Analysis of 18 Million Services over 4 Years by 2,935 Radiologists Nationwide**

**Richard Duszak MD (Presenter) ; Eugene Nsiah ; Danny Hughes PhD ; Jeff Maze \* ; Martey S Dodoo PhD ; David A Rosman MD \***

#### PURPOSE

To study the frequency, magnitude, and other characteristics of uncompensated services provided by radiologists in the emergency department (ED) setting

#### METHOD AND MATERIALS

Using patient- and physician-redacted billing claims for 2,935 radiologists from 40 states between January 2009 through December 2012, 18,475,491 professional services performed in the ED setting were identified. Analysis focused on the 133 of all reported 830 Category I CPT and HCPCS codes which comprised 99.0% (18,296,734) of all rendered services. The frequency, magnitude, and other characteristics of uncompensated (defined as zero payment) radiologist services were analyzed. National 2012 Medicare physician fee schedule amounts were used to estimate dollar value of services.

#### RESULTS

Of 2,935 radiologists, 2,835 (96.6%) provided uncompensated care to ED patients, averaging \$2,483 per physician per service month. Radiologists received no compensation at all for 28.4% (5,194,732/18,296,734) of services rendered to ED patients. Most frequently rendered services were: 1-view CXR (600,547 uncompensated of 2,885,729 total; 20.8%), 2-view CXR (634,932/2,246,987; 28.3%), non-contrast brain CT (536,947/2,028,049; 26.5%), contrast abdomen/pelvis (AP) CT (147,793/512,816; 28.8%), and non-contrast AP CT (124,844/452,860; 27.6%). Most frequent modalities were radiography (2,916,912/10,664,437 total; 27.4% uncompensated), CT (1,658,511/5,701,654; 29.1%) and US (541,397/1,615,578; 33.5%). Although CT represented 31.2% of ED services, it accounted for 64.8% of uncompensated dollars. Of all uncompensated services, 52.3% (2,714,506) were rendered to uninsured patients and 47.7% (2,480,226) to insured patients (e.g., insurer denial, patient non-payment of deductible).

#### CONCLUSION

Over 28% of services radiologists rendered by radiologists to ED patients are on a completely uncompensated basis, corresponding to \$2,483 per month per physician. Both frequency and magnitude are likely underestimated by many.

#### CLINICAL RELEVANCE/APPLICATION

Of services rendered by radiologists to ED patients, 28.4% are without compensation, corresponding to \$2,483 per physician per month. The frequency and magnitude may impact patient access. Of services

**SSE06-02 • Structured Physician Order Entry for Trauma CT Scans Improves Clinical Information Transfer and Billing Efficiency in the Emergency Department**

**Jeremy R Wortman MD (Presenter) ; Aaron D Sodickson MD, PhD ; Asha Goud MD ; Michael H Stella MD ; Ali Raja MD, MBA \* ; Anna Poulos ; Dana Marchello**

#### PURPOSE

To measure the impact of a structured physician order entry system for trauma CT imaging on the clinical information provided to the radiologist, and on associated coding practices and reimbursement success.

#### METHOD AND MATERIALS

The study was conducted between April 1, 2011 and January 14, 2013 at a quaternary care institution with a Level 1 Trauma Center and 58000 ED visits annually. The intervention implemented in March of 2012 was a structured order entry system for trauma CT scans. The presence in the requisition of clinical signs and symptoms and mechanism of injury, the primary ICD-9-CM code category, the success of reimbursement, and the occurrence of initial reimbursement denials were compared before and after the intervention for head through pelvis trauma CT ♦pan-scans.♦ Chi square statistics were used to compare examinations and patients before and after the intervention.

#### RESULTS

457 patients received CT pan-scans, including 2734 distinct exam accessions. After the intervention, there was a 62% increase in requisitions containing clinical signs, symptoms, or physical examination findings (from 1% to 63%,  $p < .0001$ ), and a 99% increase in provided mechanism of injury (from 0.4% to 99%,  $p < .0001$ ). There was a 19% increase in primary ICD-9-CM codes representing clinical signs or symptoms (from 3% to 22%,  $p < .0001$ ), and a modest 4% increase in reimbursement success for examinations submitted to insurance carriers (from 91% to 95%,  $p = .003$ ). Rate of initial reimbursement denials dropped 7% (from 24% to 17%,  $p = .04$ ).

#### CONCLUSION

Implementation of structured physician order entry for trauma CT imaging was associated with a large increase in rate of clinical history provided to the radiologist. This was associated with a decrease in initial reimbursement denials and a modest increase in reimbursement success.

#### CLINICAL RELEVANCE/APPLICATION

Structured physician order entry for trauma CT imaging can increase the clinical information provided to the radiologist, improve coding practices, and increase reimbursement success and efficiency.

### **SSE06-03 • The Expanding Role of the Radiologist in Accountable Care Organization (ACO): Improving Adherence to ACO Quality Measures through Detection of Incidental Coronary Artery Calcifications**

**Jonathan Opraseuth MD ; Ari C Sacks MD (Presenter) ; Alexander J Adduci MD, PhD**

#### PURPOSE

Evaluate the percentage of patients with incidental coronary artery calcifications on CT and determine if these patients are being appropriately managed according to the proposed new ACO quality measures for patients with ischemic vascular disease, specifically in regards to aspirin/antithrombotic treatment.

#### METHOD AND MATERIALS

IRB approved, retrospective review of all patients that underwent a Chest CT or CTA in the Emergency Department of a tertiary care, academic medical center between 9/1/2012 and 12/1/2012. The presence of coronary artery calcifications (CAC) was graded as mild, moderate, or severe. The electronic medical records of patients with CACs were evaluated to determine if there was a documented diagnosis of coronary artery disease (CAD) and if these patients were on an antithrombotic medication according to ACO guidelines.

#### RESULTS

568 consecutive patients had a Chest CT or CTA in the ED between 9/1/2012 and 12/1/2012. 45.4% patients ( $n=258$ ), average age of 67.4 years (range 30 – 97 years), demonstrated presence of coronary artery calcifications graded as mild ( $n=125$ ), moderate ( $n=74$ ), or severe ( $n=59$ ). Of the patients with CACs, 27.5% ( $n=71$ ) had a documented diagnosis of CAD and 40.3% ( $n=104$ ) were on aspirin. Of the patients who were not on aspirin ( $n=154$ ), 6% ( $n=10$ ) had a documented allergy or contraindication and 29% ( $n=44$ ) were on another antithrombotic or anticoagulant. Of the patients with severe CACs, 73% ( $n=43$ ) were on aspirin or another antithrombotic and 48% ( $n=28$ ) had a documented diagnosis of CAD.

#### CONCLUSION

A large subset of patients with coronary artery calcifications incidentally noted on CT do not have documented CAD and are not being adequately treated with antithrombotic therapy according to the newest ACO guidelines. By acting upon this information, radiologists can facilitate early preventative care of coronary artery disease and improve adherence to the ACO guidelines regarding management of patients with ischemic vascular disease.

#### CLINICAL RELEVANCE/APPLICATION

Detection of incidental coronary artery calcifications identifies patients with undiagnosed coronary artery disease and who may benefit from aspirin/antithrombotic therapy according to ACO guidelines

### **SSE06-04 • Coronary Artery Calcification Is Often Overlooked in CT Pulmonary Angiograms of Patients with Suspected Pulmonary Thromboembolism**

**Omid Khalilzadeh MD, MPH (Presenter) ; Patrick C Johnson BS ; Robert A Novelline MD ; Garry Choy MD, MS**

#### PURPOSE

In patients with suspected pulmonary thromboembolism (PTE), coronary artery calcification (CAC) can be an incidental finding in CT pulmonary angiograms. We evaluated the frequency of under-reporting CAC and its association with acute coronary syndrome (ACS) diagnosis.

#### METHOD AND MATERIALS

Data of 469 consecutive patients suspected for PTE, who were referred to the emergency radiology department for CT pulmonary angiography, were reviewed. Radiology reports were rechecked and positive CAC findings were recorded. All CT pulmonary angiograms were re-evaluated by one radiologist and CAC findings were recorded. The rate of ACS and PTE as final diagnosis for that hospital admission was calculated. The association between CAC and ACS diagnosis was assessed in different subgroups of patients.

#### RESULTS

About 11.1% of patients had PTE and 43.8% had CAC. CAC was significantly higher in patients with ACS diagnosis than those without (56.2% vs. 40.4%;  $OR=1.9$ ). There was a strong positive association ( $OR=3.5$ ) between CAC and ACS in younger patients (age=45 in men, age=55 in women); those without PTE ( $OR=2.15$ ) and without cardiometabolic risk-factors ( $OR=3.8$ ). CAC was unreported in 45% of patients with positive CAC ( $n=98$ ). ACS was the final diagnosis in 31.6% of patients with unreported CAC. There was a significant association between CAC and ACS in patients with unreported CAC ( $OR=2.18$ ). This association was more prominent in the above subgroups.

#### CONCLUSION

CAC is often overlooked in emergency CT pulmonary angiograms. CAC is a significant predictor of ACS, particularly in younger patients, those without PTE and cardiometabolic risk-factors. Especially in these sub-groups, radiologists should assess CAC findings.

#### CLINICAL RELEVANCE/APPLICATION

This study encourages radiologists to more vigilantly look for CAC in emergency CT pulmonary angiograms. Particularly in younger patients, CAC is highly suggestive for ACS diagnosis.

### **SSE06-05 • Radiology Resident On Call Performance in the Diagnosis of Ectopic Pregnancy Compared to Examinations Performed by Board Certified Sonographers**

**Alan H Richman MD ; Cynthia L Wallentin MD (Presenter) ; Ichiro Ikuta MD, MMedSc**

#### PURPOSE

To evaluate the technical and interpretive skills of radiology residents in performing ultrasound exams for the emergent diagnosis of ectopic pregnancy.

#### METHOD AND MATERIALS

All emergency ultrasound exams ordered with a clinical suspicion of ectopic pregnancy were reviewed from 9/01/2011 to 12/31/2012. Out of 182 exams, 98 were performed by a resident with a resident preliminary report issued, and 84 were performed by an ultrasound technologist with a radiology attending final report. Sensitivity and specificity was calculated for radiology residents and ultrasound technologists with manual chart review as the gold standard. In a double-blind fashion, exams were graded for image quality with a 5-point Likert scale, and compared using a Cochran-Mantel-Haenszel test. Former residents were surveyed regarding whether the

technical skills acquired in their training benefited them in their fellowship and attending positions.

#### RESULTS

A total of 22 ectopic pregnancies were found upon chart review. Ectopic pregnancy sensitivity was 69% for residents and 67% for technologist/attending; specificity was 100% for both residents and technologist/attending. Overall image quality demonstrated no statistically significant difference between residents and technologists (Figure). Resident survey reveals that ultrasound technical training is considered a valuable acquired skill.

#### CONCLUSION

Radiology residents can be trained to emergently perform and correctly diagnose ectopic pregnancy on par with ultrasound technologists and radiology attendings with a similar sensitivity and specificity to published data for the initial ultrasound exam. The comparable image quality ensures a technically adequate exam to ensure patient safety. A survey of former residents reveals that ultrasound technical training is a valuable acquired skill in fellowship and attending positions. Consideration should be given to making ultrasound technical skills an integral part of a diagnostic radiology residency curriculum.

#### CLINICAL RELEVANCE/APPLICATION

No published study has evaluated the technical skills of radiology residents in performing emergent ultrasound exams in conjunction with the resident's contemporaneous interpretation of those studies.

### **SSE06-06 • Impact of Resident Training on Imaging Utilization: A Ten Year Perspective at a Level I Trauma Center**

**Bahman Sayyar Roudsari MD, PhD (Presenter) ; Kevin Psoter ; Jeffrey G Jarvik MD, MPH \***

#### PURPOSE

Little is known regarding utilization of computed tomography (CT) over the course of resident's training in a level I trauma center. In this study, we hypothesized that CT use is higher in early academic year (i.e. July-August) compared to the rest of the year, after adjustment for potential confounding variables, such as injury severity score, that could influence utilization rate.

#### METHOD AND MATERIALS

We linked Harborview Medical Center (HMC) trauma registry to the HMC billing department data from July 2000 to June 2010. Trauma registry included detailed information regarding patient demography, injury characteristics, trauma care and outcome. Billing data included detailed information on type and frequency of different body region CTs performed during hospitalization. Number of all CTs, CT head, thorax, abdomen and pelvis were the main outcomes evaluated. The primary exposure of interest was admission in July-August vs. the remainder of the year. Negative binomial regression was used to evaluate the association between month of the year and CT use, adjusting for age, gender, race/ethnicity, year of admission, mechanism and severity of injury, length of hospitalization, ICU admission, and final disposition.

#### RESULTS

From 2000-2010 a total of 57,544 trauma admissions were recorded. The mean age of the patients was 38 years and 71% were male. On average the patients were hospitalized for 7 days. On average patients underwent 2.9 CTs during hospitalization and the most commonly performed studies for these patients were head (1.1 CTs/person), pelvis (0.5 CTs/person), abdomen (0.4 CTs/person), and thorax (0.2 CTs/person).

Patients admitted in July-August underwent slightly higher rate of abdomen (IRR: 1.06; 95% CI: 1.02-1.10), pelvis (IRR: 1.06; 95% CI: 1.02-1.10), and thorax (IRR: 1.06; 95% CI: 1.00-1.12) CTs. No differences were observed for head or extremity CTs.

#### CONCLUSION

We found that CT chest, abdomen and pelvis were slightly more common at the beginning of the academic year after adjusting for potential confounders. This could be partially due to the limited experience of new residents on trauma service. Our ongoing project further characterizes the factors associated with such observations.

#### CLINICAL RELEVANCE/APPLICATION

Limited experience of new residents on trauma service could be associated with higher utilization of CT for trauma patients.

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### **ISP: Health Service, Policy and Research (Practice and Medical Management)**

**Monday, 03:00 PM - 04:00 PM • S102D**



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**SSE12 • AMA PRA Category 1 Credit™:1 • ARRT Category A+ Credit:1**

#### **Moderator**

**Aine M Kelly , MD**

#### **Moderator**

**Gelareh Sadigh , MD**

**SSE12-01 • Health Service, Policy and Research Keynote Speaker: Medical Management**

**Aine M Kelly MD (Presenter)**

**SSE12-02 • The VAncouver workLoad Utilization Evaluation (VALUE) Study of Radiologists**

**Del Dhanoa MD (Presenter) ; Savvas Nicolaou MD ; Kirsteen R Burton MD, MBA**

#### PURPOSE

The purpose of the study is to characterize the workload of on-site hospital radiologists. Our hypotheses are that during the course of a typical work day: 1) hospital radiologists perform a wide number of duties; and 2) radiologists experience a significant number of value based interactions which directly influence patient care.

#### METHOD AND MATERIALS

A multicenter, randomized prospective observational study was performed across 1 month of observation of 14 staff radiologists at 3 independent hospital facilities. The subjects were prospectively observed to characterize the workload activities performed during dayshifts. One of the hospitals is a tertiary care academic institution and the other two hospitals are community based hospitals within the Greater Vancouver area. Interruptions were defined as: 1) simple interruptions and 2) break in tasks. A simple interruption is an event that briefly takes the physician away from his current activity but does not cause the physician to switch to a new activity. A break in task as an event that lasts greater than 10 seconds and causes the physician to switch tasks. Interruption types and frequencies were also categorized during this study.

#### RESULTS

Radiologists spent 36.4% of their time on image interpretation. The proportion of non-interpretative tasks was 43.8% which includes activities such as protocolling requisitions, supervising and monitoring studies, image guided procedures, consulting with physicians and direct patient care. Total clinical productivity was 87.7% and radiologists experienced on average 6 interactions per hour with other health personnel, over 81.2% which directly influenced patient care in real time. The total clinical productivity of a radiologist is 87.7%.

#### CONCLUSION

Radiologists spend a considerable amount of time servicing referring physicians and patients by performing tasks beyond image interpretation. Almost half of the radiologist's work day is spent on critical clinical activities separate from image interpretation which

drive the medical imaging department. The radiologist's total clinical productivity is 87.7%.

#### CLINICAL RELEVANCE/APPLICATION

The on-site added value radiologists deliver suggests that radiologists are central figures in the medical imaging department who are difficult to replace by off-site or non-radiologist image inter

### **SSE12-03 • Protocol Driven Ultrasound: An Effective Method to Improve Efficiency in an Ultrasound Department**

**Rupan Sanyal MD (Presenter) \* ; Aimen Ismail ; Benjamin R Kraft ; Mark E Lockhart MD ; Lauren F Alexander MD ; Timothy M Beasley PhD ; Michelle L Robbin MD \***

#### PURPOSE

Ultrasound is operator dependent and although each department has guidelines, a wide variation in image acquisition between studies is often seen. Ultrasound protocols are preset pathways for each study in the machine which, when launched, guide the sonographer through the mandated views for the study. The purpose of this study is to evaluate the impact of implementation of protocol-driven ultrasound on the efficiency of performing carotid Doppler studies.

#### METHOD AND MATERIALS

IRB approved/HIPAA compliant retrospective study of consecutive patients evaluated carotid Doppler ultrasounds before and after incorporation of protocols into the ultrasound machines at the outpatient facility of a tertiary care hospital. Duration of examination and number of images obtained by five experienced sonographers for 219 consecutive carotid Doppler studies before and 218 studies after implementation of protocol-driven ultrasound were calculated and compared using ANOVA test.

#### RESULTS

After implementation of protocol driven ultrasound, there was a significant 12.5% reduction in duration of carotid Doppler studies (p

#### CONCLUSION

Implementation of protocol driven ultrasound is an effective tool which streamlines image acquisition and significantly improves efficiency in an ultrasound department.

#### CLINICAL RELEVANCE/APPLICATION

Protocol driven ultrasound is an effective method of improving efficiency in an ultrasound department and its implementation is recommended.

### **SSE12-04 • Improving the Patient Experience: Communication Is Keystone for Optimizing the Outpatient Imaging Experience**

**Garry Choy MD, MS (Presenter) ; William Barron ; Sharon Gibson ; George Desko ; Barbara Hubley ; Jae Lee ; Efren J Flores MD ; Giles W Boland MD ; Gloria M Salazar MD ; David A Rosman MD \***

#### PURPOSE

Obtaining patient feedback holds significant potential in improving the quality of care for patients in radiology. The goal of this study aims to better measure patient experience in our department. We set forth to better characterize factors that impact overall patient satisfaction levels and identify key opportunities for improvement.

#### METHOD AND MATERIALS

We deployed a 13-question multiple choice and free text survey to patients who visited three outpatient imaging centers in our practice to obtain feedback on our services. We accepted responses via an electronic survey or handout. Multiple choice and free text responses were both analyzed in detail.

#### RESULTS

We received 786 responses from patients in the outpatient setting over a 5 month time period. The three indicators in which our patients were the least satisfied were: (1) communication of wait times, (2) detailed explanation of exam, and (3) staff introductions of themselves. In contradistinction patients noted outstanding performance in: (1) convenience of imaging center location, (2) cleanliness of facilities, and (3) staff friendliness. Over 98% of respondents also indicated they would refer a family, friend, or colleague.

#### CONCLUSION

While quality of imaging interpretation and aesthetics of facilities are important to an imaging center's success, a key issue identified by patients centers around communication issues. Specifically, this study provides evidence that there is a need for proper communication of wait times, explanation of exam, and staff introductions.

#### CLINICAL RELEVANCE/APPLICATION

Patient satisfaction in medical imaging setting can be improved through better communication with patients, particularly regarding staff introductions, explanation of examinations, and wait times.

### **SSE12-05 • Using a Safety Metric to Measure the Success of a Program to Manage the Utilization of Advanced Diagnostic Imaging**

**Mark D Hiatt MD,MBA (Presenter) \* ; Timothy R Johnstad MBA \* ; Brock A Oxford MPH \***

#### PURPOSE

In the context of recent concerns about inappropriate utilization of advanced diagnostic imaging (ADI) and the associated deleterious effects of excessive radiation exposure, a radiology benefit management company (RBM) implemented a program to assist a state Medicaid plan manage the use of outpatient ADI, encouraging the withdrawal of inappropriate requests or change to a more appropriate modality (such as ultrasound or MRI in lieu of CT when indicated). This study investigated the feasibility of using an innovative means to frame the importance of this initiative in terms of its safety impact, measuring the performance of the program by how well it reduced ionizing radiation delivered, as opposed to reducing costs incurred.

#### METHOD AND MATERIALS

The RBM instituted a program to manage ADI for the New York State Medicaid program on April 11, 2011. The results were analyzed, using Consults per Thousand Members as a proxy for utilization from inception through February 28, 2013, comparing program performance to pre-implementation claims data from 2010. Managed modalities included CT, CTA, MRI, MRA, cardiac nuclear medicine (CNM), and PET. The radiation reduced was expressed in terms of net milliSieverts (mSv), chest x-ray equivalents (CXREs), and cigarettes smoked (cigs) spared using consistently applied conversion factors. (A CXRE is the radiation exposure from 1 chest radiograph in the posteroanterior dimension.)

#### RESULTS

Utilization management of 115,977 procedure requests for an average covered membership of 725,012 over the course of the study resulted in a 36% reduction in radiation exposure overall, with the radiation spared equivalent to the avoidance of approximately 135 thousand mSv, 6.75 million CXREs, or 2.74 billion cigs.

#### CONCLUSION

Using a safety metric, such as radiation exposure reduced expressed in various forms that may be meaningful to patients, is a feasible means of measuring the performance of a program to manage the utilization of ADI. The success of such an endeavor may be assessed by the extent to which it spares patients unnecessary radiation through encouraging either withdrawals or changes to other exams as appropriate. In the case of the studied initiative, radiation exposure was reduced by 36% overall.

#### CLINICAL RELEVANCE/APPLICATION

Utilization management programs may feasibly use safety metrics as measurements of their performance.

## SSE12-06 • Patients Prefer the Current Model of Results Delivery, though Many Would Like Access to Their Reports

**Miguel C Cabarrus MD (Presenter) ; David M Naeger MD ; Alexander Rybkin MD ; Aliya Qayyum MBBS \***

### PURPOSE

To assess outpatients' preferences for receiving imaging results and to assess their knowledge regarding the role of radiologists.

### METHOD AND MATERIALS

This Institutional Review Board-approved study surveyed patients from an academic medical center and a county hospital over a four-week period. Voluntary, anonymous surveys were given to all English speaking, adult outpatients undergoing CT or MRI. The survey assessed patients' preferred delivery method for radiology results and their understanding of radiologists' education and role. Differences were assessed with Fisher's Exact or chi-squared tests with a significance level of 0.05.

### RESULTS

573 completed surveys were received, representing a response rate of 24%. 360 (63%) of patients preferred the usual model of communication through their referring physician, though 155 (27%) of them also wanted a copy of their report. 212 (37.0%) patients preferred a model in which radiologists communicated the results in person or over the phone in a timely manner, including the possibility of receiving a copy of the report. There were no significant differences between county and academic medical center patients ( $p=0.57$ ). If reports were made available, patients expressed an equal interest in mail, email and online portal options (38%, 31%, and 32%, respectively), though the county hospital patient subset preferred mail (60%,  $p$

### CONCLUSION

Most patients preferred the current model of result delivery in which ordering providers relay results, though many patients expressed an interest in directly receiving their reports as well. Our study also demonstrated limited awareness of our profession amongst patients.

### CLINICAL RELEVANCE/APPLICATION

Patient interest in receiving copies of their reports may represent an opportunity for radiologists to increase our communication with patients and to raise awareness of our field.

## Maximizing Space Planning in an Era of Diminishing Resources (Sponsored by the Associated Sciences Consortium) (An Interactive Session)

**Monday, 03:30 PM - 05:00 PM • S105AB**



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**MSAS24 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5**

### Moderator

**Morris A Stein**, BArch

**Morris A Stein**, BArch

**Bill Rostenberg**\*

**Steven C Horii**, MD \*

### LEARNING OBJECTIVES

1) Learn how to balance rising space demands with work flow and performance improvement expectations. 2) Review examples of how hospitals and outpatient providers have deleivered increased imaging needs while limiting increased space and new construction. 3) Understand the growing interventional nature of Radiology and what it means for project design teams. 4) Learn how to implement reading and information strategies that work.

### ABSTRACT

Planning today's healthcare environment continues to face significant, yet often conflicting determinants. These include providing new technology or expanded use, the need to accommodate greater levels of patient care quality, rising numbers of exams, all within a context of limited tonew new space, inappropriate space, and funding restraints. When new projects are proposed, they are often simply larger collections of the same thing.

This refresher course will discuss how to plan for rapid change within the context limited physical and financial resources, considering operational improvement and process implementation where flow matches function. Let's look at how to get the most out of what we have.

Speakers will cover these three specific topics: 1. Balancing rising space demands with work flow and performance improvement. 2. The growing interventional nature of Radiology and what it means for project design teams. 3. State of the art reading and information strategies that work.

## Special Interest Session: Planning for the Future Radiology Workforce: Too Many or Too Few?

**Monday, 04:30 PM - 06:00 PM • N228**



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**SPSI23 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5**

### Director

**Carolyn C Meltzer**, MD \*

### LEARNING OBJECTIVES

1) Identify the current workforce distribution of radiologists in the US. 2) Examine the many variables that may influence future workforce planning for radiology. 3) Appraise the complexity of the effects of health care reform on radiology.

### ABSTRACT

This workshop will provide attendees with a better understanding of the NIH grant review process from the perspective of those who have served on review committees in order to better prepare them for submitting and resubmitting proposals and to encourage them to serve as reviewers. If you think like a reviewer, you can be a better grant writer! Although there is a significant amount of information available on how to write NIH grants and how the review process works, many investigators (new and experienced) often have questions that are best answered directly in person by those who have first-hand experience.

## SPSI23A • Introduction and Overview of Issues

**Carolyn C Meltzer MD (Presenter) \***

### LEARNING OBJECTIVES

View learning objectives under main course title.

## SPSI23B • ACR 2013 Workforce Survey

**Edward I Bluth MD (Presenter)**

### LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

The results of the ACR 2013 Workforce Survey will be presented and discussed.

URL

**SPSI23C • Our Changing Health Care World: Factors Influencing the Need vs Surplus of Radiologists**

**Cheri L Canon MD (Presenter) \***

LEARNING OBJECTIVES

View learning objectives under main course title.

**SPSI23D • Is Radiology Still an Attractive Field: A Program Director's Perspective**

**Mark E Mullins MD, PhD (Presenter)**

LEARNING OBJECTIVES

View learning objectives under main course title.

**SPSI23E • Going Forward: Is There a Formula for Success**

**Jocelyn D Chertoff MD (Presenter)**

LEARNING OBJECTIVES

View learning objectives under main course title.

**SPSI23F • Panel Discussion/Q and A**

**Carolyn C Meltzer MD (Presenter) \* ; Edward I Bluth MD (Presenter) ; Cheri L Canon MD (Presenter) \* ; Mark E Mullins MD, PhD (Presenter) ; Jocelyn D Chertoff MD (Presenter) ; Shawn D Teague MD (Presenter) \***

LEARNING OBJECTIVES

View learning objectives under main course title.

**Hot Topics in Malpractice Litigation 2013: Communication of Radiologic Findings and Common Medicolegal Issues in Body Imaging**

**Tuesday, 08:30 AM - 10:00 AM • S403A**

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**PR**

**HP**

**RC327 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5**

**Leonard Berlin , MD  
Jonathan W Berlin , MD \***

LEARNING OBJECTIVES

1) Understand the importance of communicating radiologic findings to healthcare providers responsible for the care of patients. 2) Briefly review the American College of Radiology Communication Guidelines. 3) Review common medical legal pitfalls in body imaging, including suboptimal technique and search pattern.

ABSTRACT

Allegations of radiology negligence continue. This course will review a common but occasionally misunderstood source of malpractice allegation -- failure to communicate radiologic findings on exams that may have been interpreted correctly by the radiologist. The American College of Radiology Communication Guidelines will be discussed, and examples will be presented which illustrate potential communication breakdown between healthcare providers. The course will also discuss and illustrate common medical legal pitfalls in body imaging, including suboptimal technique and search pattern.

**ISP: Health Service, Policy and Research (Economic Analyses and Utilities)**

**Tuesday, 10:30 AM - 12:00 PM • S102D**

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**HP**

**SSG07 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5**

**Moderator  
Pari Pandharipande , MD, MPH  
Moderator  
Janie M Lee , MD \***

**SSG07-01 • Health Service, Policy and Research Keynote Speaker: Metrics of Value in Imaging**

**Pari Pandharipande MD, MPH (Presenter)**

**SSG07-02 • Who Is Medicare Paying for Medical Imaging: An Analysis of Great Regional Variation in Payments to Radiologists vs. Non-Radiologists**

**David A Rosman MD (Presenter) \* ; Eugene Nsiah ; Danny Hughes PhD ; Richard Duszak MD**

PURPOSE

An understanding of who is performing and interpreting imaging examinations will be critical to healthcare reform: 1) for aligning incentives to maximize value in payment policy development and 2) for appropriately approaching risk from a group and health system perspective. We sought to study regional variation in Medicare Physician Fee Schedule (MPFS) payments on diagnostic imaging services to radiologists vs. non-radiologists.

METHOD AND MATERIALS

Using a 5% random sample of all approximately 32 million Medicare Part B beneficiaries in 2011, total spending was calculated on a state-by-state and US Census Bureau regional basis for all MPFS-covered diagnostic imaging services. Regional variation was analyzed.

RESULTS

Mean national diagnostic imaging per beneficiary spending was \$220.37, with an average \$95.43 (43.3%) to radiologists and \$124.95 (56.7%) to non-radiologists. The percentage of spending on non-radiologists ranged from 35.5% (North Dakota) to 71.0% (South Carolina). The percentage of total MPFS payments for diagnostic imaging to non-radiologists exceeded those to radiologists in 71% of states and in every Census Bureau region. Relative percentage of total MPFS payments to non-radiologists were highest in the South (61.2%) and lowest in the Northeast (50.8%). Overall payments to non-radiologists were less than 40% in only 2 states, but greater than 60% in 11 states.

## CONCLUSION

Nationally, 56.7% (range 35.5% to 71.0% by state) of MPFS payments for diagnostic imaging services are made to non-radiologists. Although this varies substantially by region, non-radiologists claim a majority of MPFS payments for diagnostic imaging in every Census Bureau region and in 71% of all states. Payment policy directed toward medical imaging needs to consider all provider groups and their roles in the imaging chain. Majority spending on non-radiologists may have significant implications in developing bundled and capitated payment models.

## CLINICAL RELEVANCE/APPLICATION

MPFS payments for diagnostic imaging to non-radiologists exceed those to radiologists in 71% of states. Payment policies and at risk contracts must integrate this fact to accurately align incentives.

### SSG07-03 • Medicare Spending on Medical Imaging Varies Greatly between States

**David A Rosman MD (Presenter) \*** ; **Eugene Nsiah** ; **Danny Hughes PhD** ; **Richard Duszak MD**

#### PURPOSE

To study regional variation in per beneficiary Medicare Physician Fee Schedule (MPFS) spending on diagnostic imaging services in relation to that for all healthcare services.

#### METHOD AND MATERIALS

Using a 5% random sample of all approximately 32 million Medicare Part B beneficiaries in 2011, total spending was calculated on a state-by-state and US Census Bureau regional basis for all MPFS-covered diagnostic imaging services. Regional variation was analyzed.

#### RESULTS

Mean diagnostic imaging per beneficiary spending was \$197.08 ( $\pm 62.96$ , range \$98.79 in Hawaii to \$368.83 in New Jersey), with 13 states \$250. Mean total MPFS per beneficiary spending was \$2,102.29 ( $\pm 486.76$ , range \$1,175.76 in Hawaii to \$3,536 in New Jersey) with 4 states \$2,500. Mean total and diagnostic imaging spending were both higher in the South and Northeast (\$236.21 and \$2,412.84 and \$201.37 and \$2,191.11, respectively) than the Midwest and West (\$168.75 and \$1,979.44 and \$169.10 and \$1,748.10). Overall, diagnostic imaging comprised 9.8% of total MPFS spending ( $\pm 1.2\%$ , range 6.8% in Vermont to 12.3% in Nevada), with 7 states 11.0%.

#### CONCLUSION

MPFS spending on diagnostic imaging services per beneficiary varies 3.7-fold between states. Spending on all healthcare services varies 3.0-fold. The percentage of spending on diagnostic imaging to total spend varies 1.8-fold. Regional variation in total healthcare and diagnostic imaging utilization is large, creating opportunities for improved utilization management, particularly in the context of emerging shared risk and savings payment models.

#### CLINICAL RELEVANCE/APPLICATION

Marked variation in MPFS spending on diagnostic imaging and total health services creates opportunities for utilization management and empowers shared risk and savings payment models.

### SSG07-04 • Nationwide Medicare Data Show the End of Growth in Utilization Rates of Advanced Imaging

**David C Levin MD (Presenter) \*** ; **Vijay M Rao MD** ; **Laurence Parker PhD** ; **Andrea J Frangos MPH**

#### PURPOSE

Anecdotal reports from various sources have suggested that advanced imaging is no longer growing. Our purpose was to determine the correctness of this perception by studying recent trends in utilization rates of CT, MRI, and nuclear medicine, using a nationwide database.

#### METHOD AND MATERIALS

The Medicare Physician/Supplier Procedure Summary Master Files for 2000-2011 were used. These files cover all Medicare beneficiaries in traditional fee-for-service Medicare (36.3 million in 2011). All CPT codes for CT, MRI, and nuclear medicine (including PET) were selected except those for guidance for invasive procedures and for radiation therapy planning. Procedure volumes in the 3 modalities were determined by tabulating global and professional component claims. Utilization rates per 1000 beneficiaries were calculated and tracked from 2000 through 2011.

#### RESULTS

The CT utilization rate per 1000 rose from 325 in 2000 to a peak of 637 in 2009 (+96%). In 2010, for the first time, a small drop in the rate was seen, to 626. In 2011 a large drop to 500 occurred. This was mostly attributable to bundling of the codes for CT of the abdomen and pelvis. The nuclear medicine rate per 1000 rose from 193 in 2000 to a peak of 320 in 2006 (+66%). There was a gradual and slight decline over the next 3 years, to 303 in 2009. In 2010, there was a sharp decline to 135, which was primarily due to bundling of the codes for primary myocardial perfusion imaging and its 2 add-on codes for left ventricular wall motion and ejection fraction. A further decline to 128 occurred in 2011. The MRI rate rose from 95 in 2000 to 185 in 2006 (+95%). The rate thereafter remained essentially flat, and was 184 in 2011. No code bundling occurred in MRI.

#### CONCLUSION

The rapid growth that was seen in use of advanced imaging in the early part of the last decade has stopped. Sharp declines were seen in CT in 2011 and nuclear medicine in 2010, due primarily to code bundling. However, even before then, growth in those 2 modalities had halted. In MRI, where no bundling occurred, growth stopped after 2006. The cause of the cessation of growth is multifactorial.

#### CLINICAL RELEVANCE/APPLICATION

Not applicable.

### SSG07-05 • Cost Implications for Following Nationally Recommended Best-practice Follow-up Guidelines for Adrenal Lesion Characterization Detected by CT

**David A Rosman MD (Presenter) \*** ; **Tarik K Alkasab MD, PhD** ; **Anand M Prabhakar MD** ; **Daniel I Rosenthal MD** ; **Keith J Dreyer DO, PhD \*** ; **Debra A Gervais MD \*** ; **Giles W Boland MD**

#### PURPOSE

In an attempt to reduce variation and improve outcomes, the ACR developed consensus best-practice guidelines for evaluating adrenal lesions detected at CT. However the cost implications of implementing these guidelines has not been evaluated. We have also separately presented poor compliance with these guidelines, which can substantially improve using a point-of-care clinical decision support tool (CDS) built upon the ACR recommendations. We evaluated the financial cost implications when radiologists adhered to these guidelines using a CDS tool when compared to recommendations without use of the tool.

#### METHOD AND MATERIALS

33,352 consecutive abdominal CT examinations were performed January 1 through October 23, 2012. Those

#### RESULTS

510 adrenal lesions (209 adenomas, 230 Indeterminate lesions and 71 other) were identified. Without the CDS tool, overall imaging recommendation rates for further workup were 29% (147/510) compared to 66% (339/510) when using the CDS tool. Our clinical recommendation rate is 7.6% without the tool compared to 72% with the CDS tool. Excessive recommendations for f/u were made in

Cost implications included:

Cost of non contrast abdomen CT (74150 code - \$232.48). Cost of abdomen CT W/WO (74170 code - \$419.34)

Total cost in 147 patients of radiologist imaging recommended f/u without CDS: \$57,440.82.

Total cost with CDS imaging f/u: \$121,788.52 Cost of recommended endocrine consultation (99204 code - \$158) and two follow-up exams (99214 - \$99): \$11,748 without CDS and cost with CDS for endocrine consult: \$130,652.

## CONCLUSION

Compliance with nationally accepted best practice algorithms for adrenal lesion workup leads to an increase in cost of 264% due to the greater number of imaging and biochemical recommendations.

## CLINICAL RELEVANCE/APPLICATION

Consistently following departmental guidelines for adrenal lesion characterization would increase the imaging cost of evaluating patients with adrenal lesions. The effect on outcomes is not known.

### SSG07-06 • The Value of Imaging: The Primary Care Physician Perspective

**Christine Hughes** (Presenter) \*

#### PURPOSE

Measure the extent to which PCPs value advanced imaging (AI) modalities (MRI,CT,PET/CT) and to identify what the PCPs believe to be the benefits and drawbacks of AI.

#### METHOD AND MATERIALS

We worked with Harris Interactive, an independent polling firm to conduct 42 qualitative interviews with PCPs in April and May of 2011, to begin the process of defining the value of imaging and assigning metrics. A quantitative Internet survey of 500 PCPs was administered in July and August of 2012. To qualify as respondents PCPs were required to meet the following criteria: practice in the US, duly licensed in the state where practicing, General Practice, Family Practice or Internal Medicine as specialty, practice in mostly office or clinic-based setting, spend at least 75% of time in direct patient care, and see at least 1 patient for whom an advanced imaging study is appropriate in a typical month. Final results were weighted to be representative of the AMA universe based on gender, years in practice, region and specialty.

#### RESULTS

Primary Care Physicians believe imaging provides value. Ninety percent (90%) of the survey respondents agreed that AI allows them to be more confident in their diagnoses, and AI provides unique data that is otherwise not available, 89% believe AI allows them to make better clinical decisions and increases their confidence in treatment choices. Statistically significant differences occurred between age groups. More experienced physicians who were likely to have practiced without ready access to AI placed a higher value on AI than younger physicians. Whereas, younger physicians were more likely to view AI in as a tool in practice efficiency than older physicians.

#### CONCLUSION

There is no question of perceived value of advanced imaging: PCPs agree AI allows them to be more confident in diagnoses, provides unique data, and assists with clinical decision making and treatment choices.

#### CLINICAL RELEVANCE/APPLICATION

The partnership between PCPs and Radiologists will be bolstered with a deeper understanding of the perceived benefits and drawbacks of advanced imaging.

### SSG07-07 • Emergency Radiology Utilization at a Level 1 Trauma Center from 1996-2012

**Vignesh A Arasu MD** (Presenter) ; **Garry Choy MD, MS** ; **Hani H Abujudeh MD, MBA \*** ; **Elkan F Halpern PhD \*** ; **James H Thrall MD \*** ; **Robert A Novelline MD** ; **Paul D Biddinger MD**

#### PURPOSE

To retrospectively review growth rate in emergency radiology volume at an academic level 1 trauma center in a major urban city from 1996-2012.

#### METHOD AND MATERIALS

We reviewed our institution's computer database on aggregated diagnostic radiology examination volume ordered for patients visiting our emergency department (ED) from January 1, 1996 to December 31, 2012. Changes in exam coding were manually reviewed and corrected to ensure accuracy. The growth rate in volume was calculated as the average annual percent change in imaging examinations per 1000 ED visits. We statistically compared the growth rate to zero annual growth during 1996-2003 and 2003-2012 using z-test.

#### RESULTS

Both ED visits and imaging volume grew continuously throughout 1996-2012. When adjusting for ED visits, statistically significant growth of total imaging was observed from 1996-2003 at 8% per year (SD 6%,  $p < 0.01$ ), while no significant growth was seen from 2003-2012 at 2% per year (SD 3%,  $p = 0.96$ ). By modality, statistically significant growth was observed in CT and MRI from 1996-2003, and no significant growth from 2003-2012. X-ray showed no growth throughout 1996-2012. Ultrasound grew significantly during 1996-2003 at 12% per year (SD 10%,  $p < 0.01$ ), and during 2003-2012 at 4% per year (SD 7%,  $p < 0.05$ ). By anatomic region, no significant growth was observed from 2003-2012 for head and neck, abdomen and pelvis, chest, and extremity.

#### CONCLUSION

We observed a stable period of practice patterns for utilization of overall ED imaging, and specifically of CT and MRI, during the last 9 years at our institution. This is likely due to slowing of new imaging protocols during this time period, introduction of decision support systems, and increased awareness of practice guidelines and radiation risk among ED physicians. While the national health care discussion focuses on continual imaging growth, we demonstrate long-term stability in utilization of ED imaging is achievable.

#### CLINICAL RELEVANCE/APPLICATION

During the last 9 years at our institution, we have observed no significant growth in the overall utilization of imaging in the ED when adjusting for increasing ED visits.

### SSG07-08 • Developing and Maintaining Imaging Volumes in Outpatient Radiology: The Impact of Direct Radiologist Interaction

**Joseph Vavricek MD** (Presenter) ; **Laurent Grignon MD \*** ; **William W Horsley MD** ; **Raymond A Murphy MD, PhD** ; **Mark D Keiper MD**

#### PURPOSE

Direct sales and marketing efforts to referring clinicians may have a profound effect on referral patterns. This study was performed to assess the relative effect of direct radiologist participation in marketing and sales efforts on the development and maintenance of referral volumes in outpatient imaging.

#### METHOD AND MATERIALS

Monthly referral volumes of CT and MRI scans ordered by 19 referring clinicians to an outpatient imaging practice were collected over a 6 month period (January-June) in three sequential years. Data was collected in these months to control for seasonal variation. During the first 6 month period, a radiology sales representative visited the referring clinicians twice a month to provide basic support, substantive educational material and personal interaction with the clinicians. During the second 6 month period, the same sales representative visited referring clinicians' offices every two weeks but accompanied by a radiologist as a team once a month. The radiologist and sales representative provided educational lectures, technical expertise and substantive personal interactions. During the final 6 month period, the sales representative visited the referring clinicians twice a month without a radiologist. No significant changes in radiology practice service parameters occurred during the time periods studied.

#### RESULTS

The presence of a radiologist during the marketing and sales visits to referring clinicians had a positive statistically significant effect on overall scan volumes. During the time period in which the radiologist and sales representative visited clinicians, the number of CT and

MRI volumes increased as much as 2.5 times when compared with baseline. However, the referral volumes began to decrease for all providers approximately 1.5 months after the radiologist stopped visiting the clinicians. Additionally, the referral volumes returned to baseline levels approximately 5 months after the radiologist terminated visits.

#### CONCLUSION

Direct radiologist participation in marketing and sales efforts to referring clinicians is a robust tool for creating and maintaining scan volumes in outpatient radiology.

#### CLINICAL RELEVANCE/APPLICATION

Direct radiologist interaction with clinicians profoundly effects referral patterns and is recommended to help develop, maintain, and optimize outpatient radiology scan volumes.

### **SSG07-09 • Relationship of Ordering Physician MRI Equipment Ownership to the Frequency of Negative Cervical Spine MRI**

**Timothy J Amrhein MD (Presenter) ; Ben E Paxton MD ; Matthew P Lungren MD ; Heather R Collins PhD ; Ramsey K Kilani MD \***

#### PURPOSE

To determine if ownership of MRI equipment by ordering physicians influences the frequency of negative cervical spine MRIs, and to evaluate cervical spine MRI pathology rates as a metric for comparison of utilization.

#### METHOD AND MATERIALS

A retrospective review was performed of 500 consecutive cervical spine MRIs ordered by two separate referring physician groups serving the same geographic community. The first group (FI) owned the scanners used and received technical fees for their use. The second group (NFI) did not have financial interest in the scanners used. All exams were performed with identical protocols and interpreted by a single musculoskeletal radiology group without financial interest in the imaging equipment. Final reports were reviewed and exams with moderate or severe spinal canal stenosis, neuroforaminal narrowing, facet degeneration, or disk bulges were considered positive. The percentage of negative studies in each group was calculated and the number of concomitant shoulder MRIs was recorded. Among positive scans, the frequency of severe lesions per scan was calculated for each group. Chi-square tests were used for categorical data and t-tests (2-tailed) and ANCOVAs (covarying for age) were used on continuous data.

#### RESULTS

A total of 500 consecutive cervical spine MRIs that met inclusion criteria were reviewed (250 FI, 250 NFI). 164 were negative (109 FI, 55 NFI); there were 98% more negative scans in the FI group (p

#### CONCLUSION

Cervical spine MRIs referred by physicians with a financial interest in the imaging equipment used were significantly more likely to be negative than those referred by physicians with no financial incentive. Among the positive studies, there was no statistically significant difference in the number of severe lesions per scan suggesting a highly similar distribution and severity of disease between the two patient samples. Further, patients in the FI group were more likely to undergo concomitant shoulder MRI.

#### CLINICAL RELEVANCE/APPLICATION

MRI referral patterns may be affected by the presence of an ordering physician's financial interest in the imaging equipment used.

### **Health Services - Tuesday Posters and Exhibits (12:15pm - 12:45pm)**

#### **Tuesday, 12:15 PM - 12:45 PM • Lakeside Learning Center**

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HP

#### **LL-HPS-TUA • AMA PRA Category 1 Credit™:0.5**

**Host**

**Paul P Cronin , MD,MS**

**Host**

**Pari Pandharipande , MD, MPH**

#### **LL-HPS-TU1A • The Right Tools for the Job: Can Smaller Contrast Agent Packaging Improve the Cost Effectiveness of Performing MR Arthrography in a Busy Musculoskeletal Division?**

**Sandra Rutigliano MD (Presenter) ; Adam C Zoga MD ; Andrea J Frangos MPH ; William B Morrison MD \***

#### PURPOSE

Given the packaging of gadolinium-based contrast agents currently available in our department, 4.8-19.8 ml is wasted per MR arthrogram. We sought to establish the potential savings if Gd-based contrast became available in a packaging size more suitable for use in direct MR arthrography.

#### METHOD AND MATERIALS

The number of MR arthrograms performed in our MSK division from 7/1/11 to 6/30/12 was tallied. The contrast cost for each exam was calculated based upon the contrast agent, packaging and pricing specific for each site. The amount of waste was also estimated.

We then examined 2 potential packaging changes:

1. Multi-dose vial to be used for all arthrograms in a single day, then discarded at the end of the day. (est. 5ml, \$20)
2. Single dose vial more appropriately sized for MR arthrography. (est. 0.5ml, \$5)

#### RESULTS

Within our MSK division, MR arthrography is performed in 4 settings: 69% at an academic hospital (TJUH), 2% at a community hospital (MHD) and 29% at 2 outpatient IDTFs (CMIL and JOIEN). Depending on location, 3 distinct contrast agents in 4 different sizes and prices are used. Price per dose ranged from \$30-\$93. Each arthrogram required 0.15-0.2 ml of contrast, leaving 96-99% of the original volume to be discarded. From a total of 707 exams, nearly 10 L of Gd-based contrast were discarded in 1 year. Our institution spent over \$29,000 on Gd-based contrast for MR arthrography, of which 96-99% ended up in the trash. Solution 1: If a multi-dose vial were available, the volume of contrast wasted per year would decrease to 1.3 L (from approx. 10 L). This would result in a savings of \$22,089 (76%). Solution 2: If a small single dose syringe were available, the amount of savings would be directly proportional to the number of examinations performed. This option results in the most savings, \$25,594 overall (88% reduction in cost for all centers combined). The amount of waste would be 0.3 ml per exam (from 4.8-19.85).

#### CONCLUSION

Available packaging for Gd-based contrast agents is disproportionately oversized for use in MR arthrography, resulting in excess waste and expense. More reasonable packaging would significantly reduce costs for imaging centers, hospitals, and ultimately, patients.

#### CLINICAL RELEVANCE/APPLICATION

More appropriately sized packaging of gadolinium-based contrast for use in MR arthrography would save our institution \$29,000, which could have significant economic impact in widespread application.

#### **LL-HPS-TU2A • Preparing Radiology for Future Bundled Inpatient Hospital Service Payments: A National Analysis of Medicare Part Spending on Medical Imaging**

**David A Rosman MD (Presenter) \* ; Nadia Bilal ; Danny Hughes PhD ; Richard Duszak MD**

## PURPOSE

As healthcare payment systems evolve from traditional fee for service to various bundled payment methodologies, much attention is focused on inpatient hospital episodes. Little is known, however, about the appropriate allocation of spending on medical imaging in such models. We seek to identify allocation methodologies for radiology to understand its attribution of Medicare Part A dollars.

## METHOD AND MATERIALS

Using a 2011 5% national random sample of Medicare fee for service beneficiaries, we examined inpatient claims by all 744 Medicare Severity Diagnosis Related Groups (MS-DRGs) in our data set. We estimated both total charges and imaging charges for each MS-DRG and estimated both the average charge and average imaging charge per claim in each MS-DRG. Using this data, we derived the ratio of imaging charges to total charges between and within each inpatient MS-DRG. We identify the top 10 MS-DRGs by total dollars, by total dollars attributed to imaging, and by highest percentage of dollars to imaging.

## RESULTS

Analysis yielded 744 unique MS-DRGs and 319,125 unique beneficiaries associated with 527,506 unique inpatient claims. Imaging spend accounted for \$1.9BB or 7.56% of the total spend of \$25.8BB. The top 10 services by total spend account for \$5.4BB or 20.76% of total spend for all DRGs, but imaging accounted for only 4.16% (\$223MM) of these. The top 10 services by imaging spend accounted for \$2.9BB or 11.3% of total spend, but imaging accounted for only 11.9% (\$347MM) of these. The top 10 services by imaging share in the MS-DRG accounted for only 0.81% (\$208MM) of the total spend, but imaging accounted for 28.95% (only \$60MM) of these.

## CONCLUSION

Little is currently known about how MS-DRG spending is attributable to different specialty services for inpatient hospitalizations. While focusing on heavily imaging-weighted MS-DRGs may be tempting, our analysis demonstrates that this simplistic approach may be misguided. The top 10 MS-DRGs by overall imaging spend account for 5.8 times more dollars for imaging than the top 10 by percent share attributable to imaging. While only 4.16% of the total spend in the top 10 MS-DRGs is imaging-related, the bottom line impact of high spend services is profound.

## CLINICAL RELEVANCE/APPLICATION

Quantifying the share of imaging within MS-DRGs will be invaluable in accurately identifying the appropriate allocation of funds for medical imaging for inpatient hospitalization encounters.

## **LL-HPS-TU3A • Professional Efficiencies for Diagnostic Imaging Services Rendered by Different Physicians: Analysis of Recent Medicare Multiple Procedure Payment Reduction Policy**

**Richard Duszak MD (Presenter) ; Ezequiel Silva MD ; Angela Kim ; Robert M Barr MD ; William D Donovan MD ; Pamela Kassang ; Geraldine B McGinty MD ; Bibb Allen MD**

## PURPOSE

To quantify potential physician work efficiencies and appropriate Multiple Procedure Payment Reduction (MPPR) for different same-session diagnostic imaging studies interpreted by different physicians in the same group practice.

## METHOD AND MATERIALS

Medicare Resource Based Relative Value Scale data were analyzed to determine relative contributions of various pre-, intra-, and post-service physician diagnostic imaging work activities. An expert panel quantified potential duplications in professional work activities when separate examinations were performed during the same session by different physicians within the same group practice. Maximum potential work duplications for various imaging modalities were calculated and compared to those used as the basis for Centers for Medicare and Medicaid Services (CMS) payment policy.

## RESULTS

No potential intra-service work duplication was identified when different examination interpretations were rendered by different physicians in the same group practice. When multiple interpretations within the same modality were rendered by different physicians, maximum potential duplicated pre- and post-service activities ranged from 5.0% (radiography and fluoroscopy [RF] and nuclear medicine [NM]) to 13.6% (computed tomography [CT]). Maximum mean potential duplicated work Relative Value Units ranged from 0.0049 (RF) to 0.0413 (CT). This equates to overall potential total work reductions ranging from 1.39% (NM) to 2.73% (CT). Across all modalities, this corresponds to maximum Medicare professional component physician fee reductions of  $1.23 \pm 0.38\%$  (range 0.95% to 1.87%) for services within the same modality, well less than an order of magnitude smaller than those implemented by CMS. For services from different modalities, potential duplications were too small to quantify.

## CONCLUSION

While potential efficiencies exist in physician pre- and post-service work when same-session same-modality imaging services are rendered by different physicians in the same group practice, these are relatively miniscule, and have been grossly overestimated by current CMS payment policy. Greater transparency and methodological rigor in government payment policy development are warranted.

## CLINICAL RELEVANCE/APPLICATION

Current CMS MPPR policy grossly overestimates physician work efficiencies when same-session imaging services are rendered by different physicians in the same group practice.

## **LL-HPS-TU4A • Comparative Effectiveness of Contrast-enhanced CT versus Non-contrast Plus Contrast-enhanced CT in the Evaluation and Management of Patients with Hypervascular Liver Metastases: A Critically Appraised Topic**

**Gelareh Sadigh MD (Presenter) ; Kimberly E Applegate MD, MS ; Deborah A Baumgarten MD, MPH**

## PURPOSE

To critically appraise literature to evaluate whether addition of abdominal non-enhanced (NE)CT to contrast-enhanced (CE)CT improves liver mass detection, characterization or patient management for initial staging or follow-up of patients with known breast, melanoma, neuroendocrine or thyroid cancer.

## METHOD AND MATERIALS

A focused clinical question was constructed and the literature was searched using the patient, intervention, comparison, outcome (PICO) method comparing CECT vs. its combination with NECT for detection or characterization of liver metastases, the radiologists' confidence level, and detection of significant incidental findings in patients with breast, melanoma, neuroendocrine or thyroid cancer. Retrieved articles were appraised and assigned a level of evidence based on the Oxford University Centre for Evidence-Based Medicine hierarchy of validity for diagnostic studies.

## RESULTS

The retrieved diagnostic performance for different phases of CT for characterization of liver metastases showed sensitivity/specificity of 97%/76% for NECT, 97%/75% for arterial CT and 98%/76% for portal CT in patients with breast cancer (level 2 of evidence; reported in 1999); sensitivity of 96% (arterial and portal CT) vs. 100% (NECT, arterial and portal CT) in patients with melanoma (level 3 of evidence; reported in 1999); and sensitivity of 43% (portal CT) vs. 17% (NECT) in patients with neuroendocrine tumor (level 3 of evidence; reported in 2009). No primary study was found evaluating performance of CT phases in patients with thyroid cancer. Available evidence showed radiologists reported more conspicuous liver masses on CECT compared to NECT in patients with breast and neuroendocrine cancer; however, NECT was reported to add value to portal phase CT in 42% of patients with breast cancer.

## CONCLUSION

NECT adds only a small incremental value to CECT for detection/characterization of liver metastases. Further, addition of NECT increases patient's risk of exposure to radiation, and the time and cost of imaging interpretation. The role of adding NECT to CECT in confidence level of radiologists or characterization of significant incidental findings is less clear.

#### CLINICAL RELEVANCE/APPLICATION

A critical appraisal of literature shows addition of NECT to CECT for characterization of liver metastases in patients with breast, melanoma, neuroendocrine or thyroid cancer is of limited benefit.

### LL-HPS-TU5A • The Economic Value to a Health Plan of Certifying Imaging Provider Groups

**Mark D Hiatt MD, MBA (Presenter) \*** ; **Thomas W Wilson PhD, MPH \*** ; **Timothy R Johnstad MBA \***

#### PURPOSE

To assess the economic value to a health plan of certifying imaging provider groups by examining their costs before and after certification.

#### METHOD AND MATERIALS

Paid claims from a national health insurance plan (with subscribers in all 50 states) on procedure codes related to imaging (bone densitometry, CT, fluoroscopy, mammography, MR, nuclear medicine, PET, plain film, SPECT, and ultrasonography) with dates of service between 1/1/2005 and 9/30/2012 were adjusted to the dollar value on 1/1/2012 (U.S. Bureau of Labor Statistics) and linked to the date each group (based on federal tax ID) was first certified by RadSite (Annapolis, MD) -- a program promoting quality and safety at sites performing radiological procedures through the certification of equipment, personnel, and policies. This certification date was the pivot point distinguishing the pre- from the post-period (with each period lasting 2 years, defined as 12 separate 60-day segments). Groups were included that were certified between 1/1/2007 and 6/30/2010, and their costs were included for each period for each calendar year in which they billed for targeted procedures. Secular trend was the average amount billed for all provider groups over the study duration. The difference between the expected and observed costs in the post-period was determined using software from Trajectory Healthcare (Loveland, OH).

#### RESULTS

4,115 provider groups were certified during the targeted period. In the resulting model, the slopes were \$39.235 and -\$69.948 for the pre- and post-certification periods, respectively, with y intercepts of \$10,691 for the former and \$11,115 for the latter. The average cost difference per time segment of the expected (based on a linear slope of pre-certification trend) to observed in the post-certification period was \$617, or a percent difference of 5.4. The secular trend pattern was flat, supporting the linear assumption. The plan did not institute a price change that would have significantly affected these results, and non-parametric analysis based on percentiles yielded similar results (affirming that outlier claims did not skew averages in the model).

#### CONCLUSION

Certifying imaging providers significantly reduces the amount billed for imaging procedures. Further research may elucidate the reason for this relationship.

#### CLINICAL RELEVANCE/APPLICATION

This model may be used to project savings from imaging certification.

### LL-HPE1087-TUA • Incidentalomas on Abdominal and Pelvic CT: What the Radiologist and Clinician Need to Know

**Douglas S Katz MD (Presenter) ; Joseph P Mazzie DO ; Puneet Bhargava MD ; James B Gardner BS ; Perry J Pickhardt MD \***  
**James Grendell ; Maher A Abbas MD**

#### PURPOSE/AIM

To review the complex and growing problem of diagnosis and management of 'incidentalomas' identified on abdominal and pelvic CT examinations; to show representative examples of incidentalomas ranging from benign, unimportant findings to highly clinically relevant findings, in all organ systems included on A/P CT exams, including skin, musculoskeletal, breast, and lung; and to overview the controversies and emerging recommendations from the recent literature as to how the radiologist and clinician should handle such incidentalomas.

#### CONTENT ORGANIZATION

- General issues - including ethical, malpractice, economic/practice management, reporting/communication - will be overviewed - Examples from each organ/organ system will be demonstrated on A/P CT, ranging from the benign/unimportant, to the highly clinically relevant - scout image; skin, breast, lung, musculoskeletal, lymphatic, liver, spleen, adrenal, kidney, pancreas, bowel, bladder, and gynecologic - with brief reviews of the literature, including the ACR white paper - Examples from specific indications/protocols - CT urography, colonography; trauma; suspected appendicitis - with review of the literature - The clinicians' perspective will be provided by a colorectal surgeon and gastroenterologist

#### SUMMARY

Guidance will be provided for the radiologist and clinician as to how to handle the incidentaloma on A/P CT.

### Health Services - Tuesday Posters and Exhibits (12:45pm - 1:15pm)

#### Tuesday, 12:45 PM - 01:15 PM • Lakeside Learning Center



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### LL-HPS-TUB • AMA PRA Category 1 Credit™:0.5

### LL-HPE1072-TUB • A Review of the Place of Contrast Enhanced Ultrasound in International Diagnostic Guidelines. When, Why and How Should It Be Used?

**Demosthenes D Cokkinos MD (Presenter) ; Eleni Antypa ; Serafeim Kolovos ; Polychronis Liontos ; Aikaterini Pavlopoulou ; Ploutarhos A Piperopoulos MD, PhD**

#### PURPOSE/AIM

To review the diverse applications for Contrast Enhanced Ultrasound (CEUS) in nearly all systems of the human body. To assess the indications, diagnostic results and limitations of these uses. To review the place of CEUS in recent Guidelines published by International Medical Societies.

#### CONTENT ORGANIZATION

Since the first implementation of CEUS, many different applications have developed in the liver, kidney, spleen, pancreas, abdominal trauma, biliary system, adrenals, breast, abdominal-peripheral-cerebral vessels, scrotum, bowel, paediatrics, endoscopic US, vesicoureteral reflux, lung and pleura, joints, intracavitary examinations, lymph nodes, tumour response assessment, gynaecology urinary bladder, prostate, transplanted kidney etc. Guidelines of European and World Medical Societies concerning the advantages and disadvantages of these applications are reviewed. Examples of specific cases in various clinical problems are presented.

#### SUMMARY

International Guidelines are important for assuring correct use of CEUS in different indications in all parts of the human body. This presentation facilitates the use of this technique with detailed outlining of indications, results, pitfalls and limitations.

### LL-HPS-TU1B • Multiparametric Prostate MRI: Is It Worth the Cost?

#### PURPOSE

We performed an analysis on patients with trans-rectal (TRUS) prostate biopsies negative for malignancy to determine whether the use of a multiparametric (mp)- prostate MRI is associated with differences in cancer detection or increased costs as compared with not using a mp- prostate MRI.

#### METHOD AND MATERIALS

We reviewed our institution patient data base (2008-2010) and identified all patients who underwent a mp-prostate MRI and who had at least one negative TRUS prostate biopsy and persistently elevated PSA levels prior to mp-prostate MRI. We divided the patients into 3 different groups (1, 2 or 3 and more negative TRUS prostate biopsies before obtaining a mp-prostate MRI) We performed statistical analyses of cost data in patients undergoing multiple TRUS prostate biopsies compared to addition of mp- prostate MRI prior to TRUS biopsy.

#### RESULTS

Of 213 patients in all; the mp- prostate MRI overall sensitivity for predicting positive biopsies was 96.5%. At our institution, the cancer-detection rate at repeat TRUS prostate biopsy (without a mp-prostate MRI) ranges between 21%- 33%. Mean total costs for patients in group 1, 2, and 3 or more negative TRUS prostate biopsies were \$44,175, \$99,400, \$356,700 and \$152,675, \$197,400, \$528,200 without and with a mp-prostate MRI respectively (p < 0.001).

#### CONCLUSION

The value of a mp-prostate MRI in patients with elevated PSA levels and previous negative biopsies to detect tumors appears to be significant. The use of mp-prostate MRI after a single previous negative TRUS prostate biopsy has a higher cancer yield than a repeat TRUS biopsy and potential to stop multiple subsequent negative TRUS biopsies.

#### CLINICAL RELEVANCE/APPLICATION

Given the dismal yield in cancer detection on repeated biopsies and rise in hospitalizations for complications due to drug resistance; mp prostate MRI has utility early in the diagnostic strategy.

### **LL-HPS-TU2B • Re-Initiation of Advanced Diagnostic Imaging Requests Following Withdrawal or Modification in a Collaborative Peer-to-Peer Consultative Environment**

**Jeffrey D Robinson MD (Presenter) \* ; Daniel S Hippe MS \* ; Mark D Hiatt MD, MBA \***

#### PURPOSE

Utilization management (UM) oriented towards appropriateness results in withdrawal or modification of some requests for advanced diagnostic imaging (ADI). The purpose of this study was to see how often these withdrawn or modified studies were re-requested on the same patient for the same indication within 60 days.

#### METHOD AND MATERIALS

All ADI requests received by HealthHelp between January 2011 and December 2012 were reviewed for instances in which a request for a study was withdrawn or modified and subsequently re-initiated within 60 days.

#### RESULTS

1,998,620 ADI requests were included in the data set. Of these, 34,227 (1.7 %) exams were withdrawn 12 weeks or more before the end of the study period. 10,065 (29%) of the withdrawn requests were resubmitted within 12 weeks. An additional 7,928 (0.4 %) were modified, of which 297 (4%) were resubmitted within 12 weeks. Clerical errors resulted in 3,916 artifactual withdrawals, and 30 artifactual modifications, resulting in final resubmission rates of 18% and 3%, respectively.

#### CONCLUSION

Collaborative peer-to-peer consultation for ordering of ADI results in 1.7 % withdrawal and 0.4 % modification of ordered exams. Withdrawn exams have an 18% chance of being re-initiated and modified exam requests have a 3% chance of being resubmitted within 12 weeks of the original request.

#### CLINICAL RELEVANCE/APPLICATION

Providers uncommonly re-request exams after collaborative peer-to-peer consultation results in change or withdrawal of the original request.

### **LL-HPS-TU3B • Nationwide Medicare Data Show the End of Growth in Utilization Rates of Advanced Imaging**

**David C Levin MD (Presenter) \* ; Vijay M Rao MD ; Laurence Parker PhD ; Andrea J Frangos MPH**

#### PURPOSE

Anecdotal reports from various sources have suggested that advanced imaging is no longer growing. Our purpose was to determine the correctness of this perception by studying recent trends in utilization rates of CT, MRI, and nuclear medicine, using a nationwide database.

#### METHOD AND MATERIALS

The Medicare Physician/Supplier Procedure Summary Master Files for 2000-2011 were used. These files cover all Medicare beneficiaries in traditional fee-for-service Medicare (36.3 million in 2011). All CPT codes for CT, MRI, and nuclear medicine (including PET) were selected except those for guidance for invasive procedures and for radiation therapy planning. Procedure volumes in the 3 modalities were determined by tabulating global and professional component claims. Utilization rates per 1000 beneficiaries were calculated and tracked from 2000 through 2011.

#### RESULTS

The CT utilization rate per 1000 rose from 325 in 2000 to a peak of 637 in 2009 (+96%). In 2010, for the first time, a small drop in the rate was seen, to 626. In 2011 a large drop to 500 occurred. This was mostly attributable to bundling of the codes for CT of the abdomen and pelvis. The nuclear medicine rate per 1000 rose from 193 in 2000 to a peak of 320 in 2006 (+66%). There was a gradual and slight decline over the next 3 years, to 303 in 2009. In 2010, there was a sharp decline to 135, which was primarily due to bundling of the codes for primary myocardial perfusion imaging and its 2 add-on codes for left ventricular wall motion and ejection fraction. A further decline to 128 occurred in 2011. The MRI rate rose from 95 in 2000 to 185 in 2006 (+95%). The rate thereafter remained essentially flat, and was 184 in 2011. No code bundling occurred in MRI.

#### CONCLUSION

The rapid growth that was seen in use of advanced imaging in the early part of the last decade has stopped. Sharp declines were seen in CT in 2011 and nuclear medicine in 2010, due primarily to code bundling. However, even before then, growth in those 2 modalities had halted. In MRI, where no bundling occurred, growth stopped after 2006. The cause of the cessation of growth is multifactorial.

#### CLINICAL RELEVANCE/APPLICATION

Not applicable.

### **LL-HPS-TU4B • Reliability of Magnetic Resonance Enterography in Classification of Small Bowel Crohn's Disease Patterns: An Analysis Using 'Evidence-based Medicine' (EBM) Techniques**

**David J Murphy MBBCh, MRCPI (Presenter) ; David Gibson ; Sinead H McEvoy MBBCh, FFRCSI ; Anna E Smyth MRCPI ; Glen Doherty ; Dermot E Malone MD**

## PURPOSE

Magnetic resonance enterography (MRE) has a growing role in imaging small bowel Crohn's disease (SBCD). Certain SBCD phenotypes respond well to biologic therapy, others need surgery. We evaluated the MRE signs that classify SBCD into acute inflammatory, fibrostenosing, perforating and quiescent subtypes.

## METHOD AND MATERIALS

EBM methods were used to search the literature. A secondary literature search yielded no relevant returns. A primary literature search was performed using PubMed and Google Scholar. The PIO format was used linking MESH terms with the boolean operators AND and OR: ((Crohn disease OR Inflammatory bowel disease) AND (Small intestine OR Small Bowel)) AND (Magnetic resonance imaging OR MRI) AND (Severity of illness index OR Fistula OR Abscess OR Inflammation OR Subclassification OR Intestinal obstruction OR Stricture). The abstracts were reviewed and publications meeting inclusion criteria were chosen. Studies were assigned an Oxford Centre for EBM Level of Evidence, and the validity and strength of the best evidence was assessed using a radiology specific critical appraisal sheet. Raw data was extracted for calculation of test properties and graphs of conditional probability were constructed.

## RESULTS

36 abstracts were identified, 9 were relevant. Statistical tests are reported as (sensitivity {95% CI}, specificity {95% CI}, positive and negative likelihood ratios). Level 3 evidence showed MRE performed well in identifying fibrostenosing (0.92 [1-0.81], 0.9 [1-0.80], 9.2, 0.09) and perforating SBCD (0.81 [1-0.62], 0.96 [1-0.91], 20, 0.2). In the differentiation of acute inflammatory and fibrostenotic SBCD, level 2 evidence identified 3 useful, weaker signs: mural wall thickening (0.87 [0.98-.75], 0.42 [0.76-.08], 1.5, 0.4), mural T2 high signal (0.84 [0.96-.7], 0.67 [0.96-.37], 2.5, 0.3) and layered mural post contrast enhancement (unable to calculate sensitivity and specificity from available raw data). Lack of these signs may signify quiescent disease.

## CONCLUSION

MRE can reliably identify fibrostenotic and perforating SBCD, but has not been shown to reliably differentiate acute inflammatory from chronic fibrotic SBCD.

## CLINICAL RELEVANCE/APPLICATION

MRE reliably identifies fibrostenotic and perforating CD but has difficulty separating acute inflammatory from chronic fibrotic CD. Further research into multi-parametric MR assessment is required.

## LL-HPS-TU5B • The Impact of the Economy on the Utilization of Advanced Diagnostic Imaging

**Mark D Hiatt MD, MBA (Presenter) \* ; Scott Edwards \***

## PURPOSE

In determining the impact of the economy on the utilization of advanced diagnostic imaging, the recent economic downturn of 2010 provided a natural laboratory. For most of 2010, the health insurance industry in the United States witnessed a utilization rate of healthcare services that was less than projected, which contributed in turn to better-than-expected financial results for most of the industry. Many companies in the industry have attributed at least part of the drop in utilization to the concurrent economic downturn and its impact on consumers' health care spending. This study sought to define more precisely the effect of economic fluctuations on utilization.

## METHOD AND MATERIALS

To determine the impact of the economic downturn on imaging utilization for the nearly 5 million subscribers to a national health insurance company in 2010, economic data provided by The Conference Board were used to forecast what utilization would have been had economic conditions been similar between the recessionary and pre-recessionary periods. These data took into account more than 20 American economic indicators (e.g., average prime rate, average duration of unemployment) to provide aggregate indices showing how the U.S. economy was performing on an adjusted basis over time. Linear regression analysis was performed using utilization rates for CT, MRI, and PET between January 1, 2006 and November 31, 2010 as the dependent variables and the described economic indicators as the independent variables.

## RESULTS

Economic conditions had an approximately 2% impact upon utilization of advanced diagnostic imaging, with an R-squared of 0.19.

## CONCLUSION

The recent economic downturn did not significantly impact the utilization of advanced diagnostic imaging.

## CLINICAL RELEVANCE/APPLICATION

For future analyses, the Economic Adjustment Factor resulting from this study may be used to estimate the impact of economic fluctuations on imaging utilization.

## ISP: Health Service, Policy and Research (Evidence, Guidelines and Outcomes)

Tuesday, 03:00 PM - 04:00 PM • S102D



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**SSJ13 • AMA PRA Category 1 Credit™:1 • ARRT Category A+ Credit:1**

### Moderator

**David C Levin, MD \***

### Moderator

**Marta E Heilbrun, MD**

**SSJ13-01 • Health Service, Policy and Research Keynote Speaker: The Effect of CPT Code Bundling on Imaging Reimbursement**

**David C Levin MD (Presenter) \***

**SSJ13-02 • Comparative Effectiveness of Contrast-enhanced CT versus Non-contrast Plus Contrast-enhanced CT in the Evaluation and Management of Patients with Hypervascular Liver Metastases: A Critically Appraised Topic**

**Gelareh Sadigh MD (Presenter) ; Kimberly E Applegate MD, MS ; Deborah A Baumgarten MD, MPH**

## PURPOSE

To critically appraise literature to evaluate whether addition of abdominal non-enhanced (NE)CT to contrast-enhanced (CE)CT improves liver mass detection, characterization or patient management for initial staging or follow-up of patients with known breast, melanoma, neuroendocrine or thyroid cancer.

## METHOD AND MATERIALS

A focused clinical question was constructed and the literature was searched using the patient, intervention, comparison, outcome (PICO) method comparing CECT vs. its combination with NECT for detection or characterization of liver metastases, the radiologists' confidence level, and detection of significant incidental findings in patients with breast, melanoma, neuroendocrine or thyroid cancer. Retrieved articles were appraised and assigned a level of evidence based on the Oxford University Centre for Evidence-Based Medicine hierarchy of validity for diagnostic studies.

## RESULTS

The retrieved diagnostic performance for different phases of CT for characterization of liver metastases showed sensitivity/specificity of

97%/76% for NECT, 97%/75% for arterial CT and 98%/76% for portal CT in patients with breast cancer (level 2 of evidence; reported in 1999); sensitivity of 96% (arterial and portal CT) vs. 100% (NECT, arterial and portal CT) in patients with melanoma (level 3 of evidence; reported in 1999); and sensitivity of 43% (portal CT) vs. 17% (NECT) in patients with neuroendocrine tumor (level 3 of evidence; reported in 2009). No primary study was found evaluating performance of CT phases in patients with thyroid cancer. Available evidence showed radiologists reported more conspicuous liver masses on CECT compared to NECT in patients with breast and neuroendocrine cancer; however, NECT was reported to add value to portal phase CT in 42% of patients with breast cancer.

#### CONCLUSION

NECT adds only a small incremental value to CECT for detection/characterization of liver metastases. Further, addition of NECT increases patient's risk of exposure to radiation, and the time and cost of imaging interpretation. The role of adding NECT to CECT in confidence level of radiologists or characterization of significant incidental findings is less clear.

#### CLINICAL RELEVANCE/APPLICATION

A critical appraisal of literature shows addition of NECT to CECT for characterization of liver metastases in patients with breast, melanoma, neuroendocrine or thyroid cancer is of limited benefit.

### SSJ13-03 • Mobile Mammography Utilization Trends and Disparities Over a Decade at a Comprehensive Urban Cancer Center

**Sarah G Mizuguchi MD ; Elizabeth Riley MD \* ; Laura E Barkley MD (Presenter) ; Lane M Roland MD ; Shesh N Rai PhD ; Jianmin Pan PhD ; Connie L Sorrell MPH ; Stacey M Crawford MD ; Laura Fry MBA**

#### PURPOSE

Mobile mammography units (MMU) have become a model of community outreach. The purpose of this study is to assess the utilization of MMU in the largest county in Kentucky as it relates to race and insurance status.

#### METHOD AND MATERIALS

From January 2001 - December 2010, our MMU performed 21,858 screening mammograms. Demographic data was retrospectively reviewed to identify differences in screening utilization and return rates by race and insurance status. This data set was compared to existing census data for Jefferson County (JC) and Kentucky (KY). Descriptive statistics for patient age, race and insurance status were computed by entire cohort and within the subsets of cohorts. To study the patterns of frequency distributions, in-discrete variables were performed using Pearson Chi-square tests. For continuous variable range, a 95% confidence interval of mean was estimated. The comparison with a p-value < 0.05 was considered statistically significant.

#### RESULTS

Self reported Blacks (B) constitute 29% of the MMU utilization over the 10 year period. Whites (W) and Hispanics (H) represent 64% and 4%, respectively. Census data demographic reports are 19%, 74% and 3%, respectively. This discordance between demographic data of the MMU and the census data is statistically significant across all races (p

#### CONCLUSION

MMU captures minorities in greater density than JC and KY census data would predict. This data alone will help tailor future outreach and outcome initiatives to this specific patient population.

#### CLINICAL RELEVANCE/APPLICATION

Mobile mammography programs increase access to screening of disadvantaged populations. Understanding utilization by race and insurance has implications for funding, patterns of outreach and access.

### SSJ13-04 • Follow-up of Pulmonary Nodule Detected on Abdominal CT: Cost Implications for Adhering to Nationally Recommended Best-practice Guidelines

**David A Rosman MD (Presenter) \* ; Carol C Wu MD \* ; Michael T Lu MD ; Tarik K Alkasab MD, PhD ; Matthew D Gilman MD ; Jo-Anne O Shepard MD \* ; Debra A Gervais MD \* ; Keith J Dreyer DO, PhD \* ; Daniel I Rosenthal MD ; Giles W Boland MD**

#### PURPOSE

Incidental pulmonary nodules are commonly identified on abdominal CT, which often require imaging follow-up, but cost implications for these recommendations are unknown. Our department has adopted a modified Fleischner guideline for use by abdominal radiologists, which is embedded into a point-of-care clinical decision support (CDS) tool for radiologists. We evaluated the cost implications when radiologists adhered to the guidelines using the CDS tool compared to recommendations made without use of the tool.

#### METHOD AND MATERIALS

The RIS was mined for abdominal CT reports from 1/1/12 to 10/22/12 describing a pulmonary nodule, which did not have prior abdominal/chest CT or concurrent chest CT. Inclusion criteria included solid, noncalcified, pulmonary nodule < 3 cm. The numbers of additional CT examinations recommended over 2 year f/u assuming no additional findings with and without the use of the CDS tool were compared. Without the tool, some recommendations varied from unnecessary additional imaging, insufficient imaging and appropriate imaging when compared to guidelines. CDS tool recommendations conformed to departmental guidelines.

#### RESULTS

Of 20,578 consecutive abdominal CT reports analyzed, 462 documented a pulmonary nodule. Manual review yielded 268 patients who met inclusion criteria. Without use of the CDS tool, imaging was recommended on 53% (143/268) which would have led to 409 f/u CTs over two years. Furthermore, excessive imaging was recommended for 23% (61/268) and insufficient imaging was recommended for 28% (74/268). The ideal algorithm using the CDS tool would have recommended 592 f/u CT examinations in 190 patients (an additional 183 exams compared to without the CDS tool). Using MPFS payment for a non-contrast CT (71250 - \$212.98), the total cost of recommended f/u without use of the tool would be \$87,108.82 over two years. Recommendations conforming to departmental guidelines would have resulted in an increase of \$38,975.35 for a total \$126,084.16 in cost.

#### CONCLUSION

Compliance with nationally accepted best practice algorithms for follow-up of pulmonary nodules identified on abdominal CT leads to an increase in initial cost due to the greater number of imaging recommendations.

#### CLINICAL RELEVANCE/APPLICATION

Following departmental guidelines for pulmonary nodule workup would increase the short term cost. The effect on outcomes and long-term cost is not known.

### SSJ13-05 • Breast Cancer Risk, Worry, and Anxiety: Effect on Patient Perceptions of False-positive Screening Results

**Jessica Chubiz MS ; Janie M Lee MD (Presenter) \* ; John S Swan MD ; Tina Motazedi BS ; Elkan F Halpern PhD \* ; G. Scott Gazelle MD, PhD \* ; Karen Donelan DSc \***

#### PURPOSE

To evaluate how women across the spectrum of breast cancer risk view breast cancer screening and its consequences, focusing on false-positive test results.

#### METHOD AND MATERIALS

From 7/1/11 to 12/31/12, women scheduled for breast cancer screening at an academic medical center were recruited to complete a survey online, by mail, or with assistance over the telephone. Using a scale ranging from 0 (equivalent to Dead) to 100 (Perfect Health), women rated their quality-of-life (QoL) for scenarios of breast cancer screening with mammography or MRI. Scenarios described the diagnostic testing period both before and after false-positive results were known. Breast cancer risk was calculated using Gail and BRCAPRO models, and categorized as low, intermediate, or high. Risk perception and breast cancer worry were also assessed. Trait anxiety was evaluated by the State Trait Anxiety Inventory (STAI). Univariate and multivariable linear regression was performed to

identify predictors of QoL scores.

#### RESULTS

The response rate was 194/388 (50%). After excluding women with incomplete responses, 162 women at low (n=43, 26%), intermediate (n=66, 41%) and high risk (n=53, 33%) were included in the final analyses. Across all screening scenarios and risk levels, significant differences were seen in QoL scores while awaiting test results vs. when false-positive results were known (p

#### CONCLUSION

Regardless of risk level, women undergoing breast cancer screening have decreased QoL while awaiting biopsy results, which improves upon receipt of benign test results. Women with high anxiety levels have significantly decreased quality of life even after receipt of benign results at the end of diagnostic testing.

#### CLINICAL RELEVANCE/APPLICATION

Women with high baseline anxiety levels may obtain particular benefit from discussions regarding false-positive test results when selecting a breast cancer screening regimen.

### SSJ13-06 • Appraisal of LI-RADS, AASLD and EASL-EORTC Guidelines for the Non-invasive Diagnosis of Hepatocellular Carcinoma in Patients with Liver Cirrhosis

**Anne Carroll** MBBCh (Presenter) ; **Lisa P Lavelle** MBBCh ; **Eve O'Toole** PhD ; **Edmund Ronan Ryan** MBBCh ; **Dermot E Malone** MD

#### PURPOSE

There are some differences between leading guidelines in their recommendations for the non-invasive diagnosis of Hepatocellular Carcinoma (HCC) in patients with liver cirrhosis. This study was performed to establish the relative validity of these guidelines using Evidence-Based Medicine (EBM) methodology.

#### METHOD AND MATERIALS

The American Association for the Study of Liver Disease (AASLD) 2010 guidelines, the European Association for the Study of the Liver and the European Association for Research and Treatment of Cancer (EASL-EORTC) 2011 joint guidelines and the American College of Radiology Liver Imaging Reporting and Data System (LI-RADS) v.2013.1 guidelines were appraised. To assess the methodological rigor and transparency used in developing the guidelines, the internationally recognized Appraisal of Guidelines for Research & Evaluation (AGREE) 2 Instrument was used. Each guideline was appraised under 6 different domains, followed by an overall assessment. The domains were: Scope and Purpose, Stakeholder Involvement, Rigor of Development, Clarity of Presentation, Applicability and Editorial Independence. The appraisal was performed by 3 individual radiologists, under the guidance of the Research and Evaluation Manager of the Irish National Cancer Control Programme, and consensus results were compiled.

#### RESULTS

The Agree 2 scaled domain scores were calculated as follows: (obtained score ÷ minimum possible score) / (maximum possible score ÷ minimum possible score) x 100. The EASL-EORTC guidelines scored the highest at 83%. The AASLD guidelines scored 72% and the LIRADS guidelines scored 50%. All 3 guidelines were recommended for use, but AASLD and LIRADS guidelines would be improved by better referencing and better identification of the level of evidence behind the recommendations.

#### CONCLUSION

The methodological rigor and transparency of leading guidelines varies as described. If guidelines disagree, the EASL-EORTC 2011 guidelines have the highest validity by EBM criteria.

#### CLINICAL RELEVANCE/APPLICATION

EASL-EORTC 2011 are the highest quality current guidelines addressing the non-invasive diagnosis of HCC. They should be followed if conflict with AASLD or LI-RADS recommendations is noted.

### Aligning Incentives between the Physician Practice and the Hospital: Finding the Win:Win

Tuesday, 04:30 PM - 06:00 PM • S104A



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**RC427** • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

**Norman J Beauchamp**, MD \*  
**Angelisa M Paladin**, MD  
**Edward Weinberger**, MD \*  
**Cheryl Wieber**

#### LEARNING OBJECTIVES

As healthcare costs become a primary area of emphasis, the 'premium' that was allowed for academic medical centers is no longer in place. However, optimal care at acceptable cost is readily attainable in an academic center when the missions of the academic department and the hospital are aligned. In this presentation, the learner will recognize approaches to educating the next generation of radiologists while improving access, decreasing overutilization, enhancing safety and decreasing cost.

### Impact of Legislative Policy and Regulations on Imaging Informatics

Tuesday, 04:30 PM - 06:00 PM • S403A



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**RC430** • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1

**Co-Moderator**  
**Arun Krishnaraj**, MD, MPH  
**Co-Moderator**  
**Safwan Halabi**, MD

### RC430A • Clinical Decision Support and CMS

**Safwan Halabi** MD (Presenter)

#### LEARNING OBJECTIVES

1) Identify the primary drivers of imaging utilization. 2) Understand the impact of legislative policy aimed at curbing imaging utilization growth rates. 3) Demonstrate the utility of clinical decision support tools in reducing inappropriate medical imaging. 4) Compare and contrast the impact of radiology benefits managers vis a vis clinical decision support tools built upon the ACR appropriateness criteria in reducing imaging growth rates. 5) Review the purpose of the Medicare Imaging Demonstration project.

#### ABSTRACT

Increased imaging utilization rates have contributed significantly to the growth of health care expenditures in the United States, particularly over the last decade. In response, a series of legislative policies have been enacted to curb the growth of imaging but thus far none have focused specifically on reducing the inappropriate use of advanced imaging modalities, a major contributor to rising imaging

costs. To date two major approaches have been employed to reduce inappropriate imaging utilization rates: 1) Incorporation of clinical decision support (CDS) tools into computerized physician order entry systems and 2) Use of external authorization bodies such as radiology benefit managers (RBMs). While both approaches have been shown to reduce imaging utilization rates, clinical decision support tools are more transparent in their approach and have been shown to specifically address inappropriate use of advanced imaging modalities. Due to the lobbying efforts of the American College of Radiology and the growing body of literature demonstrating the effectiveness of CDS tools in reducing inappropriate imaging, language was included in the Medicare Improvements for Patient and Providers Act of 2008 (MIPPA) which mandated an appropriate use of imaging services demonstration project. The Medicare Imaging Demonstration project (MID) has been deployed at 5 institutions across the US to assess the impact that decision support systems have on the appropriateness and utilization of advanced imaging services ordered for the Medicare fee-for-service population. It is incumbent upon radiologists to be aware of current efforts at decreasing inappropriate imaging utilization so as to drive this progress moving forward.

### RC430B • Legislative Impact of CT Radiation Dose Reporting Requirements

**Jonathan Breslau MD** (Presenter)

#### LEARNING OBJECTIVES

1) Understand the motivation for dose reduction legislation in California. 2) Understand the structure, benefits and limitations of required metrics. 3) Understand the processes for complying with new regulations in California.

#### ABSTRACT

### RC430C • Informatics Solutions for Meaningful Use

**Alberto F Goldszal PhD, MBA** (Presenter) \*

#### LEARNING OBJECTIVES

1) Learn what informatics and IT solutions can be used to help practices achieve meaningful use. 2) Understand real-world challenges and solutions faced by existing practices in deploying MU.

### RC430D • Mobile Computing, Radiology, and the FDA

**David S Hirschorn MD** (Presenter)

#### LEARNING OBJECTIVES

1) Understand the FDA approval process for mobile computing applications in radiology. 2) Learn about new application available for mobile devices in radiology.

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## Value-Added Initiatives for a Healthcare System

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**Tuesday, 04:30 PM - 06:00 PM • S504AB**

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**RC432 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5**

### RC432A • Radiology Support for Major Centers of Excellence

**Barry Stein MD** (Presenter)

#### LEARNING OBJECTIVES

1) Recognize the opportunities for Radiology to contribute to healthcare systems in a value added fashion. 2) Provide framework for Radiology departments to illustrate their clinical value to the healthcare system. 3) Understand the importance and transformative potential of imaging informatics to the healthcare system and to the armamentarium of the Radiology department. 4) Appreciate the power of metric and analytic dashboards to the Radiology department and the healthcare system.

#### ABSTRACT

A. Clinical Integration & Innovation: 1. Critical role Radiology plays in supporting major clinical centers of excellence (stroke, cardiovascular, oncology, transplant, trauma, women's health, spine/joint etc), 2. Strategic multi-dimensional marketing within and for a healthcare system, B. Imaging Informatics: 1. Provide relevant imaging and reports anywhere and anytime, 2. Opportunity to change referring physician workflow with: a. powerful technology allowing easy effortless access to imaging, standardized reports, b. Zero foot print viewing solutions & mobile device technology, c. EMR & HIE integration, d. Multi modality & interdisciplinary common viewer, e. CPOE with appropriateness criteria 3. Patient access C. Improving the Bottom Line, 1. Discuss methods to derive meaningful financial & clinical metrics & analytics demonstrating how Radiology contributes to the bottom line (tangible added value), 2. Departmental dashboards supporting Healthcare system balanced score cards, 3. Improving imaging report turn around times to support initiatives to decrease hospital length of stays

### RC432B • Imaging Informatics

**Keith J Dreyer DO, PhD** (Presenter) \*

#### LEARNING OBJECTIVES

1) Develop an understanding of the essential Informatics skills required for a leader to be successful. 2) Develop an understanding of the common Informatics errors made by leaders in academic and private practices. 3) Acquire the skills of Informatics planning needed to ensure that the success of your organization is sustainable over time.

### RC432C • Radiology's Impact on the Hospital's Bottom Line

**Bernard F King MD** (Presenter)

#### LEARNING OBJECTIVES

1) Identify methods to derive meaningful financial and clinical metrics and analytics demonstrating how Radiology contributes to the bottom line (tangible added value). 2) Developing departmental dashboards supporting HealthCare system balanced score cards etc. 3) Identify methods for improving imaging report turn around times to support initiatives to decrease hospital length of stays thus improving bottom line.

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## Navigating the Regulatory, Reimbursement, and Compliance Landscape or Land Mines! (Sponsored by the Associated Sciences Consortium) (An Interactive Session)

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**Wednesday, 08:30 AM - 10:00 AM • S105AB**

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**MSAS41 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5**

**Moderator**  
**Claudia A Murray**  
**Thomas W Greeson** , JD  
**Melody W Mulaik** \*  
**Barbara Rubel** , MBA \*

LEARNING OBJECTIVES

1) Analyze key regulatory and legislative issues that will impact radiologists in 2014. 2) Describe actions radiologists can take to prepare for ICD-10 implementation. 3) Articulate 2014 changes to CPT. 4) Describe trends and issues with audits in radiology and imaging including RAC and CERT audits. 5) Discuss regulatory requirements for global billing and out-of-state enrollment for interpretation services in wake of CMS's guidance on Place of Service billing.

**Critical Issues Facing the Profession of Radiology: An ACR Leadership Perspective (In Conjunction with the American College of Radiology)**

**Wednesday, 08:30 AM - 10:00 AM • S404CD**

**LM** **HP**

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**RC527** • *AMA PRA Category 1 Credit*™:1.5 • *ARRT Category A+ Credit*:1.5

**Paul H Ellenbogen** , MD  
**Bibb Allen** , MD  
**Geraldine B McGinty** , MD  
**Howard B Fleishon** , MD

LEARNING OBJECTIVES

1) Major issues facing radiology today. 2) What steps the American College of Radiology is taking to address these issues. 3) The process of political advocacy and how organizations work with Congress and federal agencies.

ABSTRACT

**ISP: Health Service, Policy and Research (Quality and Reporting)**

**Wednesday, 10:30 AM - 12:00 PM • S102D**

**QA** **HP**

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**SSK10** • *AMA PRA Category 1 Credit*™:1.5 • *ARRT Category A+ Credit*:0.5

**Moderator**  
**Edward Y Lee** , MD, MPH  
**Moderator**  
**Jeffrey G Jarvik** , MD, MPH \*

**SSK10-01 • Health Service, Policy and Research Keynote Speaker: Pragmatic Trials-Real World Research for Real World Problems**

**Jeffrey G Jarvik** MD, MPH (Presenter) \*

**SSK10-02 • Structured Reporting of Incidentally Detected Hepatic Steatosis in Abdominal CTs: Impact on Physician Practices and Patient Management**

**Surabhi Bajpai** MBBS, DMRD (Presenter) ; **Andrew P Wright** MD ; **Kathleen Corey** MD ; **Debra A Gervais** MD \* ; **Dushyant V Sahani** MD

PURPOSE

Hepatic steatosis is a frequent incidental finding on abdominal CT. There is limited data on the impact of documentation of incidentally detected hepatic steatosis in radiology reports on PCP identification and their decision-making. The purpose of this study was to evaluate the impact of structured reporting of incidentally detected hepatic steatosis on PCP decision-making and patient management.

METHOD AND MATERIALS

This retrospective study included patients who underwent abdominal CT scans for evaluation of hematuria or nephrolithiasis between January 2008 to October 2011. An independent reader evaluated the CT reports for documentation of hepatic steatosis, nature of reporting (body of report vs impression), presence of recommendations and physician contact at the time of reporting. The patient medical records were then reviewed for diagnosis of steatosis, alcohol use, medications, diagnosis of hypertension, hyperlipidemia, and diabetes. The laboratory values were also examined prior to and after CT scanning.

RESULTS

Out of a total of 12,000 CT scans, 356 patients had hepatic steatosis on CT reports. Out of these, 127 patients (M:F, mean age- , age range- ) were included in final analysis due to availability of follow up data. On evaluation of CT reports, hepatic steatosis was documented in the impression in 83/127 (65%) patients and in the body of report in 44/127 (35%) patients. HCV screening was performed in 6.3% of patients and 59% underwent insulin resistance screening and over 80% of patients underwent LFT and lipid screening. There was a significant difference in the rate of follow up when radiology reports commented on fatty liver in the impression vs the body (30.1% vs 9.1%, p = 0.007). On follow up evaluation at 14 months, steatosis was commented in the PCP follow up notes in only 23% of patients. New cases of insulin resistance were identified in 36% of patients (12% diabetes, 24% pre-diabetes) who underwent screening within 14 months of imaging.

CONCLUSION

Structured radiology reporting practices for incidentally detected hepatic steatosis on CT scans significantly impacts PCP documentation rates, and our data suggest that steatosis should be recorded in impression section of reports.

CLINICAL RELEVANCE/APPLICATION

Structured reporting of incidentally detected hepatic steatosis in CT scans will enable the treating physician to take decisive action allowing significant impact on patient care and management.

**SSK10-03 • Assessing Competence of Non-physician Providers Trained in Point-of-Care Obstetrical Ultrasound in Under-resourced Settings of Western Kenya**

**H. B Harvey** MD, JD (Presenter) ; **Daniel Price** MD ; **Roy Ahn** MPH ; **Garry Choy** MD, MS ; **Giles W Boland** MD ; **Thomas Burke** MD \*

PURPOSE

Hand-held ultrasound machines have the potential to positively impact infant and maternal mortality in the developing world by identifying patients with high risk conditions that should deliver in a hospital setting. However, due to the paucity of radiologists in the developing world, training of non-radiologist clinicians in point-of-care ultrasound is essential. We trained a select group of nurse midwives in resource-limited areas of Western Kenya and empowered them to implement antenatal ultrasound screening programs in their hospitals and clinics. At least six months after training, we evaluated their retained obstetrical ultrasound skills.

## METHOD AND MATERIALS

From February 2011 through August 2012, nine nurse midwives underwent an intensive one-week training course to perform and interpret point-of-care ultrasound examinations followed by a few weeks of supervised on-the-job training. Approximately six months after completion of training, fellowship trained sonographers subjected the providers to an objective structured clinical examination (OSCE) on two patients. The OSCE graded their ability to assess gestational number, gestational age, fetal heart rate, fetal position, placental position, and amniotic fluid index on a 3 point scale (0 = inadequate, 1 = adequate, 2 = excellent). The maximum score for the OSCE was 12.

## RESULTS

The ultrasound screening programs were set up in three hospitals and six clinics. The average age of the providers was 36.9 yrs (28-60yrs, stdev 12.9 yrs). The providers performed an average of 9.3 scans per month (4-15, stdev 4.6) in their home clinics and hospitals. All of the providers achieved at least a score of 1 (adequate) on all the assessed OSCE measures with an average per skill score of 1.6. The average total OSCE score per provider was 9.9 (8-12, stdev 1.3).

## CONCLUSION

The findings suggest that non-physician clinical providers retain basic skills in point-of-care maternal ultrasound after one week of intensive training. Confident with the quality of the service provided, we next hope to begin the process of evaluating the potential longitudinal impact of these maternal ultrasound screening programs on patient management and maternal and infant outcomes.

## CLINICAL RELEVANCE/APPLICATION

Non-physician clinical providers can be trained to reliably perform and interpret point-of-care obstetrical ultrasound examinations in resource-limited areas of the developing world.

## **SSK10-04 • Radiologist Compliance with Institutional Guidelines for Use of Non-routine Communication of the Results of Radiologic Examinations**

**H. B Harvey MD, JD (Presenter) ; Tarik K Alkasab MD, PhD ; Gloria M Salazar MD ; Daniel I Rosenthal MD ; G. Scott Gazelle MD, PhD \***

## PURPOSE

Failure to appropriately communicate the results of radiologic examinations in urgent or non-routine clinical situations is a common source of medical malpractice liability in radiology. In 2009, the Departments of Radiology across our large integrated health system came together and developed guidelines for non-routine communication of diagnostic imaging findings based on the urgency of the findings and in view of existing guidelines and requirements. We study radiologist compliance with the guidelines nearly three years after implementation.

## METHOD AND MATERIALS

From July 2012 through March 2013, 6,716 randomly selected radiology reports with images across all sections were reviewed in a peer-review conference format by at least three radiologists. The reviewing radiologists were asked to reach a consensus on two questions relating to non-routine communication: (1) ♦Does the report describe a finding which requires non-routine communication to the patient ♦s physicians?♦ and (2) if so, ♦Were departmental guidelines for non-routine communication followed?♦ Consensus judgments were subsequently aggregated and analyzed based on section, level of acuity per the guidelines (i.e. Level 1, 2 or 3), and type of communication employed.

## RESULTS

Of the 6,716 studies reviewed, 718 (10.7%) were deemed to require non-routine communication of results and 17 (0.3%) resulted in no consensus as to whether non-routine communication was required. Out of the 718 studies deemed to require non-routine communication, 20 cases (3%) resulted in a consensus that the guidelines were not followed: 4 of these were level 1 findings, 4 were level 2 findings, and 12 were level 3 findings. Neurological imaging accounted for the majority of the failures of non-routine communication with 60% of the cases and all of the cases involving level 1 findings (e.g. new ventricular entrapment, new subarachnoid hemorrhage, and new acute cortical infarction). Cases in which no consensus could be reached primarily involved Level 3 findings.

## CONCLUSION

Guidelines for non-routine communication are appropriately applied in the vast majority of clinical cases at our large academic medical institution years out from their introduction.

## CLINICAL RELEVANCE/APPLICATION

Non-routine communication of radiologic results is an important aspect of the radiology quality and safety landscape and efforts to ensure that it occurs consistently and effectively remain essential.

## **SSK10-05 • Second-opinion Consultations in Musculoskeletal Radiology**

**Majid Chalian MD (Presenter) ; Filippo Del Grande MD, MBA ; Rashmi S Thakkar MD ; Sahar J Farahani MBBS ; Avneesh Chhabra MD \* ; Shadpour Demehri MD ; Laura M Fayad MD ; John A Carrino MD, MPH \***

## PURPOSE

To assess the patient care benefit of an institutional policy requiring official second-opinion consultation for all imaging examinations performed outside the institution.

## METHOD AND MATERIALS

The institutional review board approved the retrospective review of patient data for this HIPAA-compliant study and waived the need for individual informed consent. Two trained radiology fellows compared the second-opinion consultation reports for outside musculoskeletal radiology exams within calendar years 2010 and 2011 with the outside original reports. The reports were categorized by using a five-point ordinal rating scale: 1, no difference in interpretation; 2, clinically unimportant difference in detection; 3, clinically unimportant difference in interpretation; 4, clinically important difference in detection; and 5, clinically important difference in interpretation. Clinically important differences were defined as those likely to change patient care or diagnoses. Inter-observer reliability was assessed using linear-weighted kappa.

## RESULTS

Of 3165 exams, 2326 (73.5%) had an outside report for comparison. There were 472 (20.3%) instances with clinically important differences. Of these 472 discrepancies, 214 (45.3%) were category 4 and 258 (54.7%) were category 5. When definitive diagnoses was obtainable from pathology reports (580 exams), 102 (17.4%) studies had clinically important discrepancies between inside and outside reports. There was a very good agreement ( $\kappa=0.93$ ) between readers in scoring the discrepancies.

## CONCLUSION

A 20.3% rate of discrepant interpretations (472 of 2326 studies) was noted for a service offering second-opinion consultations for outside examinations. Most were discrepancies in interpreting identified abnormalities rather than in detecting abnormalities. When a definitive diagnosis was obtainable, there was clinically important discrepancy in 17.4% of studies between the second-opinion consultation and the outside reports.

## CLINICAL RELEVANCE/APPLICATION

Results of this study could be helpful for health care decision makers regarding second-opinion subspecialty consultation value in musculoskeletal radiology.

## **SSK10-06 • The Effect of Increasing Imaging Volumes on Radiologist Fatigue: The eFatigue Phenomenon**

#### PURPOSE

Cross-sectional imaging utilization has dramatically increased over the past two decades. Driven by technical innovations that have improved anatomic resolution, acquisition time, and applicability of CT and MRI, cross sectional modalities have supplanted use of conventional radiographs in many clinical practice guidelines. Rising utilization coupled with innovation has increased Radiologists' workload through with respect to the total number of studies and images that must be interpreted. In the current study, we quantified changes in imaging workload over time as a surrogate measure of fatigue.

#### METHOD AND MATERIALS

Monthly counts of CT and MRI studies performed at our institution from 1999-2010 were identified. Total numbers of images per exam were also extracted from the associated studies. Imaging workload data were normalized to the number of dedicated CT and MRI daily work assignments to determine the average radiologist workload assuming a 255-work day calendar and 8-hour workday. Temporal trends in institutional and individual workload were assessed by Sen's slope analysis (Q) using a normal Z-test statistic.

#### RESULTS

From 1999-2010, a total of 1,517,149 cross-sectional imaging studies (CT=994,471; MRI=522,678) comprised of 539,210,581 images (CT=339,830,947; MRI=199,379,634) were evaluated at our institution. Total numbers of annual cross-sectional studies steadily increased from 84,409 in 1999 to 147,336 in 2010, representing a two-fold increase in workload (Q=6465/yr, Z=4.2, p

#### CONCLUSION

Imaging volumes have grown at a rate out of proportion to increasing imaging utilization at our institution. The average radiologist must now interpret 1 image every 2-3 seconds in a given 8-hour workday to keep up with workload demands.

#### CLINICAL RELEVANCE/APPLICATION

Growing imaging volumes, and to a lesser extent increasing utilization, are likely major contributors to Radiologist fatigue.

### **SSK10-07 • Tension between Quality Metrics: The Case of Radiation Dose and Diagnostic Yield in Suspected Chronic Stable Angina**

**Saurabh Jha MD (Presenter)**

#### PURPOSE

Radiation dose and proportion of negative coronary catheter angiograms (CCA) are potential quality metrics in the management of patients with suspected chronic stable angina. The tension between achieving the metrics when using various gatekeeper tests for coronary artery disease (CAD) is explored.

#### METHOD AND MATERIALS

Decision model capturing the diagnostic strategies utilizing various gatekeeper tests, either singly or in combination, in a cohort of patients suspected of chronic stable angina was constructed. CCA was assumed to be the gold standard. Patients with positive and non-diagnostic tests were assumed to receive CCA. The outcomes included total radiation dose in the diagnostic pathway and the proportion of negative catheter angiograms.

The pre-test probability of obstructive CAD in the base case was determined by the model of Diamond and Forrester that uses age, sex and nature of chest pain.

The gatekeeper tests included exercise ECG, stress echocardiogram, stress MRI, SPECT, cardiac CT and PET.

The test characteristics, equivocal test rate and mean radiation dose were abstracted from the literature.

It was assumed that desired quality was the minimization of both radiation dose and proportion of negative catheter angiograms.

#### RESULTS

The typical patient in the cohort is a 55 year old female with atypical chest pain who has 30 % pre-test probability of obstructive CAD. Cardiac CT achieved one of the lowest negative CCA rate of 33 % (desirable) but the highest radiation dose of 15.04 msv (undesirable). Exercise ECG led to the highest negative CCA rate (undesirable) of 54 % but one of the lowest radiation doses (desirable) of 3.36 msv. A combination of stress echo followed by cardiac CT for the non-diagnostic tests was optimal achieving a negative CCA rate of 26 % and a radiation exposure of 3.93 msv.

#### CONCLUSION

A strategy employing stress echo and cardiac CT achieved the lowest negative CCA rate and relatively low radiation exposure; both outputs are plausible quality metrics. The scenario highlights that quality metrics can sometimes be oppositional, even if united by a singular underlying goal of improved patient care.

#### CLINICAL RELEVANCE/APPLICATION

Metrics will become ubiquitous in adjudicating quality and determining value and reimbursement in healthcare.

### **SSK10-08 • Abdominopelvic MRI for Lesion Characterization: Factors Associated with Likelihood of Added Value**

**Andrew B Rosenkrantz MD (Presenter) ; Laura Heacock MS, MD ; James S Babb PhD**

#### PURPOSE

To evaluate factors associated with the likelihood that abdominopelvic MRI examinations performed for characterization of lesions identified on other imaging modalities will provide information with potential to add value to patient management.

#### METHOD AND MATERIALS

1,132 abdominopelvic lesions in 863 patients in which MRI was performed for further characterization following detection by an alternate imaging modality were included in this retrospective study. Reports of the MRI examinations and of the prior studies were reviewed to classify cases in terms of patient, examination, and lesion related factors. The MRI reports were also classified in terms of various measures reflecting inclusion of content with potential to add value to patient management. Data was analyzed using logistic regression for correlated data.

#### RESULTS

MRI provided a definitive diagnosis (DD) for 79.2% (897/1132) of lesions, upgraded the severity of the favored diagnosis in 6.2% (70/1132) of lesions, downgraded the severity of the favored diagnosis in 34.5% (390/1132) of lesions, and showed an absence of the suspected lesion in 12.0% (136/1132) of lesions. Provision of a DD was significantly associated with the organ containing the lesion (p

#### CONCLUSION

Abdominopelvic MRI examinations performed for further lesion characterization may add value to clinical management in a high fraction of cases, the likelihood of which is influenced by factors related to the given examination.

#### CLINICAL RELEVANCE/APPLICATION

Policy decisions that impact MRI utilization should recognize factors impacting likelihood of added value, rather than the historical approach of treating all utilization in a homogeneous fashion.

### **SSK10-09 • Improved Accuracy of Gadoxetate Disodium-Enhanced MRI Using a Double Reading Paradigm for Detection and Characterization of Liver Lesions**

**Sheela Agarwal MD, MS (Presenter) ; Sandeep S Hedgire MD ; Elkan F Halpern PhD \* ; Mukesh G Harisinghani MD ; Pari Pandharipande MD, MPH ; Debra A Gervais MD \* ; Peter F Hahn MD, PhD \* ; Sanjay Saini MD**

#### PURPOSE

To evaluate the incremental clinical value of double reading gadoxetate liver MRIs for detection and characterization of liver lesions and incidental findings.

#### METHOD AND MATERIALS

During the 6 month period from 8/1/2012-1/31/2012, 489 patients underwent 544 liver MRIs with the relatively new contrast agent gadoxetate disodium. Each study was read primarily by a fellowship trained staff abdominal radiologist and over-read by a second abdominal radiologist. Change in diagnosis was confirmed by characteristic radiologic findings with consensus review (74%), imaging follow-up (12%), or histopathology (14%). Any interpretive changes were classified by clinical significance and potential change in patient management. Rates of change in diagnosis were analyzed with logistic regression analysis, including reader factors (experience level, percent of workload dedicated to MRI), exam factors (indication, scanner brand, magnet strength) and work related factors (weekend vs weekday read, presence of preliminary read by trainee).

#### RESULTS

Changes in interpretation occurred on 50 examinations (9.2%) with 23 (4.2%) leading to a potential change in clinical management. On multivariate logistic regression analysis, weekend interpretation was an independent predictor increasing likelihood of a change in interpretation ( $p < 0.01$ ). In step-wise logistic analysis, reading the study alone (without the preliminary read of a trainee) was also found to be a predictor of an interpretive change ( $p < 0.02$ ). On univariate logistic analysis, less experience with liver MRI as measured by a smaller percentage of one's workload dedicated to MRI was a significant factor predicting a miss ( $p < 0.05$ ). Common interpretative discrepancies included omission of one metastasis in the setting of multiple metastases (13), misinterpretation of HCC (9), misinterpretation of hemangiomas (6) and misinterpretation of FNH and adenomas (8).

#### CONCLUSION

Double reading of gadoxetate-enhanced liver MRI results in improved detection and characterization of liver lesions, with a significant effect on clinical management of patients. This may be considered for better clinical practice in divisions with varying levels of reader experience with hepatobiliary contrast agents.

#### CLINICAL RELEVANCE/APPLICATION

Radiologists initiating use of gadoxetate for liver MRI should consider a period of double reading until all staff have acquired full familiarity with this new contrast agent.

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### Health Services - Wednesday Posters and Exhibits (12:15pm - 12:45pm)

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Wednesday, 12:15 PM - 12:45 PM • Lakeside Learning Center

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**LL-HPS-WEA • AMA PRA Category 1 Credit™:0.5**

**Host**  
**Edward Y Lee**, MD, MPH  
**Host**  
**Janie M Lee**, MD \*

**LL-HPS-WE1A • Consensus Oriented Group Review: Analysis of the First Year of Peer Review Data**

**H. B Harvey** MD, JD (Presenter) ; **Tarik K Alkasab** MD, PhD ; **Sergio A Segrera** ; **Daniel I Rosenthal** MD ; **G. Scott Gazelle** MD, PhD \*

#### PURPOSE

Our department developed consensus-oriented group review (COGR), a software-enabled, peer review process in which groups of radiologists meet regularly to review randomly selected cases and record consensus on the acceptability of the issued reports. Designed around departmental teaching conferences, COGR is intended to foster the educational, peer coaching, and systems improvement aims of peer review. We study the peer review data collected after one year of performing COGR in our large academic radiology department.

#### METHOD AND MATERIALS

Data of all cases undergoing COGR from October 2011 through October 2012 were exported into Microsoft Excel using the COGR software tool. The data was analyzed to determine the percentage of cases undergoing COGR review in accredited modalities (e.g. CT, MRI, U/S, mammography) and the rates of discrepancy and non-consensus. Additionally, all cases resulting in a consensus that the report should change (i.e. discrepant cases) were analyzed in greater detail to identify and categorize the source of the error/discrepancy.

#### RESULTS

From October 2011 through October 2012, 7,609 cases were reviewed with COGR in 1,541 conferences. Across all divisions, 2.0% of exams in accredited modalities were reviewed by COGR. The average radiologist participated in 55 COGR conferences. A total of 156 of reviewed cases (2.1%) resulted in a consensus that the report should change and 92 cases (1.2%) resulted in no consensus. For the discrepant cases, sources of error/discrepancy could be attributed to a dictation error in 20% of cases, omitted finding in 52% of cases, interpretative error in 19% of cases, failure to use non-routine communication of results in 1% of cases, and error related to a recommendation in 8% of cases.

#### CONCLUSION

Ongoing application of the COGR process generates highly contextualized peer review data that elucidates sources of error in diagnostic imaging. Sustained use in our department permits review of sufficient cases to comply with external standards for ongoing performance review while generating opportunities to identify issues and monitor progress towards quality goals.

#### CLINICAL RELEVANCE/APPLICATION

Consensus oriented group review is a feasible and sustainable option for radiology peer review in a large academic medical center where it produces highly contextualized quality and safety data.

**LL-HPS-WE2A • The Big Picture: Radiology Quality Improvement in the Hospital QA Setting: Communication Is (almost) Everything**

**Bettina Siewert** MD (Presenter) ; **Olga R Brook** MD \* ; **Jonathan B Kruskal** MD, PhD \*

#### PURPOSE

The purpose of this study is to analyze radiology quality improvement issues that were brought to our attention through hospital personnel working outside of radiology to identify opportunities for improvement and provide better customer service

#### METHOD AND MATERIALS

We collected quality improvement entries and inquiries that were brought to our attention over an eight months period from August 2012 to March 2013. The origin of the complaint reported to us by personnel working outside of radiology was noted as: electronic hospital patient safety and adverse event reporting system, office for Health Care Quality, office for Patient Relations and hospital e-mail. The radiology component of the cases was categorized into interpretative error, technical error, procedure complication and communication issues. All cases were reviewed and opportunities for improvement were identified.

#### RESULTS

32 cases were referred to us through: electronic patient safety and adverse event reporting system (n=18), office for Health Care Quality (n=5), hospital e-mail (n=5), office for Patient Relations (n=4). Errors were classified as communication (n=16) (50%), misread (n=7)

(22%), technical (n=5) (16%), procedure complication (n=4) (12%). Upon review of the cases no opportunities for improvement could be identified in 9 cases (28%) as they represented known procedural complications that could not have been avoided (n=4), perceived 'technical errors' where the study had been performed correctly (n=4) (shoulder injury not attributable to mammogram, MRI of the pituitary gland did not identify septic emboli as area of brain was not imaged due to limited field of view, premedication for iv contrast due to shellfish allergy was not initiated by radiologist, US demonstrated no flow in transplant kidney), communication error (n=1) (radiology resident correctly documented and discussed diagnosis over the phone, but referring physician did not receive information). Four communication errors were due to misconceptions by referring physicians as to radiology department policies.

#### CONCLUSION

50% of radiology quality improvement issues reported by personnel working outside of radiology are due to communication issues alone, only 22% are due to an error in image interpretation. In 28% of cases, no opportunity of improvement could be identified.

#### CLINICAL RELEVANCE/APPLICATION

50% of radiology QA entries through hospital systems are due to perceived lack of communication.

### LL-HPS-WE3A • A Critical Review of the Level of Readability of Online Patient Education Materials from RadiologyInfo.org

**David R Hansberry** PhD (Presenter) ; **Ann John** ; **Elizabeth John** ; **Nitin Agarwal** ; **Sharon F Gonzales** MD ; **Stephen R Baker** MD \*

#### PURPOSE

The widespread availability and ease of access has made the Internet a major source of healthcare information for patients. To account for patient diversity, the American Medical Association (AMA) and National Institutes of Health (NIH) guidelines recommend that consumer healthcare websites be written between a 3rd and 7th grade level. The purpose of this study is to evaluate the jointly sponsored American College of Radiology and the Radiology Society of North America website, RadiologyInfo.org, for its level of readability.

#### METHOD AND MATERIALS

In December 2012, patient education resources from RadiologyInfo.org were downloaded. Each of the 137 patient education articles available on RadiologyInfo.org were assessed for their respective level of readability using 10 different scales: the Flesch Reading Ease, Flesch-Kincaid Grade Level, SMOG Grading, Coleman-Liau Index, Gunning-Fog Index, New Dale-Chall, FORCAST, Fry graph, Raygor Estimate, and New Fog Count.

#### RESULTS

All 137 articles were written at a level well above the AMA and NIH recommended guidelines of material to be written no higher than a 7th grade level. In fact, only 5% (7/137) were written below the 10th grade level and only 1.5% were below the 9th grade level. When averaged across all 137 articles, the readability of material on RadiologyInfo.org ranged between the 11.5 and 13.7 grade levels.

#### CONCLUSION

The readability of the text of patient education resources on RadiologyInfo.org is beyond both the AMA and NIH recommended guidelines. This disconnect may negatively impact patient understanding of such Internet resources. Therefore, patient education resources available on RadiologyInfo.org may benefit from revision in an attempt to improve patient comprehension.

#### CLINICAL RELEVANCE/APPLICATION

NA

### LL-HPS-WE4A • Peer Review (Retrospective Sampling) vs. Quality Assurance Database (Voluntary Data Entry) in Ob/Gyn Imaging

**Olga R Brook** MD (Presenter) \* ; **Janneth Y Romero** MD ; **Alexander Brook** PhD \* ; **Jonathan B Kruskal** MD, PhD \* ; **Deborah Levine** MD \*

#### PURPOSE

Our quality assurance (QA) database is a voluntary learning system for radiologists to submit technical and clinical QA errors, complications and related events. Submissions into peer review (PR) are mandatory entries by radiologists through a process of retrospective review of cases. Our purpose of this study was to evaluate patterns of submissions into PR and QA databases involving Ob/Gyn imaging.

#### METHOD AND MATERIALS

Submissions to departmental QA (9/2004-11/2012) and PR (3/2007-11/2012) databases were searched for Ob/Gyn-related keywords. After exclusion of duplicates, there were 202 cases in QA and 73 in PR databases. Review and grading of cases was performed independently by two ultrasonologists. Cases were categorized into perceptual, interpretive, communication and procedural errors. Impact of the errors was assessed based on clinical and radiological follow up. Probability of the error occurrence was estimated. 17 cases from QA and 9 cases from PR database were not true QA issues by consensus agreement, thus excluded from further analysis. The final study group included 185 cases in QA and 64 in PR databases.

#### RESULTS

There was no significant difference in patient age ( $44 \pm 18$  vs.  $42 \pm 16$  yrs,  $p=0.41$ ), or time period between study and error reporting, ( $298 \pm 584$  vs.  $152 \pm 368$  days,  $p=.10$ ) in PR and QA databases, respectively. The majority of the submissions were for outpatient studies 37/64, 58% and 139/185, 75%, respectively. More emergency room studies were submitted to PR 25/64, 39%, compared to QA 26/185, 14% (p

#### CONCLUSION

More clinically relevant, but less frequent cases are submitted through a voluntary quality assurance reporting mechanism than through the peer review process.

#### CLINICAL RELEVANCE/APPLICATION

Our results suggest that efforts to improve quality (by increasing the reporting of adverse events and diagnostic errors) should continue to encourage voluntary entry of all QA cases.

### LL-HPS-WE5A • The ABR's Practice Analysis Survey: Comparison of 2010 and 2013

**June C Yang** PhD,RN (Presenter) ; **Anthony Gerdeman** PhD ; **Kay H Vydareny** MD ; **Gary J Becker** MD ; **Jennifer Bosma** PhD

#### PURPOSE

To present the findings of the 2013 ABR Practice Analysis survey, performed to determine the critically important and frequently performed activities in clinical practice, and to note changes in practice patterns since the prior survey in 2010.

#### METHOD AND MATERIALS

The survey instrument was distributed electronically to 17,721 members of American College of Radiology with a unique identification code for each individual in 2010 and to 16,369 individuals in 2013. A five-point scale was established for both frequency and importance variables. Rating scales were identical both in 2010 and 2013. Currently, the data are being collected and data collection will be closed on April 12, 2013.

#### RESULTS

In 2010, 2909 (19.32%) diagnostic radiologists answered the survey, while in 2013, there were 1964 (13.00%) respondents as of April 2, 2013. 2,233 (76.8%) of the respondents indicated that they spent at least 50% of their time in clinical practice in 2010 whereas 1368 (69.65%) diagnostic radiologists who participated reported practicing 50% or more in clinical practice thus far in 2013. The test of

statistical significance will be tested in the clinical practice settings and in other demographic data between the two surveys, 2010 and 2013. Changes in top three activities/indications in importance and frequency between the two surveys will be compared.

#### CONCLUSION

The 2013 practice analysis survey may show changes in practice patterns between 2010 and 2013. These changes will be incorporated into the exam development processes of the ABR.

#### CLINICAL RELEVANCE/APPLICATION

Changes observed from a practice analysis survey in 2013 will be discussed. Knowledge of these changes is important so that examinations which reflect current practice patterns can be constructed.

### **LL-HPE1073-WEA • USA Are You Ready? Basic Knowledge of Ultrasound Contrast Agents for Beginners, while Waiting for the FDA Approval**

**Demosthenes D Cokkinos MD (Presenter) ; Eleni Antypa ; Despina Kriketou ; Santroninos D Papadakis MD, MSc ; Stavroula Athanaspoulou ; Ploutarhos A Piperopoulos MD, PhD**

#### PURPOSE/AIM

To prepare USA Radiologists for the long awaited FDA approval on the use of ultrasound contrast agents. To introduce basic knowledge of Contrast Enhanced Ultrasound (CEUS) and review physics, indications, contraindications and limitations. To suggest strategies for training doctors and organising departmental staff in order to facilitate the introduction of CEUS in an Imaging Department with no previous experience.

#### CONTENT ORGANIZATION

CEUS is used in many countries worldwide, solving many diagnostic problems. In the USA, it is currently not performed due to FDA regulations, a situation expected to change shortly. This presentation proposes simple steps facilitating CEUS introduction in a Department with no previous knowledge. These include knowledge of physics, presenting the technique to clinicians, initial scanning of patients with simple diagnostic questions, contacting application specialists for technical aid, scheduling CEUS exams at session beginning or end, placing IV catheters in advance, minimising clip storing to avoid memory load, transferring clips-images to PCs, reviewing scans on workstations, applying hands-on training to interns and performing next day reporting. Contraindications, limitations and safety matters are also examined.

#### SUMMARY

By following simple organising and training measures, CEUS can be introduced in everyday clinical practice.

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### **Health Services - Wednesday Posters and Exhibits (12:45pm - 1:15pm)**

#### **Wednesday, 12:45 PM - 01:15 PM • Lakeside Learning Center**

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### **LL-HPS-WEB • AMA PRA Category 1 Credit™:0.5**

**Edward Y Lee , MD, MPH**  
**Janie M Lee , MD \***

### **LL-HPS-WE1B • Communication of Acute Findings on Imaging Examinations: Quality and Performance Assessment in the Emergency Department**

**Amir Imanzadeh MD (Presenter) ; Anand K Singh MD ; Parul Penkar MBBS ; Ajay K Singh MD ; Gloria M Salazar MD ; Garry Choy MD, MS**

#### PURPOSE

To evaluate the quality, performance, and accurate documentation of communication of acute findings with referring physicians by radiologists in the emergency department.

#### METHOD AND MATERIALS

We assessed a randomly selected 150 patients who underwent imaging at our institution between 8/2012 to 4/2013. We collected the date and time of request of imaging, indication, imaging diagnosis, and time at which communication of acute findings were communicated by radiologists based on radiology report. Acute findings were defined as requiring immediate surgical or medical treatment. We then calculated time interval between image acquisition and documented time of communication and correlated to whether findings were acute or non-acute. Appropriate and complete documentation was defined as including date, time and read back information with physician name.

#### RESULTS

In our study, there was 150 patients with average age of 61 y ( $\pm 21$ ) with a M:F ratio of 68:82 where the most common imaging studies included CT scan (n=42) and MRI (n=35). Complete documentation of communication of acute findings occurred 69.3% of the time, which included all elements of referring physician name, date, and time. In those cases where the complete documentation was recorded, the average interval time between completing study and discussing the results was 3 hours and 55 minutes (SD 5 hours and 39 minutes). There were 103 cases with any abnormal imaging findings (including non-acute finding, i.e. pneumonia) and a subset of 63 cases with acute conditions. For these patients with acute findings, the time interval of communication was less than 2 hours for 60.57% of cases.

#### CONCLUSION

Communication of acute imaging findings to the referring physician is critical for patient care. In our study, we found that in a majority of time, there is complete documentation and timely communication. However, there is also high variance in radiologist documentation and communication. As a result, there remains an important opportunity for quality improvement in the communication of acute findings.

#### CLINICAL RELEVANCE/APPLICATION

Ensuring high quality radiology reporting requires both proper documentation of radiologist to referring physician communication and timely communication, particularly in the setting of acute findings

### **LL-HPS-WE2B • Evaluation of the Appropriateness of CT Chest Examinations in a Canadian Setting**

**Julie M O'Brien MBBCh, FFRCSI (Presenter) ; Catherine M Jones MBBS ; Max Sun ; John R Mayo MD \***

#### PURPOSE

We evaluated the appropriateness of chest CT referrals in an urban setting in Canada. It has been suggested that up to 30% of all CT exams may be inappropriate based on data arising from the US and Italy. Inappropriate CT exams waste limited health care dollars and expose patients to substantial doses of unnecessary medical radiation. Given the 50% lower rate of CT exams per capita in Canada compared with the US, we hypothesized that the 30% rate might not accurately reflect and may overestimate the rate of inappropriate CT exams in Canada.

#### METHOD AND MATERIALS

Following IRB approval and using the institutional PACS system, we performed a retrospective review of the clinical indication on the ordering requisition for 550 consecutive CT chest exams performed in 3 hospitals in the urban Vancouver Coastal Health system. Clinical

indication and patient demographics were evaluated by 4 observers [2 fellowship trained chest radiologists, 1 senior chest radiologist (24 yrs experience), 1 internal medicine physician]. Indications were classified using the ACR appropriateness guidelines into inappropriate (ACR 1,2,3), maybe appropriate (ACR 4,5,6) and inappropriate (ACR 7,8,9) levels. Referring physician specialty, patient location, and radiation dose were also recorded.

#### RESULTS

Of the total 550 requests evaluated, 349 examinations were performed in academic teaching centers and 201 in an affiliated community hospital. In total 432 requests (79%) were deemed appropriate by all 4 readers, 516 (94%) requests were deemed appropriate by 3 or more readers. Analysing the lowest given score in each case, 412 (75%) were deemed appropriate, 125 (22.7%) maybe and 13 (2.4%), inappropriate. Reasons for inappropriate scores included suspected duplicate ordering, illegible or confusing requisitions, and lack of radiographs in some cases.

#### CONCLUSION

Findings show the rate of inappropriate chest CT examinations performed in an urban Canadian setting is lower than that previously reported in the literature. This study however, highlights the variability in determining appropriateness given the limited clinical history available on radiology requisitions that may not adequately reflect the actual indication in a complicated clinical setting.

#### CLINICAL RELEVANCE/APPLICATION

It has been suggested that 30% of clinical radiologic examinations are inappropriate, we examined 550 consecutive CT chest requisitions in an academic setting in Canada, to evaluate this allegation.

### LL-HPS-WE3B • Are “Double” CT Scans of the Thorax Being Overused?

**David C Levin MD (Presenter) \* ; Vijay M Rao MD ; Laurence Parker PhD ; Andrea J Frangos MPH**

#### PURPOSE

A front page article in the New York Times of 6/17/11 reported that Medicare claims showed overuse of “double” CT scans of the thorax (i.e. CT without plus with contrast). Some hospitals were found to do these types of exams 60-90% of the time. Most radiologists agree that they should be done only on rare occasions. Our goal was to see what proportion of all thoracic CTs are done without plus with contrast in the Medicare population.

#### METHOD AND MATERIALS

The Medicare Part B Physician/Supplier Procedure Summary Master Files for 2001, 2006, and 2011 were our data source. CPT codes 71250 (CT thorax without contrast), 71260 (CT thorax with contrast), and 71270 (CT thorax without, followed by with contrast) were selected. The files indicate procedure volume for each code in the nationwide Medicare fee-for-service population (36.3 million in 2011). The percent of scans performed without + with contrast was calculated.

#### RESULTS

In 2011 in Medicare, there were 3,316,188 thoracic CTs performed ♦ 1,429,885 without contrast; 1,747,672 with contrast; and 138,631 without + with contrast. The latter study thus comprised 4.2% of all thoracic CTs that year. In 2006, there had been a total of 3,491,960 thoracic CTs performed, of which 212,805 were without + with contrast (6.1%). In 2001, there had been 2,016,441 thoracic CTs performed, of which 123,797 were without + with contrast (also 6.1%).

#### CONCLUSION

Although the New York Times article clearly identified a problem that existed in some institutions, only a small proportion (4.2%) of thoracic CT scans nationwide in 2011 were done both without and with contrast. Moreover, the proportion of thoracic CTs done that way dropped by almost one-third from 2001 and 2006 to 2011, suggesting that the practice is declining. This 4.2% figure can be used as a benchmark against which to judge radiology facilities in the future.

#### CLINICAL RELEVANCE/APPLICATION

Not applicable.

### LL-HPS-WE4B • Bacterial Contamination of Radiologist Workstations: Incidence and Potential Health Implications

**Brandi D Lanier MD (Presenter) ; Austin Tubbs ; Mary Ogilvie ; Sandra Thompson-Jaeger ; Richard Duszak MD**

#### PURPOSE

Bacterial contamination of electronic and other devices in the hospital setting is common and creates nosocomial infectious risks to patients and staff alike. This public health issue has received little attention in the radiology community. We aimed to quantify and characterize bacterial contamination of radiologist workstations and consider its implications.

#### METHOD AND MATERIALS

Dictation microphones and computer mice at the most frequently used radiologist workstations from 2 inpatient and 2 outpatient reading rooms each at 2 teaching hospitals in 2 states were sampled for bacteria. Reference toilet seat and doorknob sampling was performed in the restroom nearest each of those 4 reading rooms. One microphone and one mouse in each reading room were chosen at random, and repeat sampling was performed after quickly wiping each surface with an inexpensive commercially available antiseptic pad. Sampling was performed using direct trypticase soy agar plating, with sampled areas uniformly approximating 50 sq cm. Colonies were quantified and characterized after 24 hours.

#### RESULTS

#### CONCLUSION

Bacterial contamination of dictation microphones and computer mice at radiologist workstations is extremely common, with average bacterial colonization significantly greater than that of neighboring restroom toilet seats and doorknobs. Simple, rapid, and inexpensive disinfection techniques nearly completely eradicate radiologist workstation microbial contamination and likely minimize radiologist exposure and cross-contamination risk to other staff and patients alike.

#### CLINICAL RELEVANCE/APPLICATION

Bacterial contamination of radiologist workstations is common- 5x higher than nearby restroom toilet seats and doorknobs. Simple disinfection techniques are highly effective and strongly advised.

### LL-HPS-WE5B • Legal Ramifications of Computer Aided Detection in Mammography

**Jonathan Mezrich MD (Presenter) ; Cristina I Campassi MD ; Eliot L Siegel MD \***

#### PURPOSE

Computer assisted detection (CAD) is increasingly utilized in radiology, and its use is presently most prevalent in screening mammography. While CAD may be helpful to the clinician in highlighting findings the clinician may not have observed, it is not without legal ramifications. To what extent is CAD use becoming the standard of care in the subspecialty? If CAD is performed, is one then obligated to follow or biopsy CAD findings one finds questionable or would have otherwise ignored? Will a questionable finding not mentioned or dismissed by the radiologist, but marked by CAD, which ultimately did develop into a malignancy, be grounds for malpractice? To what extent do clinicians archive CAD markings, and if not, is there a worry that future better versions of CAD might be used in the courtroom to show that findings were “CAD evident”? If CAD markings are discarded, is this not a case of “spoliation” that should be determined in favor of an injured plaintiff?

#### METHOD AND MATERIALS

A link to a SurveyMonkey survey was posted on the website of the Society of Breast Imaging and circulated to subscribers of Diagnostic

Imaging.com, in order to evaluate opinions regarding CAD use and its underlying legal issues. There were 45 responses.

## RESULTS

91.1% of respondents indicated they always use CAD in their screenings, and 79.5% consider CAD use in conjunction with their own analysis the standard of care in mammography. 24.4% routinely archive CAD output into PACS along with the study, while 71.1% rarely or never do. 82.2% of respondents worry that archived CAD markings may lead to more lawsuits or greater liability, and 80.0% indicate that CAD results may influence their willingness to take a position as an expert witness in a malpractice case.

## CONCLUSION

This study suggests that a majority of breast radiologists consider CAD use the standard of care in screening mammography, and worry about CAD's potential to increase litigation or liability. The majority of respondents indicated they are not archiving CAD results. CAD is a tool with potential legal ramifications, and radiologists should carefully consider how best to integrate CAD into their archiving policies and within their reports.

## CLINICAL RELEVANCE/APPLICATION

This study is of interest to all radiologists who use computer aided detection in their practices and are concerned or cognizant of the legal ramifications of such technology.

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### Hospital Administrators Symposium

Wednesday, 01:30 PM - 05:30 PM • S103AB

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**SPHA41** • AMA PRA Category 1 Credit™:4 • ARRT Category A+ Credit:4.5

#### Moderator

**Jonathan W Berlin**, MD \*

#### SPHA41A • Introduction

**Jonathan W Berlin** MD (Presenter) \*

#### SPHA41B • New Roles for Radiologists in the Next Decade

**Alan D Kaye** MD (Presenter)

#### LEARNING OBJECTIVES

1) Awareness of the current pressures on radiologists. 2) Key constituencies for radiologists of the future. 3) How individual radiologists and their practices need to adapt to the above to provide value in the evolving health care landscape.

#### SPHA41C • Radiology in the Next Decade: The Payer's Perspective

**Mark D Hiatt** MD,MBA (Presenter) \*

#### LEARNING OBJECTIVES

1) To explain the new emphasis on value over volume in the accountable care era. 2) To examine how radiologists may need to be more involved in coordinating care to achieve appropriate utilization. 3) To discuss how radiologists may share in the savings from value-based care.

#### SPHA41D • Radiology Utilization Management in the Next Decade

**Cherrill Farnsworth** (Presenter) \*

#### LEARNING OBJECTIVES

1) Attendees will leave with having heard about radiology utilization management changing from denial based to best practices and peer to peer consulting driven by today's search engines and real time point of care smart phone, tablet and laptop tools. They will see actual such tools used today in action. 2) Attendees will learn the financial and economic drivers that are causing these changes and, thus understand where this is coming from and how it saves money in the American healthcare system and in their practice. 3) Attendees will leave having learned the political drivers of these changes and which ones are likely to stand and which ones are most likely to change or be withdrawn. 4) Attendees will be given actionable solutions that they can implement into their practices in order to maximize their department or groups readiness for change.

#### SPHA41E • Question and Answer Period

**Jonathan W Berlin** MD (Presenter) \* ; **Alan D Kaye** MD (Presenter) ; **Mark D Hiatt** MD,MBA (Presenter) \* ; **Cherrill Farnsworth** (Presenter) \*

#### SPHA41F • Radiology Practice Mergers and Acquisitions: Clinical and Administrative Issues

**Blair Faber** (Presenter) ; **Howard B Chrisman** MD (Presenter)

#### LEARNING OBJECTIVES

1) Understand economic and operational forces driving consolidation of radiologic practices. 2) Understand the positive and negative aspects of radiologic practice consolidation. 3) Explore key clinical and administrative challenges when approaching a radiology practice merger or acquisition.

#### SPHA41G • Predicting the Future of Radiology: Medical Center President Perspective

**Sharon O'Keefe** (Presenter)

#### LEARNING OBJECTIVES

1) Describe the key economic drivers of healthcare reform in the near term. 2) Identify how healthcare reform will alter the relationship between Radiology and medical centers. 3) Evaluate future opportunities for Radiology and the evolving delivery system to prosper.

#### SPHA41H • Teleradiology versus Local Radiologists: Issues and Perspectives

**David C Levin** MD (Presenter) \*

#### LEARNING OBJECTIVES

1) Become familiar with the advantages of using a teleradiology company. 2) Become aware of the drawbacks of using a teleradiology company. 3) Understand the added value to the hospital of having a fully staffed local radiology group on site.

#### SPHA41I • Question and Answer Period

**Blair Faber** (Presenter) ; **Howard B Chrisman** MD (Presenter) ; **Sharon O'Keefe** (Presenter) ; **David C Levin** MD (Presenter) \* ; **Jonathan W Berlin** MD (Presenter) \*

**SSM10 • AMA PRA Category 1 Credit™:1****Moderator****James V Rawson , MD****Moderator****Annette J Johnson , MD, MS****SSM10-01 • Health Service, Policy and Research Keynote Speaker: Medicolegal and Ethics****James V Rawson MD (Presenter)****SSM10-02 • The Medical Malpractice Environment for Radiology at a Large Integrated Health System: A 5-Year Survey****H. B Harvey MD, JD (Presenter) ; Sam T Boland ; Deborah LaValley RN ; Garry Choy MD, MS****PURPOSE**

Medical malpractice liability is a pervasive concern among radiologists and shapes the way radiology is practiced. Working with a professional liability insurer, we studied the radiology malpractice liability environment at a large integrated health system over a five-year period.

**METHOD AND MATERIALS**

All medical malpractice claims asserted against the health system from 1/1/2008 to 12/31/2012 were collected and analyzed. Claims were evaluated based on the medical specialties involved, total liability costs incurred, and the disposition of closed cases. Claims involving radiology were further evaluated to determine severity of the injury asserted, health care setting involved, primary allegation asserted, and, for missed diagnosis cases, the primary diagnosis missed. When possible, comparison was made to the Comparative Benchmarking System (CBS), a large national HIPAA-compliant, medical malpractice claims database.

**RESULTS**

Over the five-year period, 1,126 malpractice claims were asserted against the health system resulting in \$623M of total incurred liability. Claims involving radiology made up 8% of the cases, representing the 5th most commonly involved medical specialty, compared to 7th nationwide. Of the radiology claims, 57% were dropped or dismissed, 39% settled, 2% resulted in a defense verdict, and 2% resulted in a plaintiff verdict. The nature of the claims involving radiology was also assessed. Of those claims, 52% involved a high level of injury severity (defined as injury resulting in death or permanent significant deficit). The majority of the claims involving radiology involved the ambulatory setting (80%), followed by the inpatient setting (13%) and emergency department (7%). The most commonly asserted allegation against radiology involved diagnosis-related negligence (65%), followed by treatment-related (39%) and medication-related (3%) negligence. Cancer was the most commonly missed diagnosis representing 65% of missed diagnosis cases. There was little difference in the nature of the radiology claims compared to nationwide data.

**CONCLUSION**

Radiology is a significant contributor to malpractice liability with claims commonly originating in the ambulatory setting, involving allegations of diagnostic failure, and resulting in high severity injuries.

**CLINICAL RELEVANCE/APPLICATION**

Medical malpractice claims data can offer valuable insight into the current liability environment and can direct strategies for reducing liability exposure.

**SSM10-03 • SECURE Study: Observational Post-marketing Study on the Safety of Gadoterate Meglumine - Interim Analysis****Harsh Mahajan MD, MBBS (Presenter)****PURPOSE**

To prospectively assess the safety profile of gadoterate meglumine and the overall incidence of nephrogenic systemic fibrosis (NSF).

**METHOD AND MATERIALS**

An ongoing worldwide multicentre post-marketing study (PMS) is conducted to collect safety data in 40,000 patients (adults and children) with or without renal insufficiency, scheduled to undergo a routine contrast-enhanced magnetic resonance (MR) examination using gadoterate meglumine (Dotarem®). Risk factors at inclusion, indications for MR imaging, conditions of the contrast material administration, occurrence of adverse events are recorded. For any patient identified as renally impaired at the time of inclusion (i.e., estimated creatinine clearance or estimated glomerular filtration rate

**RESULTS**

As of October 23, 2012, the cut-off date for the interim safety analysis, this ongoing PMS included data on 29689 patients (mean age: 50 years; range: 0-98 years; female, 53.4%). MR examinations were mainly performed to image the central nervous system (55.1%). The main risk factors were renal insufficiency (12.7%) and hypertension (11.8%). Moderate to severe impaired renal function was reported in 552 patients (1.9%). Among them, 391 (70.8%) were reported without suspicion of NSF during the 3-month follow-up. For the remaining patients (29.2%), the follow-up evaluation was not yet reported at the time of data analysis. Twenty-eight patients (

**CONCLUSION**

This interim safety analysis already confirms the very good safety profile of gadoterate meglumine.

**CLINICAL RELEVANCE/APPLICATION**

(dealing with safety of contrast enhanced MRI in patients with or without renal insufficiency regarding NSF) this interim safety analysis confirms the very good safety profile of gadoterate meglumine.

**SSM10-04 • Patient-centered Care: Lessons Learned from Brief Radiologist-patient Interviews Prior to Musculoskeletal Magnetic Resonance Imaging****Derik L Davis MD (Presenter) ; Michael E Mulligan MD ; Arie Moszkowicz MD ; Charles S Resnik MD****PURPOSE**

To determine if brief radiologist-patient interviews before musculoskeletal magnetic resonance imaging (MRI) improve the quality of clinical information available during image interpretation.

**METHOD AND MATERIALS**

The institutional review board approved this retrospective study and waived informed consent. A total of 186 screening questionnaires completed by outpatients prior to musculoskeletal MRI at a single institution between August and November 2011 were separated into two cohorts: (1) outpatient imaging center (IC) forms with no radiologist-patient interaction; (2) hospital (H) forms with radiologist-patient interviews before MRI. Two musculoskeletal (MSK) radiologists and one MSK fellow independently reviewed each form while blind to the patient demographics, imaging site, clinician referral information, and MR images. The reviewers rated the forms for quality on a 5-point scale: 5(outstanding) to 1(poor). A third MSK radiologist performed a separate analysis to determine if each question received an answer, and also to quantify the response to the open-ended symptoms question. The unpaired t test, Fischer exact test and ?2 test were used to compare the two cohorts.

**RESULTS**

The mean score of the H-cohort among reviewers was higher than the IC-cohort: 3.79 (±0.98) versus 3.04 (±1.00), P

#### CONCLUSION

Direct radiologist-patient interaction prior to musculoskeletal MRI improves the quality of clinical information available during image interpretation.

#### CLINICAL RELEVANCE/APPLICATION

The interpretation of imaging studies with inadequate clinical information is not uncommon. Direct radiologist-patient communication before imaging may remedy this problem.

### SSM10-05 • The ABR's Practice Analysis Survey: Comparison of 2010 and 2013

**June C Yang** PhD,RN (Presenter) ; **Anthony Gerdeman** PhD ; **Kay H Vydareny** MD ; **Gary J Becker** MD ; **Jennifer Bosma** PhD

#### PURPOSE

To present the findings of the 2013 ABR Practice Analysis survey, performed to determine the critically important and frequently performed activities in clinical practice, and to note changes in practice patterns since the prior survey in 2010.

#### METHOD AND MATERIALS

The survey instrument was distributed electronically to 17,721 members of American College of Radiology with a unique identification code for each individual in 2010 and to 16,369 individuals in 2013. A five-point scale was established for both frequency and importance variables. Rating scales were identical both in 2010 and 2013. Currently, the data are being collected and data collection will be closed on April 12, 2013.

#### RESULTS

In 2010, 2909 (19.32%) diagnostic radiologists answered the survey, while in 2013, there were 1964 (13.00%) respondents as of April 2, 2013. 2,233 (76.8%) of the respondents indicated that they spent at least 50% of their time in clinical practice in 2010 whereas 1368 (69.65%) diagnostic radiologists who participated reported practicing 50% or more in clinical practice thus far in 2013. The test of statistical significance will be tested in the clinical practice settings and in other demographic data between the two surveys, 2010 and 2013. Changes in top three activities/indications in importance and frequency between the two surveys will be compared.

#### CONCLUSION

The 2013 practice analysis survey may show changes in practice patterns between 2010 and 2013. These changes will be incorporated into the exam development processes of the ABR.

#### CLINICAL RELEVANCE/APPLICATION

Changes observed from a practice analysis survey in 2013 will be discussed. Knowledge of these changes is important so that examinations which reflect current practice patterns can be constructed.

### SSM10-06 • Making Imaging around the World Better: Global Survey of Radiologists in 10 Countries

**Bhavya Rehani** MD (Presenter) ; **Pamela W Schaefer** MD ; **Ramon G Gonzalez** MD, PhD ; **Vinil Shah** ; **Javier M Romero** MD ; **Otto Rapalino** MD ; **David A Rosman** MD \* ; **Garry Choy** MD, MS

#### PURPOSE

There are substantial unmet imaging needs for vulnerable and crisis affected populations. Our aim was to survey radiologists across developing countries in Asia, Europe and South America to assess their imaging needs and find out what in their opinion are the most effective ways to improve imaging in their respective countries.

#### METHOD AND MATERIALS

A standardized questionnaire containing 11 questions was sent to radiologists in 18 developing countries across the world. Radiologists from 10 countries responded (response rate=55%). These include Sri Lanka, Thailand, Costa Rica, Belarus, Serbia, Macedonia, Singapore, the Czech Republic, Lithuania and Slovenia. Some questions addressed the overall status of radiology in their countries and focused on potential shortages of radiologists, residency positions and medical physicists, while others focused on effective solutions to problems they face everyday.

#### RESULTS

Survey results indicated that most of the countries (90%), need to establish more radiology residency training positions. For improving knowledge in radiology, 100% thought online teaching modules would be most effective, and 30% believed onsite teaching workshops would help. 60% of radiologists (95% CI being 47.6 to 72.4%) believed that humanitarian second opinion teleradiology would be valuable in more than 50% of their cases, while 40% (95% CI being 27.6 to 52.4%) believed that a second opinion would be needed in less than 50% of their cases. 100% believed that the subspecialty in which they feel most deficient is neuroradiology with musculoskeletal imaging and pediatric imaging being the second and third most highly ranked choices. Only 60% (95% CI being 47.6 to 72.4%) had access to a medical physicist and most believed that they need education in radiation safety and dose reduction. Other practical questions focused on image transfer, organizational development and informatics.

#### CONCLUSION

This survey helps radiologists around the world communicate the imaging needs in their respective countries and how can they be met. This survey can help radiologists who want to reach out in their humanitarian efforts to improve imaging around the world.

#### CLINICAL RELEVANCE/APPLICATION

Global outreach programs can use this survey to determine more effective ways of improving radiology in developing countries.

## Controversy Session: Lung Cancer Screening: Conflict of 'Dollars and Sense?'

Wednesday, 04:30 PM - 06:00 PM • E450A

HP | OI | CH

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SPSC41 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

#### Moderator

**Ned Patz**, MD

**Ned Patz**, MD

**Caroline Chiles**, MD

#### LEARNING OBJECTIVES

1) Understand the primary objectives of the NLST. 2) Describe the results of the NLST and assess their potential applications to clinical practice. 3) Assess advantages and limitations of LDCT screening. 4) Consider financial implications of widespread screening.

ABSTRACT

URL



**MSRT51** • AMA PRA Category 1 Credit™:1 • ARRT Category A+ Credit:1  
Mark Given , MRT, RT

LEARNING OBJECTIVES

1) An overview of best practice for medical radiation technologists in Canada. 2) A detailed overview of the processes used to develop the evidenced-based recommendations within each guideline. 3) An understanding of the collaborative approach used to vet the recommendations. 4) A brief tutorial on how to use the guidelines. 5) Discuss how the guidelines are being used to change practice.

ABSTRACT

Guidelines provide a tool to help individuals enhance their professional lives and keep up with changes in their field. The opportunity to develop best practice documentation for medical radiation technologists in Canada was identified as an important strategic step for the profession and a key component of the push to gain greater recognition. In 2010, the Canadian Association of Medical Radiation Technologists (CAMRT) assembled a multidisciplinary committee from across Canada to develop Best Practice Guidelines. Since that time, the group has been identifying and developing new guidelines for MRT professionals across Canada to use in their daily practice. The process of working with this diverse group and developing an interactive Best Practice Guidelines website has been an evolution from start to finish. It provides many lessons and innovations to share with those who wish to pursue this path in the future.

**How To Evaluate Resident Milestones Effectively and Efficiently: Practical Ideas Will Help Program Directors and Residents To Know What Is Expected**

Thursday, 08:30 AM - 10:00 AM • S404AB



**RC602** • AMA PRA Category 1 Credit™:1.5  
Angelisa M Paladin , MD  
Mary H Scanlon , MD, FACR  
Todd S Miller , MD

LEARNING OBJECTIVES

1) Become familiar with each main milestone category. 2) Learn the constituent parts of each main milestone category and how they are structured into graduated sections organized by level of training. 3) Learn methods of gathering data for each milestone category, section, and level within each using the resources provided by the milestone committee. 4) Learn how to apply proven assessment strategies via review of lessons learned during successful and unsuccessful implementations undertaken by the milestone committee members.

**Health Policy Initiatives in Medical Imaging: Promoting Value and Relevancy in Evolving Healthcare Delivery and Payment Systems**

Thursday, 08:30 AM - 10:00 AM • S504AB



**RC627** • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5  
Moderator  
Richard Duszak , MD  
Bibb Allen , MD  
Richard Duszak , MD  
Danny Hughes , PhD

LEARNING OBJECTIVES

1) Articulate trends in healthcare delivery system evolution which warrant evidence based policy making founded in credible research. 2) Describe current and future physician payment models as healthcare reform moves compensation from one based on volume to one based on value. 3) Discuss how imaging services can be appropriately considered under future value-based purchasing models. 4) Identify opportunities for health services researchers and those interested in health services research to pursue projects focusing on medical imaging.

ABSTRACT

Medical imaging has played an increasingly important and valuable role in patient care, but has captured the attention of payers and policy makers alike. In order to study the role and value of radiology and radiologists in current and evolving healthcare payment and delivery systems, the Harvey L. Neiman Health Policy Institute was founded. Leadership will discuss the need for health services and policy research as they pertain to medical imaging, review projects completed and underway, and describe opportunities for those interested in health services research to collaborate and advance their interests.

**Health Services - Thursday Posters and Exhibits (12:15pm - 12:45pm)**

Thursday, 12:15 PM - 12:45 PM • Lakeside Learning Center



**LL-HPS-THA** • AMA PRA Category 1 Credit™:0.5  
Host  
David C Levin , MD \*  
Host  
James V Rawson , MD

**LL-HPS-TH1A • Minimizing Z-Axis Scan Length during Chest CT: Guidelines for Dose Reduction**

Stuart L Cohen MD ; Thomas J Ward MD (Presenter) ; Claudia I Henschke MD, PhD ; Matthew D Cham MD ; David F Yankelevitz MD \*

PURPOSE

To understand the relationship between the scout image and the CT scan; To develop guidelines that minimize the z-axis scan length during chest CT, thereby reducing radiation dose.

METHOD AND MATERIALS

Consecutive outpatient non-contrast chest CTs were reviewed from February to July 2012. Identical breathing instructions, breathe in and hold your breath, were given prior to both the scout topogram and the CT scan. The position of the first rib's superior edge on the frontal scout was cross referenced with the axial CT slice corresponding to the superior most lung parenchyma. The position of the costophrenic angle (CPA) on the lateral scout was cross referenced with the axial CT slice corresponding to the inferior most lung parenchyma. Paired two-tailed t tests were used for analysis.

## RESULTS

1220 CTs were evaluated to determine the relationship between the first rib on the scout and the superior lung on the CT. The mean distance between the first rib on the scout and the superior lung edge on the CT was 13 mm. The position of the first rib ranged from 0mm to 85mm above the superior lung edge. 100% of CT scans showed the superior edge of the first rib on scout at or above the lung on CT. In 20% of CT scans, the first rib on scout was at least 1 cm superior to the lung edge on CT. 1004 CTs were evaluated to determine the relationship between the CPA on scout and the inferior lung edge on CT. The mean distance between the scout CPA and the inferior lung edge on CT was 27 mm with a significant (p

## CONCLUSION

There is a lack of concordance between the position of the CPA on the scout versus during the CT acquisition. The inferior margin of Z-axis scan length should be positioned 3 cm below the scout CPA to image the entire lungs while minimizing Z-axis scan length and unnecessary radiation.

## CLINICAL RELEVANCE/APPLICATION

CT of the chest should be performed from the top of the first rib to 3 cm below the CPA in order to image the entire lungs while minimizing Z-axis scan length and unnecessary radiation.

### **LL-HPS-TH2A • Impact of a Radiology Utilization Management Program on the Performance of Expensive Outpatient Imaging Studies: Effectiveness of Collaboration and the Sentinel Effect**

**David P Friedman MD (Presenter) ; Nancy Smith ; Ashish R Gandhe MD, MBBS**

## PURPOSE

To assess the impact of a collaborative radiology utilization management (UM) program on the performance of expensive outpatient imaging studies.

## METHOD AND MATERIALS

Using evidence based guidelines, a radiology benefit management (RBM) company (HealthHelp, LLC) provides real time decision support for clinicians ordering expensive outpatient imaging studies (CT, MRI, PET, nuclear medicine). After initial consultation between RBM personnel (level 1, customer service representative; level 2, nurse) and the provider's staff, studies not meeting appropriateness criteria are referred to a subspecialty academic radiologist (level 3) for review. The radiologist can approve the study based upon an electronic chart evaluation, or call the provider for further information. If a suitable person cannot take the call, and there is subsequently 'no callback' from the provider's office within 48 hours, the study is administratively closed. Studies are not denied by the radiologist. We analyzed the rate of withdrawals (procedure withdrawn or changed by consensus with the provider) as a measure of the effectiveness of collaboration between the provider and radiologist. The rate of 'no callback' was a measure of the effectiveness of the sentinel effect; we also determined how often a study was reordered within 30 days after being closed due to 'no callback'. Withdrawal rates, as well as administrative closures at 30 days due to 'no callback', were aggregated to assess the overall impact of the UM program. The study interval was one year (January - December 2012).

## RESULTS

A total of 12,758 studies were reviewed. There were 1,644 studies (12.9%) 'not performed by consensus' and 643 studies (5.0%) 'changed by consensus'; hence, 2,287 studies (17.9%) were withdrawn after provider-radiologist collaboration. There were 'no callbacks' for 2,761 studies (21.6%); of these, 811 were reordered within 30 days; hence, 1,950 studies (15.3%) were not performed due to 'no callback'. In aggregate, this UM program impacted the performance of 4,237 studies (33.2%).

## CONCLUSION

Our data demonstrate the striking impact of provider-radiologist collaboration, together with the sentinel effect, in reducing utilization of inappropriate or unnecessary, expensive outpatient imaging studies; these results were achieved without the use of denials.

## CLINICAL RELEVANCE/APPLICATION

A collaborative RBM is highly effective in reducing the utilization of outpatient imaging studies.

### **LL-HPS-TH3A • Radiologist Error Rate When Interpreting Adult Computed Tomography: Systematic Review and Meta-analysis**

**Mark Z Wu MSc (Presenter) ; Matthew D McInnes MD, FRCPC ; Blair MacDonald ; Ania Z Kielar MD ; Shauna Duigenan MD**

## PURPOSE

To use meta-analysis to determine the radiologist error rate when interpreting computed tomography (CT) performed on adult patients. Secondary objectives include determination of whether error rate differs based on body region or level of training.

## METHOD AND MATERIALS

Medline and Embase were searched through June 2012. Two reviewers independently selected studies that met the inclusion criteria and extracted study data. The error rates were investigated with a random-effects meta-analysis. Subgroup analyses: level of training of the initial reader; definition of major error; body system and risk of bias.

## RESULTS

Fifty-eight studies met the inclusion criteria (388,123 CT examinations). Pooled total error rate was 7.7%, 95% CI[5.6,10.3] and major error rate was 2.4%, 95% CI[1.7,3.2]. The pooled major error rate was comparable for staff (2.9%, 95% CI[1.2,6.7]) and residents (2.2%, 95% CI[1.7,2.9]); Q=0.92, p=0.63. The pooled major error rate for head (0.8%, 95% CI[0.4,1.6]) and spine (0.7%, 95% CI[0.2,2.7]) was lower than for chest (2.8%, 95% CI[1.5,5.4]) and abdomen (2.6%, 95% CI[1.0,6.7]); Q=8.28, p=0.041. Lack of blinding of the reference reader to the initial report was associated with a lower major error rate (2.0%, 95%CI [1.4,2.8]) than when blinding was present (12.1%, 95%CI [4.4,29.4]); Q=10.64, p=0.0011.

## CONCLUSION

This study documents the total and major error rates in interpretation of adult CT; these may be useful as reference standards for quality assurance programs aimed at error reduction. Cautious application of this data is suggested since numerous sources of heterogeneity are present.

## CLINICAL RELEVANCE/APPLICATION

This study documents total(7.7%, 95% CI[5.6,10.3]) and major(2.4%, 95% CI[1.7,3.2]) error rates in interpretation of adult CT; these may be useful as reference standards for quality assurance programs

### **LL-HPE-TH4A • What the Patients Prefer during the MRI Examination: The Answers**

**Liana G Sanches Da Rocha MSc (Presenter) ; Elaine Goncalves Guerra ; Ronaldo H Baroni MD ; Marcelo B Funari MD**

## PURPOSE

The magnetic resonance (MR) examination is a procedure that can be seen in a bad way by the patient. The restriction inside the magnet, the need to stay still for a period of time or weight limit of the table may prevent the realization of the exam. As a result, we have increased procedures with anesthesia (1) and / or loss of the income generated by these patients. In any imaging service, these issues may have great impact. Thinking of solutions, some alternatives have emerged, as shorter and wider bore equipment's, with greater weight tolerate, exam rooms with specific surroundings and optionally resources as music and blindfold. These actions have a cost / benefit. This abstract aims to demonstrate the perception of patients who schedule their MRI exams about these alternatives, collecting their opinions in a specific questionnaire.

## METHODS

A short and wide bore MR equipment (Magnetom Espree, Siemens, Germany) was installed in the hospital satellite unit in March 2007.

The room is designed so that one wall was replaced with window overlooking the outdoors area. 919 patients were asked to answer a questionnaire voluntarily after his MR procedure (regardless of type of examination) in the period from 07/20/2007 to 11/30/2007. The questionnaire contained seven direct questions (answers yes / no / do not know) and comments field. Data were compiled and presented at results.

#### RESULTS

Of the 919 patients who answered the questionnaire, 27% had never performed MRI. With respect to impression of the device, 60% found the device more comfortable (Graph 1). Among the comments pointed out, the key issue was the width of the magnet: the possibility to better accommodate the upper limbs and larger distance between the machine and face. Among those questioned, 89 (10%) had failed to perform MRI because of claustrophobia and 10 due to weight limits (Graph 2). During the study period, 6 patients (0.65%) failed the exam. Was asked if the use of blindfold was a preference. 71% answered does not. In the comments field, the presence of light and the window was attributed as a factor that made this unnecessary accessory. It was also asked if listening to music during the exam was a preference. 75% answered yes.

#### CONCLUSION

It's known that anxiety about MRI is a multi-faceted problem that involves fear not just from the machine, but also others like from being hurt, or feel pain, or even about the examination result. In this abstract we try to find alternatives to help, not only the claustrophobic, but also anyone who has to perform a MR examination. The magnets with friendlier layout are more comfortable and can decrease the number of given up patients, especially of the claustrophobic patients. Other devices as music during the procedure and the presence of window or other sights at the wall can make the MRI examination more pleasant. But it's important to ask the patient before, giving them the chance of choice, cause some devices cannot be as good for one as for another. The results of this study helped our Imaging Department on the design of new MR units and guided the investments in machines more friendlier-like.

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### Health Services - Thursday Posters and Exhibits (12:45pm - 1:15pm)

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Thursday, 12:45 PM - 01:15 PM • Lakeside Learning Center

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HP

LL-HPS-THB • AMA PRA Category 1 Credit™:0.5

#### LL-HPE-TH4B • How to Tangibilize Quality in a Medical Imaging Clinic? - Results of an Opinion Survey

Leonardo K Bittencourt MD, MSc (Presenter) ; Emerson L Gasparetto MD ; Roberto Vieira ; Romeu C Domingues MD

##### PURPOSE

With the ever growing tendency for mergers, acquisitions and turnabouts in private medical imaging market, competition for referrals is becoming a key issue to ensure the survival of small/middle clinics.

In this context, not only the final customer, i.e. the patient, is taken into account, but also his/her referring physician, who is ultimately the main responsible for the renewal of our workflow.

Therefore, an opinion survey was developed, aiming to assess the main factors that our nearby physicians take into account when choosing the best clinic to image their patients

##### METHODS

We distributed an online survey to a mailbase that included about 300 physicians in the city of Rio de Janeiro, among different medical specialties.

In addition to the socio-demographic information, the core of the research consisted of a list of 'quality criteria' for a radiology department, that the referrers should order according to the degree of importance.

The information was then tabulated in a proper spreadsheet, allowing the construction of graphs that illustrate this work.

##### RESULTS

The sampled physicians spend about 44% of their time in private offices, 24% at private hospitals, and 32% at public hospitals. 72% declared that most of their patients came from HMO's, while 17% had only private patients. It was found that 98% of the physicians influence the patient on the choice for a specific imaging clinic to perform their examinations, and up to 43% of doctors reported that they do so in an active and unsolicited way, usually refusing results from other institutions. The types of ordered exams were also subject of the study, noting that ultrasound scans are required often daily or weekly for up to 66% of the responders, and plain x-rays by 55%, while up to 45% of physicians said they never request contrast-enhanced x-rays.

The five 'quality criteria' that were reputed as the most important when judging an imaging clinic were the following, in decreasing order:

- Reports and results that are 'more correct';
- Updated and/or academical radiologists;
- State-of-the-art equipment;
- Radiologists directly involved with my medical specialty
- This clinic is considered as 'the best' by my peers

Other criteria that ranked high were: easily accessible radiologists, radiologists that are kind to my patient, readiness on the delivery of reports, readiness to fit urgent cases into the schedule, and punctuality.

##### CONCLUSION

The quality criteria assigned by attending physicians were identified and graded, reflecting the main points where the marketing effort should be emphasized: tangibilizing the medical accuracy of test results, the involvement of physicians in clinical academic and scientific activities, advertisement on the quality of the equipment, conducting scientific/social sessions assistants with referrers from key medical specialties, and obtaining statements and testimonies from attending physicians that are opinion-makers.

#### LL-HPE1076-THB • Current Status Nephrogenic Systemic Fibrosis

Laleh Daftaribesheli MD (Presenter) ; Shima Aran MD ; Hani H Abujudeh MD, MBA \*

##### PURPOSE/AIM

Nephrogenic Systemic Fibrosis (NSF) is a debilitating complication of the Gadolinium Based Contrast Agents (GBCAs) in patients with severe renal failure. The current guidelines regarding restrictive use of GBAs in these patients decreased its incidence dramatically. The purpose of this educational exhibit is to discuss and compare the most recent guidelines along with presenting the latest discoveries on this subject

##### CONTENT ORGANIZATION

1. Epidemiology of the NSF
2. Clinicopathological diagnosis of NSF and treatment options
3. Most recent updated guidelines regarding GBCAs use in different patients: ESUR (European Society of Urogenital Radiology) 2013 updated guideline and ACR (American College of Radiology) 2012 updated guideline
4. Comparing ESUR 2013 and ACR 2012 guidelines in a table
5. Presenting the latest discoveries on NSF pathogenesis, mechanism of development and treatment

##### SUMMARY

The incident of NSF decreased dramatically following implementation of the past guidelines. In this review we introduce the latest worldwide guidelines regarding GBCA usage, we also present the latest basic science discoveries regarding NSF

#### LL-HPS-TH1B • CT Scanning in Head Injuries-Are We Compliant with the NICE Guidelines?

**PURPOSE**

The National Institute for Health and Care Excellence (NICE) is a UK based institute which provides national guidance and advice to improve health. The NICE guidelines for the management of patients with head injuries were published in 2007 and are frequently used in emergency departments across Europe. A simple algorithm identifies patients who should undergo CT brain scanning. Our aim was to assess compliance with these guidelines in a busy emergency department.

**METHOD AND MATERIALS**

We performed a retrospective study of all patients who presented with head injuries to the emergency department over a one month period. Patients who had a CT scan were identified and analyzed as to the appropriate use of the NICE guidelines.

**RESULTS**

138 patients presented with head injuries. 97 were male and 41 were female. The mean age was 41 years. 49 patients (36%) had a CT brain performed and form the basis of this study. Of these patients, 45% (n=22) of the CT scans performed complied with the NICE guidelines and 51% (n=25) did not. The remaining 4% (n=2) had alcohol intoxication. Overall, 22% (n=11) who underwent a CT brain had acute pathology. However, in patients who fulfilled the criteria for CT brain as per the NICE guidelines 36% (n=8) had positive findings. In those who did not fulfill the criteria (51% of the study group) one patient (4%) had positive findings.

**CONCLUSION**

Our study shows poor compliance with the NICE guidelines and suggests that improved adherence to the guidelines when evaluating patients with head injuries and the appropriateness for a CT scan would significantly reduce Radiology workload, patient radiation exposure and cost.

**CLINICAL RELEVANCE/APPLICATION**

Our study shows poor compliance with the NICE guidelines in the management of head injuries. As a result many unnecessary CT scans are performed with implications for both patients and Radiologists.

**LL-HPS-TH2B • The Potential Effect of the Choosing Wisely Initiative on Radiology**

**Vijay M Rao** MD (Presenter) ; **David C Levin** MD \*

**PURPOSE**

The Choosing Wisely initiative (CW) is a major undertaking that was first announced by the American Board of Internal Medicine Foundation in April 2012 to try and reduce unnecessary tests and procedures. The ACR and 26 other national medical societies have joined, but despite the fact that it was widely publicized, most radiologists are still unfamiliar with it. Our purpose was to try and determine how much of this initiative is focused on radiology.

**METHOD AND MATERIALS**

The CW web site and other materials were studied. Each participating society had been asked to select 5 tests or procedures it felt were overutilized. All 135 tests/procedures were reviewed to determine which ones pertained to imaging and how much overlap existed. Imaging tests were then categorized by body system.

**RESULTS**

Among their 5 options, 21 of the 27 societies chose at least 1 imaging exam that was judged to be overused. Of the 135 tests/procedures listed by the 27 societies, 61 were imaging tests (45%). There was some redundancy among the various societies, and after culling out the duplicates, there remained a total of 49 separate imaging tests. Six of these were echocardiography exams, which are only rarely performed by radiologists; eliminating these left 43 imaging tests commonly performed by radiologists. These tests fell into the following body system categories: cardiac 11, head/neck 10, pediatric 5, musculoskeletal 4, abdomen/pelvis 4, vascular 4, chest 2, breast 2, whole body 1. Of the 43 tests, 9 were listed by more than 1 society.

**CONCLUSION**

The CW campaign is now widespread and will likely continue to grow. It very clearly targets radiology as a specialty whose services are often overused and/or unnecessary. Radiologists need to become familiar with the list of studies that are perceived to be overused. They must then either refute the allegations of overuse or take steps to limit their use. As the recognized stewards of imaging during a time when great effort is being made to reduce costs, radiologists will likely be judged by their response to this well publicized initiative. It is very important that they be knowledgeable and involved.

**CLINICAL RELEVANCE/APPLICATION**

Choosing wisely campaign to reduce unnecessary or overutilized imaging tests.

**LL-HPS-TH3B • Benchmarking the Elapsed Time for Patients with a Breast Biopsy Recommendation: Time from Initial Breast Imaging Evaluation to Biopsy Pathology Resolution for Benign Breast Disease**

**Carmen S Kirkness** PhD (Presenter) ; **Jessica A Guingrich** MD ; **Jimna Ren** PhD ; **Danette Doubet** MS ; **Denise Mammolito** MD ; **Lynne Jalovic** MD ; **Ravi S Ramakrishna** DO, MBA ; **Kelly Kennell** MD

**PURPOSE**

Prompt evaluation after abnormal mammography is thought to reduce a patients' anxiety yet the determination of the evaluation time after abnormal mammography is lacking. The purpose of this study was to evaluate and characterize the time from an abnormal mammogram to biopsy pathology resolution for those women who had a biopsy recommendation.

**METHOD AND MATERIALS**

This study included women aged 13to 93 years who were recommended for biopsy (BIRADs 0, 4, 5) after an abnormal mammogram (1314 screening and 1656 diagnostic) in a rural non-academic medical center in Central Illinois between 2001 and 2007. The outcome was the number of weeks between the abnormal mammogram (screening and diagnostic) and time to benign biopsy pathology resolution. Logistic regression models were used to assess the effect of age, race, and marital status.

**RESULTS**

**CONCLUSION**

Determination of pathology after an abnormal mammography was timely for the majority of women. Women that waited one month or more to have a biopsy were young and non-married African American. Further research is required to determine why race differences exist in non-married women.

**CLINICAL RELEVANCE/APPLICATION**

Benchmarking elapsed time from abnormal mammography to benign pathology resolution provides a clinical practice standard of care to compare services and practices across the nation.

**RC727** • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

**Bibb Allen**, MD  
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**Robert K Zeman**, MD  
**Geraldine B McGinty**, MD  
**Pamela Kassing**  
**Mark O Bernardy**, MD  
**Timothy A Crummy**, MD

LEARNING OBJECTIVES

1) Understand the current process of how reimbursement for new technology is obtained from CPT code development, valuation and coverage. 2) Using CT colonography as an example, the participants will become familiar with the specific processes for obtaining coverage for new technology and procedures in the public and private sectors and how a myriad of governmental agencies and other policymaking groups are involved in determining which new procedures are covered. 3) Understand why obtaining coverage has become the limiting factor in bringing new technology to the mainstream. 4) Interactive techniques will be used to engage the audience in the consideration of strategic partnerships between industry, clinical research, governmental agencies and third party payors.

ABSTRACT

**Consumerism and Radiology**

**Friday, 08:30 AM - 10:00 AM • S504AB**

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**RC827** • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

**Richard Duszak**, MD  
**Christine Hughes** \*  
**Debra Richman**  
**Nancy Davenport-Ennis**, MD  
**Cherrill Farnsworth** \*  
**Steve Bonner**

LEARNING OBJECTIVES

1) Identify the present and future ramifications of the rise of consumerism on radiology. 2) Characterize strategies radiology practices and departments can use to prepare for these changes. 3) Define what consumers need to know about imaging and how is it best communicated to consumers. 4) Illustrate how to create a bond with consumers in a commodity market.

ABSTRACT

The rise of consumerism has impacted the relationships patients have with payors and providers. Because of the insular nature of radiology the full impact of consumerism has not yet been felt. Historically, radiologists have managed a Physician to Physician (P2P) relationship. Radiologists have been the invisible heroes in the patient care cycle. Ripples of Radiologist to Consumer (R2C) relationships are emerging in pockets of the US. This session will address the following questions: What are the present/ future ramifications of the rise of consumerism on radiology? How can radiology practices and departments prepare for these changes? What do consumers need to know about imaging and how is it best communicated to consumers? How is a bond created with consumers in a commodity market?

**Disclosure Index**

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