To start our quality and safer care through collaboration

WELCOME

On behalf of the Organizing Committee of the 1st Asia-Pacific Forum on Quality and Safety of Medical Imaging (APQS) 2015, it is our great pleasure to welcome you to participate in the conference on November 14 (Saturday PM) and November 15 (Sunday AM/PM), 2015 in Taipei, Taiwan.

The audience will consist of professionals and trainees who are interested in quality improvement and safer care of medical imaging, the Radiology Society presidents, representatives and chief quality officers from most of the Asia Pacific countries and Taiwan.

This conference represents the first large-scale effort in the Asia-Pacific to build a consensus among thought leaders in radiology, with the intention to solidify the knowledge of designing and implementing quality and safety programs. The Program Committee also intends to summarize the conference proceedings of the consensus meeting with the Asia-Pacific radiology leaders in the form of a Consensus White Paper on Quality and Safety, specifically regarding MRI safety, radiation safety and pre-procedural guidelines.

We accept abstracts from individuals and teams who are interested in displaying their improvement e-poster presentation at the APQS. All abstracts will go through a peer-review process before being approved for display. The registration fee will be deducted 50% for presenter whose abstract is accepted.

The APQS 2015 is the best place to present your work, hear about the latest trends and challenges in the field, and network and make connections that can enhance your career.

Sincerely,

Wing P. Chan, M.D.
President, 1st Asia-Pacific Forum on Quality and Safety in Medical Imaging 2015; Chair, Quality and Safety Committee, Chinese Taipei Society of Radiology; Professor of Radiology, Wan Fang Hospital, Taipei Medical University

Wan-Yuo Guo, M.D., Ph.D.
Honorary President, APQS Forum 2015, President, Chinese Taipei Society of Radiology; Professor of Radiology, Taipei Veterans General Hospital
COURSE OBJECTIVE
To start our quality and safer care through collaboration.

ACTIVITY DATE
November 14 (Saturday, PM) to November 15, 2015 (Sunday, AM/PM)

VENUE
Conference Room 3, and Conference Room 5
Chi-Teh Building, Taipei Veterans General Hospital, No. 322, Sec. 2, Shipai Road, Beitou District, Taipei, Taiwan 11217, R.O.C.

PRESIDENT
Dr. Wing P. Chan, President, APQS Forum 2015; Chair, Quality and Safety Committee, Chinese Taipei Society of Radiology; Professor and Chief, Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei.

Dr. Wan-Yuo Guo, Honorary President, APQS Forum 2015; President, Chinese Taipei Society of Radiology; Professor of Radiology, Taipei Veterans General Hospital, Taipei.

FACULTY
Dr. Stephen J. Swensen, Medical Director for Leadership and Organization Development; Professor, Department of Radiology, Mayo Clinic, USA.

Dr. Pek-Lan Khong, Professor, Head of Department of Diagnostic Radiology, The University of Hong Kong, Hong Kong.

Dr. Cindy Lee, Assistant Professor in Residence Women’s Imaging Section, Department of Radiology and Biomedical Imaging, University of California San Francisco, USA.

Dr. Swee-Tian Quek, Associate Professor and Head Department of Diagnostic Radiology, National University of Singapore, Singapore.

Dr. Wing P. Chan, President, APQS Forum 2015; Chair, Quality and Safety Committee, Chinese Taipei Society of Radiology; Professor and Chief, Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei.
HOST
Chinese Taipei Society of Radiology
Department of Radiology, Wan Fang Hospital, Taipei Medical University

Co-HOST
Taipei Veterans General Hospital
Taiwan Association of Medical Radiation Technologists

SPONSOR
Siemens Limited Taiwan
GE Medical Systems Taiwan, Ltd.
Bayer Taiwan Ltd.
San Kwang Instruments Co., Ltd.
Chzu Ho Medical System
Nan Kai Corporation

INFINITT Taiwan Co., Ltd.
Cooperative C. L. Enterprise Co.
Carestream Health Taiwan Limited
Taiwan Western Technology Co., Ltd.
Best Biomedical Supply Co., Ltd.
Rotary Trading Co., Ltd.

OVERVIEW
This intensive 1.5-day conference is designed to provide a focused, comprehensive, and in-depth experience in quality and patient safety through collaboration.

The conference format will accommodate with varying levels of experience in quality and patient safety of medical imaging.

This conference is run by friendly, experienced faculty with leading-edge knowledge and established backgrounds in quality and patient safety of medical imaging.

TARGET AUDIENCE
This course is intended for all professional and trainees interested in quality and safer care of medical imaging.

PROGRAM FEES
International

<table>
<thead>
<tr>
<th>Category</th>
<th>Registration (Until 2015/10/26)</th>
<th>On-site (2015/11/14~15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiologists</td>
<td>USD$ 150</td>
<td>USD$ 200</td>
</tr>
<tr>
<td>Trainee/Non-Physician</td>
<td>USD$ 100</td>
<td>USD$ 150</td>
</tr>
<tr>
<td>Other Medical Professional</td>
<td>USD$ 200</td>
<td>USD$ 250</td>
</tr>
</tbody>
</table>
Local

<table>
<thead>
<tr>
<th>Category</th>
<th>Registration (Until 2015/10/26)</th>
<th>On-site (2015/11/14~15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>會員</td>
<td>NTD$ 1,500</td>
<td>NTD$ 2,000</td>
</tr>
<tr>
<td>準會員／醫事放射師</td>
<td>NTD$ 1,000</td>
<td>NTD$ 1,500</td>
</tr>
<tr>
<td>非會員</td>
<td>NTD$ 2,000</td>
<td>NTD$ 2,500</td>
</tr>
</tbody>
</table>

International participants: All amounts are payable in US dollars. All bank charges must be paid by the participant.

REGISTRATION
Registration is limited to 250 people
Payment must be received on or before **2015/10/26**
Registration and payment Website:
Local: https://www.rsroc.org.tw/action/actions_onlinedetail.asp?EType=&id=7164
International: http://www.apqs2015.org

CME
放射線專科醫師教育積分 **12** 分，簽到時同時領取參加證書，會後不補寄
中華民國醫事放射學會教育積分，11/14 共 **3.2** 積分，11/15 共 **8.6** 積分

CANCELLATION POLICY
Participants who cancel before October 21, 2015 will be required to pay the participation fee in full. Cancellation by October 21, 2015 will reimburse 50% participation fee. Cancellations must be made by email or facsimile only.

LIABILITY
Neither the host/co-host organizers nor sponsors are liable for any losses, accidents or damage to persons or objects, regardless of the cause. Participants and accompanying persons attend the conference and all accompanying events at their own risk and responsibility.

CONTACT
APQS 2015 Secretariat
Tel: +886-2-25865332
Fax: +886-2-25865330
EMail: secretariat@apqs2015.org
WebSite: www.apqs2015.org
# APQS Forum 2015

**1st Asia-Pacific Forum on Quality and Safety of Medical Imaging**

**Day 1**

<table>
<thead>
<tr>
<th>11/14 (Sat)</th>
<th>Moderators / Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:10~14:10 Registration</td>
<td></td>
</tr>
</tbody>
</table>
| 14:10~14:50 Beijing medical image quality control and continuous improvement center experience | **Moderators:** Dr. Mu-Huo Michael Teng and Dr. Mao-Yuan Su  
**Dr. Kuncheng Li (China)**  
Vice President, Chinese Radiology Society, China; Professor, Department of Radiology, Xuanwu Hospital, Capital Medical University, China |
| 14:50~15:20 Free Papers | **Moderators:**  
Dr. Yao-Liang Chen and Dr. Cheng-Hsun Lin |
| 14:50~15:00 OR-01 Qianli Chen, Lei Zhang, Gonghua Dai  
Evaluation in low-dose radiation and less contrast of CT for diagnosing for liver tumors  
(Department of Radiology, Shanghai East Hospital, Tongji University, Shanghai, China) | |
Patient Safety during Radiological Examination: A Nationwide Survey of Residency Training Hospitals in Taiwan  
(Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan) | |
| 15:10~15:20 OR-03 Min-Chi Chen, Shu-Kun Huang, Siu-Wan Hung, Chi-Chang Clayton Chen  
Utilization of PDCA method for decrease medical error incidence rate of Patient Safety – a preliminary experience  
(Department of Radiology, Taichung Veterans General Hospital, Taichung, Taiwan) | |
| 15:20~16:10 Coffee and Tea Break  
(Industry time: Image Quality Display-Chest X-rays)  
(e-Poster Time) | |
<table>
<thead>
<tr>
<th>11/14 (Sat)</th>
<th>Free Papers</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:10~16:20</td>
<td>OR-04</td>
</tr>
</tbody>
</table>
| **Siok Mei Ng, Chew Pheng Loh** | Feasibility and sustainability of Two Patient Identification check documentation to drive patient and radiation safety in a Radiology department  
*(Department of Diagnostic Imaging, National University Hospital, Singapore)* |
| 16:20~16:30 | OR-05       |
| **Ju-Fang Wen, Yi-Wen Wang, Bing-Chung Wu, Chin-Ming Fan, Yao-Liang Chen** | Change of Safety Considerations regarding Taking Metformin before and after Intravascular Iodinated Contrast Medium Administration  
*(Department of Diagnostic Radiology, Keelung Chang Gung Memorial Hospital, Keelung, Taiwan)* |
| 16:30~16:40 | OR-06       |
| **Mu Huo Michael Teng, Yan-Hsing Chiou, Tien-Yu Chang, Jia-Hwia Wang** | Adverse Contrast Media Reaction Occurred Within 17 Months in Cheng Hsin General Hospital in Taipei  
*(Department of Medical Imaging, Cheng Hsin General Hospital, Taipei, Taiwan)* |
| 16:40~16:50 | OR-07       |
| **Cheng-Yu Tsai, Wilson T. Lao, Bo-Shin Jeng, Po-Yen Chang, Min-Fang Lin** | Using Dual Source CT (DSCT) to Reduce Coronary CTA Radiation Dose in Obese Patients  
*(Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan)* |

| 16:50 | Closing |

**Moderators:**  
Dr. Yeun-Chung Chang and Dr. Siu-Wan Hung
# Day 2

<table>
<thead>
<tr>
<th>11/15 (Sun)</th>
<th>Topic</th>
<th>Moderators / Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00~08:30</td>
<td>Registration</td>
<td></td>
</tr>
</tbody>
</table>
| 08:30~08:40 | Welcome and Opening                                                   | Dr. Chung-Liang Shih  
Secretary General, Ministry of Health and Welfare, Taiwan |
|            | Background and Introduction to this Forum                            | Dr. Wan-Yuo Guo  
President, Chinese Taipei Society of Radiology, Taiwan |
|            |                                                                      | Dr. Wing P. Chan  
President, 1st Asia-Pacific Forum on Quality and Safety of Medical Imaging         |
| 08:40~09:40 | ⬤ Five Wishes of a Radiology Patient  
● Culture of Safety and Transparency  
● Five High-Impact Leadership Behaviors | Moderator: Dr. Chung-Liang Shih  
Dr. Stephen J. Swensen (USA)  
Professor, Department of Radiology, Mayo Clinic |
| 09:40-10:20 | ⬤ ICRP and The System of Radiological Protection  
● Radiological Protection in Paediatric Computed Tomography (CT) | Moderator: Dr. Chuen-Horng Tsai  
Dr. Pek-Lan Khong (Hong Kong)  
Professor and Head of Diagnostic Radiology, The University of Hong Kong |
| 10:20-11:00 | Coffee and Tea Break  
(Industry time: Image Quality Display-Coronary CTA) (e-Poster Time) |                                                                                      |
| 11:00-12:00 | ⬤ Designing a Practice Quality Improvement Project  
● Quality Committee in Radiology: 3-Tiered Job Checklist  
● Leveraging Big Data in Quality Improvement | Moderator: Dr. Kou-Mou Huang  
Dr. Cindy Lee (USA)  
Assistant Professor of Radiology and Biomedical Imaging, University of California San Francisco |
| 12:00-12:50 | Course Luncheon Provided  
(Industry time: Image Quality Display (e-Poster Time) |                                                                                      |
| 12:50-13:40 | ⬤ Preprocedural safety in Radiology  
● Quality Professional Communication | Moderator: Dr. Ran-Chou Chen  
Dr. Swee-Tian Quek (Singapore)  
Associate Professor and Head of Radiology, National University of Singapore |
<table>
<thead>
<tr>
<th>11/15 (Sun)</th>
<th>Topic</th>
<th>Moderators / Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:40~14:00</td>
<td><strong>Mini Forum</strong>&lt;br&gt;Whole systems approach to patient safety – Can we do more?&lt;br&gt;<em>CSR, FDA, Radiological Society, Institutions, Professionals, Patients...</em></td>
<td><strong>Speaker:</strong>&lt;br&gt;Dr. Wing P. Chan (Taiwan)&lt;br&gt;*Professor and Chief, Department of Radiology, Wan Fang Hospital, Taipei Medical University&lt;br&gt;*Panelists: Industry Representatives</td>
</tr>
<tr>
<td>14:00~15:40</td>
<td><em>Local Experiences of Quality and Safety of Medical Imaging (10 mins presentation each)</em>&lt;br&gt;<em>10 mins Q&amp;A</em></td>
<td><strong>Moderators:</strong>&lt;br&gt;Dr. Wan-Yuo Guo and Dr. Lei Zhang&lt;br&gt;<em>Representatives of AP countries</em>&lt;br&gt;Dr. Wilaporn Bhothisuwan (Thailand)&lt;br&gt;Dr. Johanna Patricia A. Cañal (Philippines)&lt;br&gt;Dr. Kyung-Hyun Do (Korea)&lt;br&gt;Dr. Aziza Icksan (Indonesia)&lt;br&gt;Dr. Pek-Lan Khong (Hong Kong)&lt;br&gt;Dr. Kuncheng Li (China)&lt;br&gt;Dr. Zaharah Musa (Malaysia)&lt;br&gt;Dr. Swee-Tian Quek (Singapore)</td>
</tr>
<tr>
<td>15:40</td>
<td>Closing</td>
<td></td>
</tr>
</tbody>
</table>

**Consensus Meeting**

Moderators: Director Ching-Chung Huang and Dr. Wing P. Chan  
Panelists: Representatives of AP Countries and all guest speakers  
Venue: Conference Room 5

<table>
<thead>
<tr>
<th>11/15 (Sun)</th>
<th>Topic</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:50-16:20</td>
<td>Pre-Procedural Safety guideline</td>
<td>Dr. Swee-Tian Quek (Singapore)</td>
</tr>
<tr>
<td>16:20-16:50</td>
<td>Radiation Safety guideline</td>
<td>Dr. Pek-Lan Khong (Hong Kong)</td>
</tr>
<tr>
<td>16:50-17:20</td>
<td>MRI Safety guideline</td>
<td>Dr. Wing P. Chan (Taiwan)</td>
</tr>
<tr>
<td>17:20-17:30</td>
<td>Next APQS Discussion</td>
<td>All participants</td>
</tr>
</tbody>
</table>
Speakers
Moderators
Dr. Kuncheng Li (China)

Vice President, Chinese Radiology Society, China;  
Professor, Department of Radiology, Xuanwu Hospital,  
Capital Medical University, China

Kun-cheng Li, M.D, and Ph.D., Chairman and Prof. of Dept. of Radiology, Xuan Wu Hospital, Capital Medical University.

As a Cardio-radiologist and neuro-radiologist, the major research directions are the imaging of coronary heart disease, Alzheimer’s disease, Parkinson’s disease, stroke, epilepsy, and medical informatics.

Up to date, more than 760 papers were published in Chinese, of which 176 papers in English were cited by SCI. 16 profession books (as chief editor) were published, and more than 30 profession books (as editor) were published (in Chinese). More than 300 abstracts were presented on nationwide academic conferences, and 125 abstracts were presented on international academic conferences.
Beijing medical image quality control and continuous improvement center experience

Dr. Kuncheng Li (China)
Vice President, Chinese Radiology Society, China; Professor, Department of Radiology, Xuanwu Hospital, Capital Medical University, China

The report including two parts: one is mainland China medical image quality control history, and second is Beijing medical image quality control and continuous improvement center experience. And the focus of medical image quality control is four elements: equipment:

1. Equipment, mainly is medical physics, phantom, and test software;
2. Technical operation, technicians, technical operation guideline
3. Diagnostic requirements, radiologist, and diagnostic criteria
4. Management by government

We believe that the key of continuous quality improvement of the department of radiology is the chairman of Department, second is the support from the leadership of the hospital, third we must build special team to improve management and systems of department, fourth is formulate long-term quality control planning of the department, finally, steady implementation of quality control and continuous improvement.
Dr. Stephen J. Swensen (USA)

Medical Director for Leadership and Organization Development; Professor, Department of Radiology, Mayo Clinic College of Medicine, Rochester, USA

Dr. Stephen Swensen is the Medical Director for Leadership and Organization Development and a Professor in the Mayo Clinic College of Medicine. From 2005-2012 he served as the Director for Quality and Associate Dean for Value. Under his leadership, the Quality Academy and the Value Creation System were established. More than 52,000 colleagues have been certified as Bronze, Silver or Gold Quality Fellows. Dr. Swensen has been conferred the Diamond Quality Fellow Lifetime Achievement Award. Dr. Swensen chaired the Department of Radiology from 1998-2006. His leadership team used Lean-Sigma and Baldrige methods to improve the value of care for patients provided by 1,200 staff who performed more than one million exams annually. During his tenure the department was recognized as the No. 1 Radiology Practice in the USA (Medical Imaging) and the most Patient-Centered (Diagnostic Imaging). Dr. Swensen has served as a Director on three Boards and as a member of the Mayo Clinic Management Team and Clinical Practice Committee.

He holds a Masters of Medical Management from Carnegie Mellon University’s Heinz School. Dr. Swensen is a trained Executive Coach. He received his MD from the University of Wisconsin. His residency training was at the Mayo Clinic and his Thoracic Radiology Fellowship at Harvard Medical School, Brigham and Women’s Hospital.

Dr. Swensen is a Senior Fellow of the Institute for Healthcare Improvement. He is past President of two international societies: the Fleischner Society and the Society of Thoracic Radiology. He teaches Value Creation at the School of Public Health in the University of Minnesota. He chaired the American College of Radiology’s Quality Metrics Committee and led the RSNA’s Continuous Quality Improvement Initiative. He founded the Big Sky Quality Roundtable, the Keystone Quality Officer Group and the Sun Valley Quality Assembly.

He has been Principal Investigator of three NIH grants related to lung cancer screening with CT and diffuse infiltrative lung disease. He has authored two books and 146 peer-reviewed articles. During the two past decades, Dr. Swensen has started three businesses. He has been married for 38 years and has two children. This year he completed his 38th marathon.
There is a moral imperative for Person-centered Radiology. To be Person-centered medical imaging must be safe, appropriate, timely and of the highest quality. Imaging decisions must be made jointly with patients and when indicated with their families. Full transparency of all safety, quality and adverse outcome information is requisite. Person-centered Radiology moves from "What's the matter with you?" to "What matters to you?" The Five Wishes of a Radiology Patient form the core of Person-centered Radiology.

Five Wishes of a Radiology Patient

1. Listen to what matters to me...
2. The information to choose...
3. The right exam...
4. Performed the right way...
5. A provider without conflict...

Person-centered Radiology facilitates achievement of the Radiology Triple Aim. The Radiology Triple Aim results represent a shift from volume to value. The Radiology Triple Aim is delivery of superior patient experience and outcomes of radiology care with reduced cost for the community. The Five High-Impact Leadership Behaviors are practices that will facilitate the achievement of Radiology Triple Aim results.

Five High-Impact Leadership Behaviors

1. Person-centeredness: Be consistently person-centered in word and deed
2. Front Line Engagement: Be a regular, authentic presence at the front line and a visible champion of improvement
3. Relentless Focus: Remain focused on the vision and strategy
4. Transparency: Require transparency about results, progress, aims, and defects
5. Boundarlessness: Encourage and practice systems thinking and collaboration across boundaries
Dr. Pek-Lan Khong (Hong Kong)

Head and Clinical Professor, Department of Diagnostic Radiology, The University of Hong Kong, Hong Kong

Professor Khong is Clinical Professor of Radiology and serves as the Head of Department of Diagnostic Radiology, The University of Hong Kong. She received her Paediatric Radiology specialist training in The Birmingham Children's Hospital, U.K. and Boston Children's Hospital, U.S.A. Subsequently, she completed her Doctorate of Medicine (M.D.) thesis in The University of Hong Kong.

She is an invited member of The International Committee of Radiological Protection (ICRP, committee 3 on Radiological Protection in Medicine) since 2009. She is the corresponding author of the document; Radiological Protection in Paediatric Diagnostic and Interventional Radiology (Annals of the ICRP, ICRP Publication 121, 2013;42:1-63), and has lectured in multiple regional and international conferences on the subject of Radiological Protection in Medicine. She is a member of the Radiological Protection Advisory Group of the Government of the Hong Kong SAR, an invited member of the International Society of Magnetic Resonance in Medicine (ISMRM, Nominating committee) and International Society for Strategic Studies in Radiology (IS3R).

Her research interests in paediatric radiology include perinatal and neonatal imaging, and paediatric neuroradiology. In recent years, her research focus has extended to include oncological imaging using PET-CT and MRI, and Radiological Protection in Medicine. Published work includes more than 180 articles in international peer-review journals, from journals such as Journal of Clinical Oncology, Radiology, NeuroImage and Journal of Nuclear Medicine, including articles on imaging the adverse effects of radiation in the white matter, dosimetry studies of new imaging technologies and radiation protection in paediatric imaging.
ICRP and The System of Radiological Protection
Radiological Protection in Paediatric Computed Tomography (CT)

Dr. Pek-Lan Khong (Hong Kong)
Head and Clinical Professor, Department of Diagnostic Radiology, The University of Hong Kong, Hong Kong
Dr. Cindy Lee (USA)

Assistant Professor in Residence Women’s Imaging Section, 
Department of Radiology and Biomedical Imaging, 
University of California San Francisco, USA

Cindy Lee, MD, is an Assistant Professor in Residence in the Women's Imaging and Ultrasound subspecialties at the University of California, San Francisco. She received her medical degree from State University of New York in Stony Brook followed by an internal medicine internship at Winthrop University Hospital, NY. During her Diagnostic Radiology Residency training from 2009-2013 at the Johns Hopkins Hospital in Baltimore, MD, she also completed the ACR’s Stephen Amis Quality and Safety fellowship in 2012. This was followed by a breast and ultrasound fellowship at UCSF in 2013-2014. In July 2014, Dr. Lee accepted the position of Assistant Professor in Residence in Ultrasound and Women’s Imaging, at UCSF and San Francisco General Hospital.

Dr. Lee has research interests in breast database analysis and quality improvement. She has been working on the preliminary data from the National Mammography Database (NMD) with the American College of Radiology, which is the fastest growing mammography database nationwide, collecting data on over 5 million mammograms as of 2013. She serves on the NMD Steering Committee since 2013.

Dr. Lee’s second main research interest is quality improvement and safety. She serves on the scientific program committee of the American College of Medical Quality since 2012 and organized the 2012 “National Workshop for Medical Quality” at Johns Hopkins Medical Center for over 100 students, residents and fellows. She also serves on the Radiographics panel for Quality Improvement at Radiological Society of North America since 2013.
Designing a Successful Practice Quality Improvement (PQI) Project
Since 2007, the American Board of Radiology and the American Board of Medical Specialties have required PQI for the ABR Maintenance of Certification program. The Accreditation Council for Graduate Medical Education also requires PQI for radiology residency and fellowships. PQI aims to improve the quality of care through radiologist-initiated learning and quality improvement. This presentation discusses 5 strategies to effectively complete PQI projects and reviews the three most common PQI methodologies: Six Sigma, Lean, and Model for Improvement. In addition, this lecture presents radiology PQI case studies to help attendees apply this knowledge in their own practice.

Quality Committee in Radiology: 3-Tiered Job Checklist
Over the past decade, academic and private practice radiology groups have created quality leadership committees. The responsibilities of these committees range widely, from proactively improving patient safety and quality of care to ensuring compliance with the Joint Commission guidelines. However, we know little about what roles these committees should have and how they can improve quality. There is also little consistency in the makeup and responsibilities of a quality committee. This presentation discusses specific roles for a quality committee and presents a blueprint of escalating responsibilities for a robust radiology quality program. Using the three-tiered job checklist, the audience will be able to assess how well their quality programs measure up against others.

Leveraging Big Data in Quality Improvement
Data collection and analysis in radiology is a vast and rapidly expanding enterprise. As a result, radiologists are best positioned to convert this data into clinically relevant practice. Data mining has changed the face of radiology, as seen in new evidence-based ACR appropriateness criteria and clinical metrics to identify performance gaps. In particular, the ACR’s National Mammography Database is the second largest of its kind in the United States and provides benchmarking data from over 6 million mammograms. Well-designed, targeted, objective, and transparent metrics streamline workflow and increase efficiency within your organization. This lecture demonstrates how the National Mammography Database helps radiologists reduce unnecessary workups and invasive procedures.
Dr. Swee-Tian Quek (Singapore)

Head and Senior Consultant, Department of Diagnostic Imaging, National University Hospital, Singapore

Associate Professor and Head Department of Diagnostic Radiology, National University of Singapore, Singapore

Clinical Director, Breast Screen Singapore Programme, National University Health System, Singapore

Graduated from the National University of Singapore (NUS) and embarked on his Radiology training obtaining the Fellowship of the Royal College of Radiologists. He underwent further training in musculoskeletal radiology at several centres in the UK. His areas of interest are in Musculoskeletal, Oncologic/Body and Breast Imaging.

He was previously a Senior Consultant in the Department of Oncologic Imaging, National Cancer Centre Singapore and held concurrent appointments as Visiting Consultant to the Department of Surgical Oncology at the National Cancer Centre, Department of Diagnostic Radiology at the Singapore General Hospital and the Ministry of Defence Singapore. He is an Examiner for the MMed (Diag Radiology), NUS and Royal College of Radiologists and an External Examiner for the Indonesian National Board Examinations and also sits on the Singapore Medical Council’s Complaints and Disciplinary Panel.
2015/11/15 12:50~13:40 Conference Room 3

- Preprocedural safety in Radiology
- Quality Professional Communication

Dr. Swee-Tian Quek (Singapore)
Head and Senior Consultant, Department of Diagnostic Imaging, National University Hospital, Singapore
Associate Professor and Head Department of Diagnostic Radiology, National University of Singapore, Singapore
Clinical Director, Breast Screen Singapore Programme, National University Health System, Singapore

Preprocedural safety in Radiology
Patient safety is of primary concern to healthcare providers. It is also often said that prevention is better than cure. One of the keys to promoting patient safety and preventing mishaps/unintended complications in Radiology lies in the preprocedural preparations taken. Good, well-planned preprocedural care will minimize complications and should not be taken for granted or overlooked in the interest of time and increased patient turnover. This talk reviews both the generic as well as some specific preprocedural patient safety measures encountered in Radiology.

Quality Professional Communication
Effective health care delivery systems rely heavily not only on high degrees of professionalism and skill on the part of the caregivers but also on their good and clear communication to function effectively as a team. While technology is often seen as driving the development of diagnostic imaging, softer skills like effective communication are also critical to radiologists. We look at some of the issues encountered in providing for quality professional communication in our practice and share on strategies for resolving some of these issues.
Dr. Wing P. Chan (Taiwan)

Professor, Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei

Chief, Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei

Wing P. Chan, MD, is Professor of Radiology, School of Medicine, Taipei Medical University, and Chief, Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan. He received his medical degree from Taipei Medical University in Taipei and completed his internship in Taipei Medical University Hospital. He received radiology residency training at National Taiwan University Hospital, and was Chief Resident there. In 1989 he trained as research fellow in MSK Radiology, supervised by Professor Harry K. Genant, at the University of California, San Francisco, and remained at UCSF as Visiting Assistant Professor till 1992. After his return to Taiwan, he took service as Staff Radiologist at Sun Yat-Sen Cancer Center. Three years later, he was appointed as Chief of Radiology in Taipei Medical University Hospital. Dr. Chan is a recognized expert in MSK radiology with more than 25 years of experience. During his stay in UCSF, he wrote his first book “MRI in Musculoskeletal System” published by W. B. Saunders. Dr. Chan is Founding Convener, Musculoskeletal Subcommittee, Radiological Society of the Republic of China (Taiwan) and Founding Convener and Consultant, Safety and Quality Committee of RSROC. He is also Vice-Chair, Special subspecialty group, Resident Review Committee, Department of Health, Executive Yuen, Taiwan. He founded the Seed Program – Radiology CME Seminar in Taiwan-Shanghai. This program has been recognized as a leading source of education on primary care radiology for residents and radiologists. In 2013, Dr. Chan received the highest educational honor, The National Best Teacher Award, from Ministry of Education in Taiwan.

Dr. Chan has been editor of more than 7 books and author or co-author of more than 40 chapters or invited articles, over 160 articles in peer-reviewed scientific and medical journals, and over 300 abstracts presented at national and international scientific and professional gatherings. He is on the editorial boards in 4 international journals and reviewers in 23 journals.
Whole systems approach to patient safety – Can we do more?

Dr. Wing P. Chan (Taiwan)
Professor, Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei
Chief, Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei

Medical ‘errors’ can occur anywhere in the health care system. We experienced a projectile incident that occurred when an unconscious patient was sent for brain MRI and the ‘sandbag’ went unnoticed. Its attraction to the scanner wall resulted in a minor abrasion and bruise on the patient’s face. We also encountered an unexpectedly high radiation dose that occurred in a patient with arrhythmia though his pulse rate was under control on scanning table before low-dose coronary CTA was performed.

As usual, we reviewed and analyzed every incident to improve the policies and procedures of the radiological team. We informed patients that we can do much to increase the safety of their care. We followed the clinical practice guidelines, customs, and ethics of the profession. We regularly received continued medical education and training and were regularly monitored and accredited by professional external agencies. Nevertheless, once an incident happens, we ask ourselves what we can do better. Furthermore, professional societies continuously establish standards or guidelines for clinical practice. Governments and FDA regulate industries activities, including design, manufacture, packaging, labeling, and/or the import medical devices into our countries. But, does that sufficiently protect patients and avoid mishaps?

How do these incidents happen?

Ultimately, what is missing is the corporate social responsibility (CSR) of the industry. The responsibilities include the clarification of risk in the instructions and supplying safety accessory devices accompanying the scanner, improvement in safety design of the medical device, and keeping cost down without sacrificing safety. To hide the risk can harm the industry’s reputation. Reputation management is the key element of CSR. CSR policy necessarily translates to CSR performance. Communications within the whole systems need to be improved for better patient safety, and active measures to monitor CSR initiatives need to be taken.

We need to have trust and transparency in the whole system. The trust between healthcare professionals and industry, however, demands disclosure of errors or near misses as the aviation industry does. Manufacturers ought to pay greater attention on the processes of care of their medical devices to ensure that patients and users are safe from accidental injury. It is about time we let industry to step up efforts to establish Industry Trust Funds, and thus, share responsibility to cover losses occurring from an accidental injury related to the manufacturers’ ought-to-pay-attention-to basis of the safety’s needs.

Everyone concerned is responsible to see that no harm occurs to patients. Together we can do more, and better.
Moderators

Dr. Mu-Huo Michael Teng
Professor and Chief, Department of Medical Imaging, Cheng Hsin General Hospital, Taipei, Taiwan

Dr. Mao-Yuan Su
Chief Radiological Technologist, Department of Medical Imaging, National Taiwan University Hospital, Taipei, Taiwan

Dr. Yao-Liang Chen
Chief, Department of Diagnostic Radiology, Keelung Chang Gung Memorial Hospital, Keelung, Taiwan

Dr. Cheng-Hsun Lin
Chief, Continuing Education School and Associate Professor, Central Department of Medical Imaging and Radiological Science, Taiwan University of Science and Technology, Taichung, Taiwan

Dr. Yeun-Chung Chang
Professor and Chief, Department of Medical Imaging, National Taiwan University Hospital, Taipei, Taiwan

Dr. Siu-Wan Hung
Chief, Division of Abdominal Imaging, Department of Radiology, Taichung Veterans General Hospital, Taipei, Taiwan
Moderators

Dr. Chung-Liang Shih
Secretary General, Ministry of Health and Welfare, Taiwan

Dr. Wan-Yuo Guo
Honorary President, APQS Forum 2015; President, Chinese Taipei Society of Radiology; Professor of Radiology, Taipei Veterans General Hospital, Taipei

Dr. Wing P. Chan
President, APQS Forum 2015; Chair, Quality and Safety Committee, Chinese Taipei Society of Radiology; Professor and Chief, Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan

Dr. Chuen-Horng Tsai
Minister and Chairman, Atomic Energy Council, Taiwan
Moderators

Dr. Kou-Mou Huang
Consultant, Quality and Safety Committee, Chinese Taipei Society of Radiology, Taiwan

Dr. Ran-Chou Chen
Deputy Director General, Health Promotion Administration, Ministry of Health and Welfare, Taiwan

Dr. Lei Zhang
Associate Professor and Chief, Department of Radiology, Shanghai East Hospital, Tongji University, Shanghai, China

Director Ching-Chung Huang
Director, Department of Radiation Protection, Atomic Energy Council, Taiwan
Evaluation in low-dose radiation and less contrast of CT for diagnosing for liver tumors

Qianli Chen  Lei Zhang  Gonghua Dai
Department of Radiology, Affiliated Tongji University, Shanghai, China

Background and Aims: To investigate the performance of low-dose abdominal enhanced CT in liver tumors using iterative reconstruction technique for reducing body radiation.

Methods: One hundred patients with liver tumors underwent hepatic enhanced CT scan of low-dose radiation and less contrast using iterative reconstruction technique. Fifty patients underwent a 80 kVp protocol (18 < BMI≤24, group A), and thirty patients underwent a 100 kVp protocol (24 < BMI≤28, group B), twenty patients underwent a 120 kVp protocol (28 < BMI≤35, group C), and compared with routine dose group. Image noise and CNR measurements were performed. Sharpness of tumors, contrast between tumors and normal liver tissue and image quality were graded (scale 1-4) and compared. The volume CT dose index (CTDI) and the dose-length product (DLP) were measured.

Results: Image noise level and CNR on low-dose CT using iterative reconstruction technique were significantly lower than routine-dose CT images. In visual evaluation of the images, there were no statistically significant differences. The average CTDI at low-dose and routine-dose CT was 10.7 and 21.5 mGy, respectively.

Conclusion: Low-dose radiation and less contrast of liver tumors CT using iterative reconstruction technique allows for approximately 50% reduction in radiation dose without a degradation of image quality compared to routine-dose CT.
Background and Aims: Patient safety, known to be maintained by well-implemented patient care policy and procedures, has been increasingly recognized all over the world for preventing patient harms during the process of health care. Previously, national surveys for radiological examination process in Taiwan medical centers revealed decreases in the reporting cases of high risk reminder systems, the cases of severe allergic reactions to contrast media, and the reporting time for out-patient clinical results in 2014 in comparison with those in 2006. In this study, we aimed to understand the current status of patient safety during the process of radiological examination at medical centers versus non-medical centers (district and local healthcare organizations that hold residency training programs) in Taiwan.

Methods: Design: Questionnaires with 62 items covering 12 themes affecting patient safety were mailed to 19 medical centers and 17 non-medical centers in Taiwan. All themes at medical versus non-medical centers are compared via chi-square or two-sample t tests. Participants: Radiology Directors or the responding supervisors of 19 medical centers and 17 non-medical centers in Taiwan participated in this survey research by completing questionnaires. Statistical analyses: Descriptive statistics with numeric or ordinal variables were analyzed with the two-sample t test while those with nominal variables were analyzed with the Pearson’s chi-square test for the statistic significance at p ≤ 0.05.

Results: The response rates of medical and non-medical centers were 94.7% and 100%, respectively. From the responses to our survey, examination monitoring procedures, radiologist-guided patient education for specific examinations, and incident review and analyses were found to be frequently carried out in medical centers to the extent significantly greater than those taken place in non-medical centers. Access time for CT and MRI examinations, yearly extravasation of large-volume contrast media and blank radiographs were longer or more frequently seen at medical centers while the monthly rates of defective (but still interpretable) radiographs and high-risk reminder reporting were lower in comparison with those at non-medical centers.

Conclusion: By surveying most of the residency training hospitals in Taiwan, the status of patient safety in Diagnostic Radiology were elucidated, thereby providing helpful information for policy makers to establish patient safety guidelines of medical imaging in the future.
Utilization of PDCA method for decrease medical error incidence rate of Patient Safety – a preliminary experience

Min-Chi Chen  Shu-Kun Huang  Siu-Wan Hung  Chi-Chang Clayton Chen
Department of Radiology, Taichung Veterans General Hospital, Taichung, Taiwan

Background and Aims: In recent years, patient safety has become one of the health care reform issue, the patient suffered in the course of medical treatment of medical adverse events, mostly from human error, but the majority of human error is caused from a failure of the system. This report analyzes the patient safety incidents related to medical radiographic examination of a medical center in central Taiwan and explore whether the use of the Deming cycle method can reduce the recurrence rate of patient safety events.

Methods: From January 2014 to August 2015, all patient safety related events are collected. By using the Deming cycle method, they are divided into (1) Planning: using patient safety conference to restore the whole incident. They are discussed whether the events are due to failure of the system. Through peer brainstorming process, the most likely and most easily means of improvement resolution program of re-engineering program is found; (2) Do: try to accomplish the implementation processes; (3) Check: recording patient safety incident number, improve program delivery and patient safety incident rate of recurrence (4) Act: Analysis of collected patient safety event type, Notification Unit, the severity and the number of meetings held and other patient safety in order to achieve continuous improvement and sophistication.

Results: Total of 80 safety events of examination is collected. 48 of them are reported from our unit and 32 are from other units. They are accounting for total hospital patient safety reporting event of 1.4%, the severity assessment classification (SAC): 1st class: 0; 2nd class: one; 3rd class: 23; fourth class: 56. According to event patterns to distinguish: Inspection and examination related: 33 (42%); drug or medication errors events: 22 (27%); medical practice related events: 7 (9%); tubing related incidents event: 6 (8%); falls: 4 (5%); unexpected public accident: 3 (4%); and other events: 2 (3%); asystole Unexpected cardiac arrest: 1 (1%); blood transfusion event Blood transfusion associated incidents: 1 (1%); pins and needles: 1 (1%); patient safety briefing event 80, a patient safety conference convened 12 times, 34 resolution had been created as improved programs, two of them were suspended after reassessment. A total of 32 improvement programs have achieved with accomplished rate up to 94 %. Within the 12 review safety meetings, the contrast media spills (>20ml) changed from 12 in 2013 to 5 events in 2014 after being held patient safety meeting. The other 11 patient safety events are no more happened up to August of this year.

Conclusion: With PTCA method, as safe events meeting was held to review the process of elaboration and implementation of improvement plans, check to improve program effectiveness, develop effective standard procedures, can further reduce the recurrence rate of patient safety events.
Feasibility and sustainability of Two Patient Identification check documentation to drive patient and radiation safety in a Radiology department

Siok Mei Ng  Chew Pheng Loh
Department of Diagnostic Imaging, National University Hospital, Singapore

Background and Aims: To explore the feasibility and sustainability of 2 patient identification (ID) check documentation to drive patient safety and radiation safety by reducing the incidence of wrong patients scanned. Background: Failure in identifying patients correctly in health-care organization has serious implications on patient safety. The Joint Commission International (JCI) described identifying patients correctly as the first, most important, mandatory International Patient Safety Goal[2]. Radiological exams performed in DDI mostly involve the use of radiation, which once delivered, the radiation dose cannot be retracted. Therefore, correct patient identification is crucial for patient safety and radiation safety. After 4 serious patient misidentification incidents in 2010 (the wrong patient was scanned in the CT scanner and another patient given a wrong radiopharmaceutical injection), the radiology management team decided to explore the feasibility and sustainability of 2 patient identification check documentation to improve drive patient safety and radiation safety.

Methods: All Department of Diagnostic Imaging (DDI) radiographers were instructed to document at the back of the x-ray request forms that identification of patients were performed by obtaining the patient’s signature or signing off for patients who were unresponsive or unable to sign. A root cause analysis performed to identify the reasons for low documentation compliance showed the following causes: manual stamping of forms is tedious and radiographers lack time to do this, process seen as extra effort &amp; not perceived as valuable. A retrospective convenience sampling of 5% or 30 samples (whichever is higher) of total request forms per month by 11 imaging modalities was performed. The audit was performed quarterly on a quarterly basis and a documentation compliance rate was computed. 3 interventions were implemented from February 2011 to January 2012.

Results: The 2 patient ID compliance rate increased 9%, 6% and 16% after the 1st, 2nd and 3rd interventions respectively. The Pearson Chi-Square test (2-sided) showed a significant increase ($p=0.000$) in the compliance rate after the 3rd intervention. The incidence is incorrect identification of patients for scans reduced from 4 in 2010 to 0 for 2012 - 2015 (100% reduction).

Conclusion: 2 patient identification (ID) check documentation has been shown to be feasible, sustainable, can be used as a performance indicator for staff to drive patient safety.
Change of Safety Considerations regarding Taking Metformin before and after Intravascular Iodinated Contrast Medium Administration

Ju-Fang Wen  Yi-Wen Wang  Bing-Chung Wu  Chin-Ming Fan  Yao-Liang Chen
Department of Diagnostic Radiology, Keelung Chang Gung Memorial Hospital, Keelung, Taiwan

**Background and Aims:** To clarify the change of safety considerations regarding taking metformin before and after intravascular iodinated contrast medium (IICM) administration in Taiwan according to the latest American College of Radiology (ACR) Manual on Contrast Medium.

**Methods:** The editions of ACR Manual on Contrast Medium (ACRMC) were collected from version 5 to 10.1, ranging from 2004 to 2015, by her official website and Google internal search engine. Two official documents of Taiwan regarding metformin notifications issued by Department of Health of Executive Yuan on 2008 (No. 0970344756) and by Ministry of Health and Welfare on 2014 (No. 1031412405A), respectively.

**Results:** In version 5, ACRMC mentioned metformin should be discontinued at the time of using IICM, withheld for 48 hours after the procedure, and reinstated only after renal function has been re-evaluated to be normal. Through version 6 to 9, patients taking metformin were categorized by I,II and III according to renal functions and comorbidities. Patients with comorbidities and normal renal function (category II), metformin should be discontinued at the time of using IICM and withheld for 48 hours. In patients with renal dysfunction (category III), metformin should be suspended when contrast injection, and be cautious follow-up of renal function until safe reinstitution of metformin. However, only two categories were revised in latest version. Patients without acute kidney injury (AKI) and with estimated glomerular filtration rate (eGFR) ≥30 mL / min/1.73m2, there is no need to discontinue metformin either prior to or following administration of IICM, nor is there an obligatory need to reassess the patient’s renal function following the procedure. Among of two documents of Taiwan, the first one on 2008 asked clinicians to suspend metformin before ICCM administration and restart metformin when renal function returned to normal limit. The last one on 2014 just asked clinicians to terminate prescription of metformin if the patient with impaired renal function, eGFR<30 mL / min/1.73m2. No notification was revised regarding administration of IICM.

**Conclusion:** Renal function, especially eGFR= 30 mL / min/1.73m2, is only one evaluation benchmark currently for patients with medication of metformin before radiological procedure with ICCM. Discontinuing metformin before and/or after the procedure could be unnecessary or redundant safety consideration. There is also no mandatory need of post-procedural follow-up of renal function.
Adverse Contrast Media Reaction Occurred Within 17 Months in Cheng Hsin General Hospital in Taipei

Mu Huo Michael Teng  Yan-Hsing Chiou  Tien-Yu Chang  Jia-Hwia Wang
Department of Medical Imaging, Cheng Hsin General Hospital, Taipei, Taiwan

Background and Aims: Contrast media reaction is a problem that any radiological department may encountered off and on. It is an important issue in patient safety. Being prepared to handle any contrast media reaction, careful observation of the patient’s vital sign and clinical condition, immediate response and proper treatment are important when encountered a contrast media reaction.

Methods: We make record of any occurrence of adverse contrast media reaction, filing a record for each case, and reviewed monthly. We summarized contrast media reaction we encountered in our department from April 2014 to August 2015.

Results: Totally 12,034 patients received iodine-containing contrast media, 16 patients (0.13%) had adverse reaction. Only one of these patients needed CPR and/or endotracheal intubation (0.008%). We used Omnipaque 350, Iopamiro 370, and Visipaque 320 in 5277, 6667, and 90 cases respectively. Adverse contrast media reaction was found in 6, 10, and 0 cases representing 0.11%, 0.15%, and 0% respectively. The degree of contrast media reaction was mild in 11 cases, moderate in 3 cases, and severe in 2 cases. Sulo-cortef 100mg iv and/or Vena 1amp im were given in 8 cases. Only one patient needed endotracheal intubation and cardiopulmonary resuscitation (CPR). The endotracheal tube was removed 10 days later and gradually recovered and discharged from the hospital. Totally 4,269 patients received gadolinium-containing contrast media, and 5 patients (0.12%) had adverse reaction. We used Gadovist, Multihance, Dotarem in 1720, 1389, and 1160 patients respectively. Contrast media reaction occurred in 3, 2, 0 patients and 0.17%, 0.14%, and 0% respectively. Degree of the adverse reactions were mild in 3 cases, moderate in 2 cases. Sulo-cortef 100mg iv and/or Vena 1amp im were given in 3 patients. None needed endotracheal intubation or CPR.

Conclusion: About 0.13% of 12,034 patients received iodine-containing contrast media had adverse reaction. Only one patient needed endotrachial intubation and CPR. About 0.12% of 4,269 patients received gadolinium-containing contrast media had adverse reaction, none of them needed endotrachial intubation or CPR.
Using Dual Source CT (DSCT) to Reduce Coronary CTA Radiation Dose in Obese Patients

Cheng-Yu Tsai, Wilson T. Lao, Bo-Shin Jeng, Po-Yen Chang, Min-Fang Lin
1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: CT angiography has become an essential tool for the non invasive diagnosis and characterization of coronary arterial disease, however radiation dose is still considered a major issue. With the introduction of faster CT scans and dual-source CT (DSCT), there was significant reduction in radiation dose. But obese patients still require a higher radiation dose as compared to patients with low BMI. The main purpose of this study was to promote patient safety by attempting to reduce radiation dose of cardiac CTA in obese patients by reducing scanning phase.

Methods: From January 2013 to June 2015, consecutive patients who underwent cardiac CTA with BMI values greater than 27, stable heart rate (HR<80bpm) and same scanning technique (Sequence mode) were reviewed retrospectively, and evaluated for effective radiation dose and the image quality.

Results: The dose of reducing scanning phase was shorter and statistically significant (3.73mSv at 60%-75%; 5.77mSv at 50%-75%; P <0.001), but Image quality was not compromised with no significant difference (P=0.29).

Conclusion: Radiation dose was significantly reduced 36%, and image quality was not compromised with no significant difference. Appropriate adjustment scanning phase was useful in reduction of radiation dose in obese patients undergoing cardiac CTA.
Safety versus Quality Analysis of Pediatric Chloral Hydrate Sedation for MRI Scanning Procedure

Yi-Wen Wang  Yu Hsuan Tsai  Ju Fang Wen  Bing Chung Wu  Yao Liang Chen  
Department of Diagnostic Radiology, Keelung Chang Gung Memorial Hospital, Keelung, Taiwan

**Background and Aims:** Chloral hydrate (CH) sedation of pediatric patients for MRI procedure is an important safety issue in daily practices of radiological department, as higher dosage than other pediatric medical examinations needed. We retrospectively compared two different dosages of pediatric chloral hydrate sedation for MRI scanning procedure and made analysis of their safety versus quality.

**Methods:** Twenty pediatric patients, all less than 6 years old, were enrolled in this study. There were 12 girls and 8 boys respectively. Mean age is about 3.8 years of age. Group A with 10 patients, 7 girls and 3 boys, were given CH via oral or rectal route with 100 mg/Kg. Group B with the other ten, 5 girls and 5 boys, were given same route with 75 mg/Kg. Each patient was given less than 2 gram in total dosage. The prepared time, MRI scanning time and recovery time were recorded. Partial pressure of oxygen in arterial blood (PaO2) saturation and heart rate were also in motoring and recorded. Imaging quality was classified as well, fair and poor by physicians.

**Results:** The averaged prepared time was 14.3 minutes (m) in group A and 46.2 m in group B. Recovery time was 85.7 m in group A and 27.3 m in group B. Imaging quality was recorded 8 well and 2 fair in group A, but 5 well, 3 fair and 2 poor in group A. One patient in group A was recorded PaO2 saturation down to 79% less than 1m and recovered to 100% after O2 mask given. The patient recovered well 355 m later without sequel. Four patients woke up during scanning in group B, two with poor imaging quality. Mann-Whitney test shows significant differences on prepared time, recovery time and imaging quality between group A and B.

**Conclusion:** Group A with CH 100 mg/Kg discloses shorter prepared time, prolong recovery time and adequate imaging quality, but need to pay more attention on the safety of patients. However, group B with CH 75 mg/Kg shows more safe, prolong prepared time, shorter recovery time but relatively suboptimal imaging quality.
The Safety Impact of Accessed Needles in Iodinated Contrast Medium Extravasation: An In Vitro Study

Chen-Yi Wu  Yan-Ciou Lyu  Yu-Chen Chang  Chih-Ming Fan  Yao-Liang Chen
Department of Diagnostic Radiology, Keelung Chang Gung Memorial Hospital, Keelung, Taiwan

Background and Aims: Iodinated contrast medium extravasation (ICME) get more and more safety concerns in radiological daily practices as widely utilization of high-velocity intravenous (IV) contrast medium (CM) administration by power injector. ICME usually occurs due to unsecure IV access, fragile vessel well and high velocity injection. Unsecure IV access is closely related to accessed needle type or size. Herein, We try to set an in vitro model to approach the needle impact on ICME.

Methods: Daily accessed needles were classified by A and B two groups. Group A included intravenous cannula needles (ICN): 18 gauge (G), 20G and 22G and group B included scalp vein needles (SVN): 19G and 21G respectively. First, we puncture into the subdermal layer of pork leg by different needles and injected 10 cc Omnipaque (Iohexel 350 mg Iodine/ml) by power injector with the rate of 2.5 ml/sec. Then we record end injection pressures and extravasation areas by CT scanning and reconstruction. Second, sequential injection of 10 cc, 20 cc and eventually 30 cc CM in total amount were done and measured the pressure of each needle and scanning the extravasation extent.

Results: Group A ICN has soft plastic tip within subdermal layer and Group B SVN has stiff steel tip within the same layer. The end-pressures of first study were recorded as 170 pounds per square inch (PSI) in 22G, 145 PSI in 20G and 100 PSI in 18G of group A; 175 PSI in 21G and 150PSI in 19G of group B. The extravasation volumes by CT was 14.8 ml, 14.1 ml, 14.3 ml in group A; 13.5 ml and 14.4 ml in group B. Sequential injection shows increased PSI in each needle. For 22G was recorded as 170, 181 and 203 PSI; for 20G as 145, 152, 168 PSI; for 18G as 100, 108, 113 PSI; for 21G as 175, 189 and 211 PSI; for 19G 145, 158 and 170 PSI. Among the 20 ml CM injection subgroup, the volumes were measured between 23.4 ml to 25.6 ml. For 30 ml CM injection subgroup, the volumes ranged from 33.1 ml to 37.5 ml.

Conclusion: The end-pressure of ICN is lower the that of SVN, implying more safe ICN than SVN as less pressure on vessel wall and surrounding tissues. The extravasation volume is usually overestimation by CT but the discrepancy deceases as volume increases. Smaller needle size produces higher pressure. More extravasation volume means more high pressure within the tissues. If we want to avoid large amount of ICME, bigger-bore needle needs less pressure setting.
The use of information systems analysis of renal dysfunction and prevent allergies of contrast media in the Department of Radiology of Medical Center

Huan-Chung Yao Chun-Chin Shih Hsueh-Mei Yang Yu-Ting Kuo
Department of Medical Imaging, Chi Mei Medical Center, Tainan, Taiwan

Background and Aims: According to available publications in the literature, the administration of radiographic contrast media is one of the leading causes of renal failure in patients undergoing imaging studies. The purpose of this system is to explore ways of improving patient safety and quality of care by reducing events of adverse reactions and minimizing the occurrence of renal failure induced by contrast media.

Methods: This evaluation system integrates information pertaining to contrast media administration (including contrast media injection safety protocols, the occurrence and management of contrast media extravasation, allergic reactions to contrast media, and statistical calculations), adverse drug reactions, and biochemical laboratory data. Before proceeding with imaging studies involving the use of contrast media, the nursing staff was able to access the contrast media monitoring system, which is also linked to the adverse drug reaction reporting system of the medical center.

Results: From 2006 to 2014 alone, a total of 51,253 patients underwent CT scans, of whom 276 experienced allergic reactions, 275 were found to have impaired renal function, and 337 sustained other contrast-related adverse events and injuries. 16,569 patients underwent intravenous urographic studies, of whom 79 experienced allergic reactions, 14 were found to have impaired renal function, and 113 sustained other contrast-related adverse events and injuries. 23,129 patients underwent MRI scans, of whom 61 experienced allergic reactions, 219 were found to have impaired renal function, and 244 sustained other contrast-related adverse events and injuries.

Conclusion: The ultimate goal is to minimize the adverse effects of contrast media administration, personnel costs incurred when such incidences happen, and time consumption in the process of managing these events. In addition, nurses, radiologist and physicians receive regular drills and continuing education on managing anomalous incidences related to contrast media administration.
Use Triangular Styrofoam to comparison of the Imaging Quality between Traditional and the 30° Hand PA Oblique Projection

Hui-Feng Ho  Meng-Yu Lin
Department of Radiology, Taichung Veterans General Hospital, Taichung, Taiwan

**Background and Aims:** The traditional 45° hand PA oblique projection usually results in images with too big a rotation angle and with too much metacarpus overlapping; as a result, radiologists may misinterpret the image if the fracture is located at the metacarpal bones. This study improved upon the traditional 45° by utilizing the 30° Hand PA Oblique Projection for angle comparison, in order to investigate the correctness of the Hand PA Oblique Projection as well as to promote the imaging quality.

**Methods:** During the traditional hand PA oblique projection, hands and forearms are placed on the inspection bench with the elbows bent at 90 degrees. The CR faces directly at the 3rd MP joint of the examined part, with the whole hand and wrist rotating 45° outwards. This study used Triangular Styrofoam was cut into 45° and 30° angles, respectively, to serve as auxiliary tools, where the palm was placed in the middle of the tool. The CR directly faced the 3rd MP joint of the examined part.

**Results:** A good image shall comprise the whole hand, wrist and about 1-inch of the distal forearm are visible. The center of the collimation range shall align with the 3rd MP joint. The middle diaphysis of the 3rd, 4th and 5th metacarpus shall not overlap. The distal head of the 3rd, 4th and 5th metacarpus would somewhat overlap, but that of the 2nd and 3rd metacarpus should not overlap. Excessive overlapping of the metacarpus indicates excessive rotation, while too much gap represents insufficient rotation. This study found that most patients who used the 45° Styrofoam auxiliary tool received projection images with excessive rotation angle, which showed excessive metacarpus overlapping. On the other hand, most patients who used the 30° Styrofoam auxiliary tool received high quality projection images.

**Conclusion:** By improving the angle, the 30° Hand PA Oblique Projection not only increases the correctness of the hand PA Oblique Projection, but also provides more accurate images for the clinicians to make their diagnosis. Conversely, the imaging quality obtained from the traditional 45° Hand PA Oblique Projection is much poorer, with too much metacarpus overlapping, and the fracture, if any, cannot be clearly observed.
To investigate the effectiveness of short message service alerting system for critical values notification of abnormal radiological findings

Yung-Cheng Wang  Wen-Chang Tseng  Shieh-Yu Lai  China-Ying Chou  
Department of Radiology, Cathay General Hospital, Taipei, Taiwan

Background and Aims: According to the report by Joint Commission on Accreditation of Healthcare Organization (JCAHO), 42% of hospitals were not able to provide the critical examination information to the patients on time, which is the main reason for delayed treatment.

Methods: In order to increase the timeliness of clinical treatment and enhance the communication between radiologists and clinicians, we have constructed short message service alerting system. The system is launched in September, 2009 and the short message system (SMS) server is operated by Chunghwa Telecom to send and receive the messages. We have discussed with the radiologists and defined nine clinical conditions for critical values reporting, including dissecting aortic aneurysm, PPU, pneumothorax, tuberculosis, newly diagnosed tumor, non-traumatic SAH, incidental SDH, ICH, stroke, and other significant incidental findings. Once the radiologists identify the above conditions in reading, the system will be initiated and a text message is sent to notify the ordering physicians. The physicians can response the notification by sending the text message, calling back the radiologists or replying via management platform. The action has to be completed within 24 hours after text message is received. If the message status is shown as “in process” after text message is successfully sent for 30 minutes, staff at the radiology department will call to inform the physicians to ensure the response rate.

Results: From September 2009 to September 2015, the radiology department has reported 4,247 cases. “Other significant incidental findings” and “newly diagnosed tumor” are the top two conditions to be reported at the rate of 43.2% and 31.4%, respectively. In September 2011, a designated person is responsible to follow up the physicians who do not response within 30 minutes. The follow-up rate increases from 41.4% to 100% and the response rate rises from 68.4% to 91.4%.

Conclusion: We applied the fishbone diagrams to analyze the reason of non-response and found that physicians react faster than the reporting. That is the direction we are moving forward to provide a holistic care.
Comparison of Image Quality Between Iterative Reconstruction and Filtered back projection in brain CT

Shan-Ju Yeh  Meng-Yu Lin  Ji-Da Li
Department of Radiology, Taichung Veterans General Hospital, Taichung, Taiwan

**Background and Aims:** To assess iterative reconstruction (IR) and filtered back projection (FBP) with different brain filter kernels on brain CT image quality.

**Methods:** Using Philips iCT 256, we received adult brain CT scans. 10 consecutive raw data sets of clinical routine native brain CT scans with pre- and post-contrast were reconstructed with IR level 0 (=filtered back projection), 2 and 5; 3 different brain filter kernels (smooth/standard/sharp) were applied respectively. Detailed ROI analysis of image contrast, noise, contrast-to-noise ratio and Signal-to-noise ratio in white matter (WM) and gray matter (GM) was performed. Statistical analysis was carried out by applying a random intercept model.

**Results:** In pre-contrast brain scan, the mean GM and WM attenuation values were 34.37 and 27.24 HU. After using contrast, the mean GM and WM attenuation values were 37.04 and 28.45 HU. Objective measurements revealed an overall increase in contrast-to-noise ratio and Signal-to-noise ratio at higher IR levels, which was highest when applying the soft filter kernel. But contrast-to-noise ratio and Signal-to-noise ratio at filtered back projection, which was lowest when applying the shape filter kernel. The absolute grey white contrast decreased with an increasing IR level and was highest when applying the sharp filter kernel.

**Conclusion:** Different combinations of IR level and filter kernel substantially influence image quality of brain CT, they may be of acceptable diagnostic quality for some routine clinical applications.
The evaluation of radiation dose and medical quality for coronary CT angiography.

Ming-Hung Liu  Kuei-Yuan Hou  Tiem-Min Lin  Yung-Cheng Wang
Department of Radiology, Cathay General Hospital, Taipei, Taiwan

Background and Aims: Coronary CT angiography (CCTA) has advantages of rapidity, accuracy, and non-invasiveness for coronary artery diseases. However, they were heightened concern for the radiation dose from CT examinations. Since 2010s, the adaptive iterative dose reduction (AIDR) was excellent algorithm for improve image quality and reduce radiation dose comparison conventional reconstructions. In order to avoid this higher radiation exposure, the AIDR algorithm must be used. In our previous studies, AIDR algorithm can maintain medical image quality and effectively reduction radiation dose in abdominal and pelvic CT examination that was confirmed. The aim of this study is analyzing the radiation dose of patient received by CCTA from our institution.

Methods: In this study, we used 320 row multi-detector CT systems (Aquilion ONE, Toshiba, Japan) to perform CCTA examination. The inclusion criteria of patient data: (a)Body mass index &gt;24kg/m2, (b)Tube voltage was 120 kV, (c)The heart rates less than 65, (e)Using prospective ECG gating and (f)The R-R interval selected 70-80%. The estimated effective dose compared of 2010s CCTA with filtered back projection (fixed tube current) and 2011-2014s CCTA with AIDR algorithm (used SureExposure system). Statistics analyses were using SPSS (Statistical package for the social sciences, version 18.0) to perform independent t-test.

Results: During the 5 year period, a total 160 consecutive patients have no statistical significance with BMI (P value&gt; 0.05). Since 2010 to 2014s, the CCTA examination of estimated effective dose was 3.0±0.57, 2.92±0.38, 2.19±0.86, 2.08±0.87 and 2.47±0.73, respectively. Therefore, the percentage difference of estimated effective dose was 2.65%, 27.2%, 30.57% and 17.74%, respectively.

Conclusion: Overall, the estimated effective dose of CCTA was benefited from AIDR algorithm in 2011 to 2014s. It has great improvement during 2011 to 2012. However, the reducing radiation dose slowed down in 2014. Analyzing the cause, we found it was the period training in training new CT Technician. In conclusion, using AIDR, AEC, and well training can decrease radiation dose and keep good image quality.
Analysis of unqualified mammography to increase image quality

You-Chen Lin  Kuei-Yuan Hou  Chung Ho Lan  Yung-Cheng Wang  
Department of Radiology, Cathay General Hospital, Taipei, Taiwan

**Background and Aims:** Breast cancer is the most common cancer in women. Enhance the high-quality images, and over the dose range is worth low as reasonably achievable elevation issues. The aim of this study is to analyze unqualified mammography and project methods to improve it.

**Methods:** We collected unqualified images during October 1st, 2014 to September 30th, 2015. We collect and report the sheet of unqualified mammography every season. We divided it into two groups: Group A, the data before June 30th, and Group B, the data during July 1st to September 30th, 2015. The causes of unqualified images include improper positioning, patient motion, artifacts, X-ray equipment failure, and et al. We assessed the data of Group A, and then put forward the methods to decrease unqualified images from July 1st, 2015. From Group A, we found the most three factors of unqualified images are improper positioning, patient motion, artifacts. The strategies included reeducation of the newer radiographers, remind the patients to keep still, and remove and check the material on patients' breasts. After the intervention, we collect the data of Group B.

**Results:** The average of rejection rate of Group A is 2.56%, while Group B is 1.79%.

**Conclusion:** According to the regular check of the unqualified images, and offer the optimal solution to improve it. It can increase the image quality of mammography and decrease the repetition and radiation dose.
Evaluation of annual radiation output stability in angiography using local diagnostic reference level - A case study using liver tumor embolism cases

Yi-Chun Huang1 I-Chih Cheng1 Ching-I Hsu1 Ying-Chi Tseng1 Chi-Jen Chen2
1. Department of Radiology, Taipei Medical University Shuang Ho Hospital, New Taipei, Taiwan
2. Department of Radiology, Chia-Yi Hospital, Chiayi, Taiwan

Background and Aims: The local diagnostic reference level (local DRL) was established to ensure uniform radiological procedures and medical equipment, so that patients are treated with a reasonable radiation dose meeting the principle of medical exposure—as low as reasonably achievable—and also adequate to obtain diagnostic image quality. In this study, the LDRL established in 2013 and the DRL (diagnostic reference level) collected in 2014 were used for annual assessment to ensure radiation output stability, in turn ensuring patient safety.

Methods: Taking the angiography instrument (GE, Innova 3131-IQ biplane) as an example, 123 cases of liver embolism examination in 2013 were collected, of which 48 were selected using the standard weight range (60-70 kg) as the selection criterion. Radiation dose area product (DAP) (cGy•cm2) under fluoroscopy mode and photo mode were recorded. Under fluoroscopy mode, the average DAP per second was obtained by dividing the fluoroscopy examination time with DAP. Under photo mode, the average DAP per image was obtained by dividing the number of images taken by DAP. These data were used as the DRL for 2014, and compared with the LDRL established in 2013 and 37 cases of patients treated in 2014 under the same conditions. The results revealed whether the dose output was stable: if the DRL exceeded the LDRL by $\geq$ 20% (condition 1) or twice of SEM (standard error of the mean) (condition 2), the cause of dose increase needed to be examined; if the LDRL exceeded the DRL by $\geq$ 10%, the LDRL could be corrected.

Results: Neither DRL nor LDRL exceeded the threshold values, suggesting stable radiation output. The LDRL can be corrected when it exceeds the DRL by $\geq$ 10%. The DRL obtained in 2014 was used as the new LDRL.

Conclusion: Medical institutions should establish local DRLs for medical equipment producing ionizing radiation. This will enable the annual inspection of radiation output and dose monitoring, thus increasing patient safety. Improvements may be made based on the results of monitoring, if necessary. Additionally, the local DRL may be combined with the annual quality assurance operation of radiographic fluoroscopy to maintain equipment output quality, so as to meet the principle of medical exposure as low as reasonably achievable.
A Survey of Patient Safety and Job Stress in a Radiology Department

Wen-Chang Tseng¹  Chia-Hui Cheng²  Shieh-Yu Lai¹  Yung-Cheng Wang¹
1. Department of Radiology, Cathay General Hospital, Taipei, Taiwan
2. Quality Management Center, Cathay General Hospital, Taipei, Taiwan

Background and Aims: Using structured questionnaire, the objectives of this study are to investigate the patient safety attitude and job stress among staff of the radiology department. The Safety Attitudes Questionnaire (SAQ) version 2015 was used to evaluate the patient safety attitude and job stress. The questionnaire consists of 7 dimensions of patient safety attitude, including teamwork climate, safety climate, job satisfaction, perception of management, working condition, resilience and work-life balance.

Methods: Multivariate regression models are used to investigate the factors that may affect the patient safety attitude. Forty-six objects are enrolled, and the response rate was 74%.

Results: The positive response rates of 5 dimensions of patient safety, which are teamwork climate, safety climate, job satisfaction, perception of management and working condition, are 61.5%, 69.2%, 76.9%, 41.7% and 61.5%, respectively. Staff with managerial job, aged more than 40 years-old, and employment years more than 10 years had higher scores in the dimensions of patient safety. Only 38.5% of the participants had high resilience scores, while 76.9% of them had maintained work-life balance.

Conclusion: The SAQ survey data is reliable to provide patient safety attitude and job stress information of the certain unit within a healthcare organization. It is a useful tool for manager to acknowledge the status of the unit and identify the difference.
The Application of Transport Grading Scale to Rationalize the Portable X-ray Examination—Experience of a Medical Center

Yung-Cheng Wang  Wen-Chang Tseng  Shieh-Yu Lai  China-Ying Chou
Department of Radiology, Cathay General Hospital, Taipei, Taiwan

Background and Aims: The portable X-ray examination is one of the fastest ways to gain the patient’s condition and the chest X-ray is the most utilized item. The portable X-ray examination is designed for emergent use, so the quality of the image is not sufficient. That feature does not influence clinical diagnosis for certain medical imaging, but it does cause some confusion in imaging report. The advance of the equipment can solve the problem of poor image quality by increasing the radiation dosage, which results in the issue of radiation protection such as the physical environment of medical wards and the radiation protection gears for the patients and their family.

Methods: Since the ordering physicians are not fully aware of the criteria for taking X-ray examination, we applied patient transport grading scale as the standard. Physicians assess patient conditions and classify them into 4 scales from A, B, C and D. Patients who are graded as scale A and B are fitted to undergo the portable X-ray examination.

Results: The execution rate of the portable chest X-ray is at 3%; while others account for 1%.

Conclusion: Applying the patient transport grading can prevent overusing the portable X-ray examination, but also reduce patient waiting time. Moreover, the new policy can enable to thoroughly execute the radiation protection guideline and be beneficial in imaging reports.
Patient Safety Evaluation before CT Study by Using the Patient Self-assessment Form and Automatically Display of the Renal Function Test Values

Ya-Ju Weng  Hung-Yu Lai  Ya-Ju Qu  Cheng-Chiang Huang
Department of Radiology, Kuo General Hospital, Tainan, Taiwan

**Background and Aims:** Computed tomography (CT) is a radiological examination with higher radiation dose compared to other radiological studies. Usage of contrast medium may also cause side effects such as contrast nephropathy. Therefore, the patient evaluation mechanism before the CT study should be established.

**Methods:** From August 10 2015 to October 10 2015, we use the new safety guideline of CT to assure patients’ safety. When a clinician orders a CT study, the recent renal function test values are automatically displayed on the application sheet, and a "CT patient self-assessment form" is printed and hands the patient. The renal function test values including creatinine and eGFR must be within one month before the CT study. If the patient didn’t receive renal function test recently, the clinician must check it first. Besides, the patient or their family should fill in the self-assessment form, including the possibility of pregnancy, and in line with contrast medium administration criteria.

**Results:** During the period when the new safety guideline of CT was applied, patients had to check renal function before administration of contrast medium, and the ratio reached 97.3%. We found three cases of poor renal function (eGFR<30), and contrast enhancing studies were held. The completion rate of the "CT patient self-assessment form" was 100%, which means that every patient received complete radiation safety and contrast medium safety evaluation before CT study.

**Conclusion:** The renal function test values automatically displayed on the CT application sheet can remind a clinician to evaluate the patient’s renal function. Before CT study, the self-assessment form can help the radiology department to evaluate the patient’s condition. These mechanisms can maintain patients’ safety during the CT studies.
Correlation of mammography exam time with image quality between hospital and mobile van

Chen-Yu Chien¹ Yi-Hsin Su¹ Jian-Jhih Chen² Ying-Chi Tseng¹
1. Department of Radiology, Taipei Medical University Shuang Ho Hospital, New Taipei, Taiwan
2. Department of Radiology, Chia-Yi Hospital, Chiayi, Taiwan

Background and Aims: Breast cancer in Taiwan is currently the first female cancer disease and forth mortality rate. It can be found a higher proportion of early stage breast cancer through screening mammography. Breast cancer receiver treatment five-year survival rate was 97.5% of the Stage 0, and 95.6% of the Stage 1. Therefore Health Promotion Administration, Ministry of Health and Welfare(HPA) currently grant women aged 45-69 for breast cancer screening every two years, the purpose to achieve early diagnosis and early treatment. In recent years, mobile mammography van is become popular contribute to very convenience. Usually have hundreds of people receiver the exam at the once time. Relatively, the exam time must reduce in order to service more people. However, mammography in hospital use reservation system, the examination time was longer than mobile mammography. The purpose of the study is to evaluate mammography examination time and image quality between hospital and mobile van.

Methods: A retrospective study was conducted between 2014 January and June of 300 women (screening mammography) served by three radiological technologists, seniority were 1, 4, and 10 years. That included 150 women of regional teaching hospital and 150 women of mobile van served. We evaluate correlation between examination time and image quality. The image quality is according ACR–AAPM–SIIM practice parameter. All mammograms is interpreted by one of HPA committee board-certified.

Results: The average exam time of mobile van was 4.1 minutes (3.6-4.8) and average image quality score was 64.0 points (54-73). The average exam time of hospital was 7.3 minutes (6.6-9.3), average image quality score was 65.6 points (58-74). The results show longer exam time and better image quality (P <0.05) of mammography in hospital.

Conclusion: Screening mammography mobile van provides the convenience examination, and increases the burden on the radiological technologists. Shorten exam time in order to perform more mammography caused lower image quality and probably higher false positive rate. We suggest restrictions reasonably number of patient at mobile van in order to optimize balance between exam time and image quality.
Risk of Leukemia Post Percutaneous Cardiac Intervention: A Nationwide Population-Based Case-Control Study

Shiang-Jiun Tsai1, Wen-Yen Chiu1,2,3, Hon-Yi Lin1,2, Shih-Kai Hung1,2, Moon-Sing Lee1,2, Kai-Che Wei4
1. Department of Radiation Oncology, Buddhist Dalin Tzu Chi Hospital, Chiayi, Taiwan
2. School of Medicine, Tzu Chi University, Hualien, Taiwan
3. Director of Public Health, College of Medicine, National Cheng Kung University, Tainan, Taiwan
4. Department of Dermatology, Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan

Background and Aims: New electrophysiological ablation and stent implantation techniques, which are more complex procedures, increase significantly the radiation exposure time. These advancements inevitably lead to a much higher accumulated radiation dose in these patients. Therefore, it is sensible to speculate that the cardiac fluoroscopy intervention might pose an even higher risk of malignancy, giving its higher radiation exposure.

Methods: This was a population-based case-control study. 5026 leukemia patients and 100,520 age-sex matched controls (1:20) by propensity score method without any cancer history were enrolled from Registry Data for Catastrophic Illness, and the National Health Insurance Research Database (NHIRD) of Taiwan between 2008 and 2010. These people were retrospectively surveyed to year 2000 to exam if they ever received percutaneous cardiac intervention (PCI). Then we analyzed data using conditional logistic regression models and estimated crude and adjusted odds ratios and 95% confidence intervals.

Results: The characteristics and comorbidities of 5,026 leukemia patients and 100,520 controls were listed in Table 1. After adjusting for age, gender, hyperlipidemia, diabetes, hypertension, chronic obstructive pulmonary disease (COPD), CAD (coronary artery disease), Chronic heart failure (CHF), the adjusted leukemia incidence rate in the PTCA cohort was 1.566 times higher than the controls (P < 0.001). Persons who ever receive coronary angiography but never receive PTCA were not found to have significantly higher leukemia risk (P = 0.059).

Conclusion: Since the use of cardiac angiographic fluoroscopic intervention in medicine is widespread and appears to be increasing, our study results provide additional data to quantify the long-term health effects of radiation exposure derived from the cardiac fluoroscopic diagnostic and therapeutic intervention. Continued follow-up of existing cohorts will be valuable to assess lifetime risks of cancer.
Using a web-based information system to effectively monitor patient safety in conducting computer tomography simulation

Shu-Mei Huang1 Shih-Kai Hung1,2 Moon-Sing Lee1,2 Wen-Yen Chiou1,2,3 Hung-Yi Lin1,2 Bing-Jie Shen1,2 Pei-Han Yeh1
1. Department of Radiation Oncology, Buddhist Dalin Tzu Chi Hospital, Chiayi, Taiwan
2. School of Medicine, Tzu Chi University, Hualien, Taiwan
3. Department of Public Health, College of Medicine, National Cheng Kung University, Tainan, Taiwan

Background and Aims: Most patients received a computer tomography (CT) simulation before radiotherapy. For effectively targeting, using intra-venous (IV) contrast is essential. However, contrast-associated allergic/adverse reactions may occur, such as skin rashes, dyspnea, and shock (a lethal rate about 1/40,000 ~ 1/100,000). In addition, contrast-associated renal toxicity may be developed (up to 50% in high-risk patients). Herein, we used a web-based information platform to monitor patient safety systematically.

Methods: Before simulation:1. Radiation oncologist: order the radiotherapy by using our web-based information system. The system automatically integrated renal function data in the e-order. 2. Nurse: check allergic history and assess the risk level. 3. Radiologist and nurse: education and vital sign monitoring.
After simulation:1. All members: observe the patient for at least 15 mins. 2. Nurse: educate for post-contrast self-care.

Results: From 2014/08 to 2015/08, a total of 1400 patients received CT simulation in our radiotherapy department. Of these, 1076 patients received intra-venous contrast. The conducting rates of four monitoring items are: pre-radiotherapy education (100%, 1400/1400), pre-simulation vital sign monitoring (100%, 1400/1400), confirming renal function test (100%, 1076/1076), and the doctor-on-site-assessment rate while contrast injection (100%, 1076/1076). No severe allergic/adverse reactions occurred during the monitoring time period.

Conclusion: In clinical practice, using a well-established information system is able to effectively monitor patient safety in conducting CT simulation.
Using Electronic Information System to Increase Interdisciplinary Duty-exchange Satisfactory and Effectiveness in a Radiotherapy Department

Shu-Mei Huang1  Shih-Kai Hung1,2  Moon-Sing Lee1,2  Wen-Yen Chiou1,2,3  Pei-Han Yeh1  Min-Juan Lu1

Hung-Yi Lin1,2

1. Department of Radiation Oncology, Buddhist Dalin Tzu Chi Hospital, Chiayi, Taiwan
2. School of Medicine, Tzu Chi University, Hualien, Taiwan
3. Department of Public Health, College of Medicine, National Cheng Kung University, Tainan, Taiwan

Background and Aims: Effective duty-exchange is a cornerstone for protecting patient safety, especially in modern radiotherapy. In a radiotherapy department, multidisciplinary team members – including radiation oncologist, oncological nurse, medical physicist, and therapeutic radiologist – require to frequently communicate about treatment information and patient condition. The present study intended to compare effectiveness among three duty-exchange methods in different time periods.

Methods: In our department, three duty-exchange methods have been used: (1). oral communication only; (2). hard copy; and, (3). electronic information exchange. Oral communication only: Multidisciplinary team members communicated by using phones only. Hard-copy communication: Team members mainly used hard-copy documents for interdisciplinary communication. Electronic information exchange: By using a web-based information system, our members currently doubly confirmed and documented treatment information electronically. We used multi-dimensional questionnaire for surveying effectiveness of the three duty-exchange methods. A ten-scoring system was used for performance comparison.

Results: A total of 23 members replied a validated questionnaire. Overall, electronic communication (average score, 8.74) demonstrated the best satisfactory score for performance when compared with hard-copy (score, 5.65) and oral-only ones (score, 3.61). The best performance of electronic communication was noted in the dimension of “convenience of documentation review” (score, 9.26) when compared with hard-copy (score, 5.09) and oral-only ones (score, 2.00).

Conclusion: According to our experience, applying a web-based information system is useful for duty-exchange. Multidisciplinary communication is able to enhance significantly.
An audit of 10-year screening mammography examinations at Wan-Fang Hospital (Taiwan)

Min-Szu Yao, Shee-Yen Tay, Yi-Chien Hsieh, Hui-Wen Chiu, Wing P. Chan
1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Regular mammographic auditing provides an objective criterion of the appropriateness and accuracy of image interpretation, and is the best measure of a professional performance. This report aims to present an audit of screening mammography and to compare our results to American College of Radiology (ACR) standard.

Methods: We analyzed and compared outcomes of 8841 vs. 23285 consecutive examinations performed in 10 years (2005-2009 vs. 2010-2014) at one institution, respectively. Screening cases were evaluated based on the Breast Imaging Reporting and Data System (BI-RADS) classification. The service was free of charge from Bureau of Health Promotion, Taiwan, to all women aged 40 or over (high risk) or aged 45 or over (average risk). Screening mammographies were defined as those performed in asymptomatic women with a negative self or clinical breast exam. Each patient was preformed with digital mammography (GE Senographe 2000D) and consisted of the routine two views of each breast: craniocaudal (CC) and medio-lateral-oblique (MLO) views.

Results: The recall rate was 5.0% (2005-2009) vs. 6.9% (2010-2014) (ACR standard, <10%). Positive predictive values [PPV1 (ACR, 5-10%), PPV2 (25-40%), and PPV3 (25-40%)] were, respectively, 6.8% (2005-2009) vs. 7.6% (2010-2014); 48.6% vs. 41.8%; 53.0% vs. 44.3%. Cancer outcomes in the screening exam were, respectively, as follows: cancer detection rate 3.6% vs. 5.1% (ACR, 2-10%), early cancer detection rate 25.0% vs. 36.6% (ACR, >30%); invasive cancer size <2cm, 59.4 vs. 40.9% and lymph node negativity, 72.7% vs. 59.7% (ACR, >75%).

Conclusion: The measures of our screening outcomes were continuously improved and concordant, in part, with the ACR standard for screening mammography. The reason for diagnosis of breast cancer with larger size and lower lymph node negativity compared to the ACR standard can be due to contamination of symptomatic patients using free-of-charge exam from Bureau of Health Promotion.
An audit of gastric cancer T and N staging with CT scan in Wan Fang Hospital (Taiwan)

Chin-Wei Chien¹, Wilson T. Lao¹,², Shee-Yen Tay¹, Hui-Wen Chiu¹, Wing P. Chan¹,²
¹. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
². Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Accurate preoperative staging of gastric cancer is essential for the planning of appropriate therapy. This audit report aims to present diagnostic discordance of contrast-enhanced CT scan for preoperative staging of gastric cancer and compared these data 2010 vs. 2011 in one institution in Taiwan.

Methods: Cases of gastric cancer obtained from the Cancer Registry Database, Radiology Department, in 2010 vs. 2011 were audited and analyzed. There were 25 patients in 2010 and 35 patients in 2011 with gastric carcinoma underwent preoperative contrast-enhanced CT scan. A regular peer-review meeting by radiologists together interpreted the tumor invasion into the gastric wall (T) and regional lymph node involvement (N) on CT images. Disagreements were recorded and resolved by means of consensus. CT findings were compared with pathologic results, which served as the reference standard. CT diagnosis was not revised if discordance agreed by peer reviewers after re-read the films on retrospect.

Results: In T staging, overall discordance was 16.0% (2010) vs. 5.7% (2011). Overstaging had 2 cases, 50% (vs. 2 cases, 100%) and understaging had 2 cases (50%) (vs. none, 0%), respectively. In N staging, overall discordance was 20% (2010) vs. 17.1% (2011). Overstaging had 2 cases, 40.0% (vs. 4 cases, 66.7%) and understaging had 3 cases (60.0%) (vs. 2 cases, 33.3%), respectively.

Conclusion: The process of gain experience through peer-review meeting and learn from larger volume of cases can improve CT diagnosis for preoperative local staging of gastric cancers.
An audit of lung cancer T and N staging with CT scan in Wan Fang Hospital (Taiwan)

Yi-Chien Hsieh¹  Chia-Hsun Lu¹  Po-Yen Chang¹²  Hui-Wen Chiu¹  Wing P. Chan¹²
1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Accurate preoperative staging of lung cancer is essential for the planning of appropriate therapy. This audit report aims to present diagnostic discordance of contrast-enhanced CT scan for preoperative staging of lung cancer and compared these data 2010 vs. 2011 in one institution in Taiwan.

Methods: Cases of lung cancer obtained from the Cancer Registry Database, Radiology Department, in 2010 vs. 2011 were audited and analyzed. There were 38 patients in 2010 and 56 patients in 2011 with lung carcinoma underwent preoperative contrast-enhanced CT scan. A regular peer-review meeting by radiologists together interpreted the tumor extend (T) and regional lymph node involvement (N) on CT images. Disagreements were recorded and resolved by means of consensus. CT findings were compared with pathologic results, which served as the reference standard. CT diagnosis was not revised if discordance agreed by peer reviewers after re-read the films on retrospect.

Results: In T staging, overall discordance was 2.63% (2010) vs. 3.6% (2011). Overstaging had 1 case, 100% (vs. 2 cases, 100%) and understaging had none case (0%) (vs. none, 0%), respectively. In N staging, overall discordance was 2.63% (2010) vs.1.8% (2011). Overstaging had 1 case, 100% (vs. 1 case, 100%) and understaging had none case (0%) (vs. none, 0%), respectively.

Conclusion: The diagnostic performance of CT staging in lung cancer was consistent in these periods of time, and the rate of discordance was low.
An audit of colorectal cancer T and N staging with CT scan in Wan Fang Hospital (Taiwan)

Wilson T. Lao1, Chin-Wei Chien1,2, Yi-Chien Hsieh1,2, Hui-Wen Chiu1, Wing P. Chan1,2
1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Accurate preoperative staging of colorectal cancer is essential for the planning of appropriate therapy. Previous literatures revealed that preoperative staging accuracy has been disappointing, ranging between 48% and 77%. This audit report aims to present diagnostic discordance of contrast-enhanced CT scan for preoperative staging of colorectal cancer and compared these data 2010 vs. 2011 in one institution in Taiwan.

Methods: Cases of colorectal cancer obtained from the Cancer Registry Database, Radiology Department, in 2010 vs. 2011 were audited and analyzed. There were 79 patients in 2010 and 101 patients in 2011 with colorectal carcinoma underwent preoperative contrast-enhanced CT scan. A regular peer-review meeting by radiologists together interpreted the tumor invasion into the colorectal wall (T) and regional lymph node involvement (N) on CT images. Disagreements were recorded and resolved by means of consensus. CT findings were compared with pathologic results, which served as the reference standard. CT diagnosis was not revised if discordance agreed by peer reviewers after re-read the films on retrospect.

Results: In T staging, overall discordance was 18.9% (2010) vs. 13.9% (2011). Overstaging had 9 cases, 60% (vs. 6 cases, 42.9%) and understaging had 6 cases (40%) (vs. 8 cases, 57.1%), respectively. In N staging, overall discordance was 32.9% (2010) vs. 15.8% (2011). Overstaging had 18 cases, 69.2% (vs. 12 cases, 75%) and understaging had 8 cases (30.8%) (vs. 4 cases, 25%), respectively.

Conclusion: The process of gain experience through peer-review meeting and learn from larger volume of cases can improve CT diagnosis for preoperative local staging of colorectal cancers.
An audit of revised radiology reports of a medical center in Taiwan

Po-Yen Chang¹  Chia-Yuen Chen¹,²  Min-Szu Yao¹,²  Chien-Ju Huang¹  Wing P. Chan¹,²
¹. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
². Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Radiologists can learn from referring clinicians’ feedback to improve quality and accuracy of radiology reports. The present report aims to understand revised radiology reports of a medical center in Taiwan, and compare the results in 2011-2012 (Period-1) vs. 2013-2014 (Period-2).

Methods: A total of 318 revised reports in Period-1 (vs. 235, Period-2) were analyzed and divided into five types: initial misdiagnosis, transcription errors, requested by clinicians, obtained additional information, and defective films. All initial radiology reports were included and trainees reports were excluded in this audit.

Results: The rate of revised reports was 0.05% in Period-1 (vs. 0.03%, Period-2). Of these, plain X-rays had 64 films (vs. 34, Period-2), CT had 105 films (vs. 100, Period-2), MRI had 98 films (vs. 70, Period-2), and other special procedure examinations had 51 films (vs. 31, Period-2). The most frequent reason for revision of plain X-rays reports was initial misdiagnosis 48.4% (vs. 50%, Period-2). Initial misdiagnosis was the main reason for revision of CT reports in Period-1 (35.2%) and requested by clinicians was the main reason for revision of CT reports in Period-2 (42%). Requested by clinicians was the main reason for revision of MRI reports 31.6% (vs. 30%, Period-2). Requested by clinicians was the main reason for revision of special procedure examinations in Period-1 (25.5%) and transcription errors was the main reason in Period-2 (32.3%).

Conclusion: The rates of revised reports were slightly decreased in two audited periods. The diagnostic discrepancies were various among different imaging modalities. This audit has allowed and stimulated the medical team for fully awareness of the interpretation and reporting process, thereby improving the quality of our work.
An audit of communication of critical radiologic findings using High Risk Reminder (HRR) system at Wan Fang Hospital in Taiwan

Shih-Hung Yang¹  Chi-Wen Christina Huang¹  Po-Yen Chang¹,²  Jo-Chiao Amy Cheng¹  Wing P. Chan¹,²
1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Purpose: Previous report revealed that nearly 60% of malpractice lawsuits involving radiologists were due to failure of communication of urgent or significant unexpected findings to referring clinicians. American College of Radiology (ACR) calls for a development of a system to ensure effective communication of unusual, unexpected, or urgent findings to the referring physician. This audit report aims to understand the rate and characteristic of using High Risk Reminder (HRR) system to communicate critical radiologic findings in one medical center in Taiwan.

Methods: Methods: We audited and compared consecutive case series over two 12-month periods (2012 vs. 2014) in a medical center in Taiwan. Cases were characterized using daily automated record review. In the imaging domain, HRR system has been installed in reporting system to enable radiologists to categorize their significant interpretations (urgent: tension pneumothorax; pneumoperitoneum; active bleeding in thorax and abdomen; TB with cavitation; aortic aneurysm diameter ≥5cm or aortic dissection; and significant stat: unexpected tumor; pneumothorax; aortic aneurysm diameter ≥4 to <5cm; TB, undeterminate) and automatically invoked notification procedures (dial phone for urgent cases; text message for stat cases) for communicating results to referring physicians. Our established systems can track the receipt of the message and send reminders to ensure that the information is acted on.

Results: Results: A total of 544 (2012) and 522 (2014) HRR reports was identified, representing 0.0017% and 0.00154% annual radiologic images, respectively. The response rates by referring clinicians were 88.4% (2012) and 91.0% (2014), respectively. Of these, the top three findings were in order as follow: pneumoperitoneum, TB, and unexpected tumor in 2012 whereas pneumoperitoneum, unexpected tumor and pneumothorax were noted in 2014.

Conclusion: Conclusions: High response rate of referring clinicians were consistently improved. A reduced HRR report rate was noted due to specified particular urgent/stat findings after 2012. The importance of effective communication of urgent/stat reports can be improved by means of HRR system.
An audit of procurement specifications and achieving DSCT of Wan Fang Hospital (Taiwan)

Ming Fang Lin¹  Hui-Wen Chiu¹  Chien-Ju Huang¹  Po-Yen Chang¹,²  Wing-P. Chan¹,²
1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Demand of high technology to caring patients increases recently. Dual-source CT scan can be used to screen high-risk individuals for coronary arterial stenoses and follow-up stent treatment. This audit report aims to show the initial requirement of DSCT specification, purchasing and achieving the scanner after 18 months.

Methods: We compared 3 indices before and 18 months after purchasing DSCT. There were (1) radiation dose using FLASH mode in normal BMI patients (index rate, 90%), (2) image quality of coronary stent resolution (score I-4, index 80%), (3) indications for screened patients (at least one risk factor, index 90%).

Results: There were 589 subjects during 18-month period (increase 29% as compared with our old model scanner operated last 18-month). (1) In patients with heart beat < 65/min, normal BMI and using FLASH mode, 45 patients fulfilled the criteria and achievement rate was 91.1%; (2) 31 patients (60 arteries) follow-up coronary stenting, average heart rate was 69 beat/min, and sequential mode was used. Results revealed that achievement rate was 80.6%. Three out of 31 patients with quality score below 3. (3) Eight out of 589 patients had no risk factor for DSCT, accounting achievement rate of 98.6%.

Conclusion: We first reported an audit of procurement specifications and achieving DSCT of our institution and results revealed achieved procurement objectives and indices.
An audit of film-retake rates and causes in digital mammography at Wan Fang Hospital (Taiwan)

Yu-Ting Chiu¹ Chia-Yun Liang¹ Shu-Ru Tseng¹ Min-Szu Yao¹,² Wing P. Chan¹,²
¹. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
². Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Diagnostic accuracy is affected by image quality of mammography. This report aims to present an audit of film-retake rates and causes in digital mammography at one teaching hospital.

Methods: We reviewed records of repeat/retake films obtained from mammography examat Wan Fang hospital between January 2013 and December 2014. Retake digital mammography films (General Electric Senographe 2000D) were classified into four types: suboptimal positioning, motion artifacts, improper exposure dose, and foreign body. These films wereroutinely peer-reviewed and recorded by radiological technologists. Three technologists consistently performed mammographic exam and no shift changes of technologists for that time period. Retake rates werealyzed and reported quarterly between 2013 and 2014.

Results: Retake rates were 0.63% (167/26688) in 2013 and 0.39% (95/24480) in 2014. The quarterly retake rates for were 0.53%, 0.74%, 0.56% and 0.64% in 2013 and 0.26%, 0.36%, 0.40% and 0.52% in 2014, respectively. Of these films, suboptimal positioning (91.62% vs. 88.42%), motion artifacts (2.99% vs. 6.32%), improper exposure dose (1.20% vs. 0%), foreign body(4.19% vs. 5.26%), respectively.

Conclusion: The measures of film-retake rates were continuously improved for screening mammography. The major cause of retake films remains suboptimal positioning.
PREVENTION OF WRONG SIDE, WRONG SITE AND WRONG PATIENT RADIOGRAPHS (2009-2014)

Chih-Feng Liu¹  Su-Ru Tseng¹  Tsung-Chih Tang¹  Min-Fang Lin¹  Wing P. Chan¹,²  
¹. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan 
². Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Radiographic errors of wrong side, wrong site and wrong patient occur not infrequently. This study aims to apply "pause-and-check (PAC)" action before taking film to reduce these major errors occurred.

Methods: We divided radiographic QA process into six steps before problems reaching to patients, including X-ray film: (1st gatekeeper) taken by radiological technologist, (2) checked by QA technologist, (3) interpreted by radiologist, (4) read by clinician before report, (5) read by clinician with formal report, and (6) medical dispute. We applied PAC for 2 sec (without written record required) during radiographic procedure. We compared outcome data: Period -1, April to September 2009 (1Q) versus October 2009 to March 2010 (2Q); and Period -2, April to September 2013 (1Q) versus October 2013 to March 2014 (2Q).

Results: The error rates were 0.1% in both 1Q and 2Q periods in period-1, whereas decrease to 0.04% in period-2. In Period-1, errors were detected by the first (0.037% vs. 0.047%) and second (0.061% vs. 0.048%) gatekeepers in 1Q and 2Q, respectively. In Period-2, errors were detected by the first (0.019% vs. 0.021%) and second (0.017% vs. 0.016%) gatekeepers in 1Q and 2Q. Through the period 1 and 2, there was no major errors were noted by the 5th gatekeeper or medical dispute resulted.

Conclusion: With use of PAC, the detection of major errors was shifted to the front gatekeepers during radiographic procedure, and continuously and consistently reduced the error rates in period-1 and period-2, thereby, providing effective action to reduce the incidence of wrong side, wrong site and wrong patient films presenting to the clinicians.
Reproducibility of measurement of subcutaneous and visceral adipose tissues on Computer Tomography

Hsing-Fen Hsiao1 Hou-Ting Yang2,3 Shih-Yi Huang4 Yuan-Hao Lee1 Wing P. Chan1,5
1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Program of Electrical and Communications Engineering, Feng Chia University, Taichung, Taiwan
3. Department of Nuclear Medicine, Chang Gung Memorial Hospital, Taoyuan, Taiwan
4. School of Nutrition and Health Sciences, Taipei Medical University, Taipei, Taiwan
5. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Imaging studies on abdominal fat have been carried out with computer tomography (CT), MRI, ultrasound, and dual-energy x-ray absorptiometry (DXA). Among all the modalities, CT appears to be relatively more available and reliable for measuring abdominal fat. Abdominal fat consists of subcutaneous adipose (SAT) and visceral adipose tissue (VAT). There was little study testing the precision of SAT and VAT measurements. Hence, we aim to examine the reproducibility of CT-based measurement of abdominal fat.

Methods: Subject We measured SAT and VAT from group1 (N=20) and group2 (N=20) to assess the reproducibility of CT-based measurement of abdominal fat. CT SAT and VAT were quantified using GE Light Speed VCT In Wanfang Hospital. Images were acquired with a 2.5mm slice thickness for 8 slices (20mm) at the level of the umbilicus (sFOV=large body, rotation time=0.5s). The acquisition voltage was set to 120kVp while the currency was adjustable in the range of 100mAs to 300mAs according to BMI of individual subjects. Image processing The analytic software, AZE 3.1, was used for processing and measuring SAT and VAT. The intra-reproducibility was assessed by two researchers through measuring the SAT and VAT of individual subjects twice. On the other hand, the inter-reproducibility was assessed by two researchers by measuring the SAT and VAT of individual subjects once. Statistical methods The Pearson’s test was used for analyzing the intra-reproducibility and the inter-reproducibility. The test indicated the reproducibility of measurements on individual subjects. A p-value <0.05 was considered statistically significant.

Results: For SAT measurement, the intra-reproducibility of researcher 1 and 2 were r=0.9993 and r=0.99988, respectively. For VAT measurement, the intra-reproducibility of researcher 1 and 2 were r=0.99509 and r=0.99928, respectively. The inter-reproducibility of SAT and VAT measurements were r=0.9877 and r=0.99363, respectively.

Conclusion: CT-based measurement of abdominal fat was assessed to be reliable method for SAT and VAT quantification.
Background and Aims: BMD (bone mineral density) measurement and analytic results are closely associated with the operation of radiologic technologists. Incorrect positioning and incorrect analyses can result in erroneous examination results, which may produce significant impact on clinical diagnoses and the medicine prescriptions. Yet, this issue has long been devaluated. In this study, we aim to evaluate BMD scans and the rate of suboptimal images for understanding and reducing the prevalence of suboptimal images and analytic results.

Methods: BMD scans were accomplished with a densitometer of dual-energy absorptiometry (Lunar Prodigy, General Electric). From January 2015 to August 2015, 30 scans (approximately 10% of the total accessed volume) were randomly selected for monthly review by three radiologic technologists, who passed the ISCD examinations and have working experiences for three or more years. Scan defects on spine were listed as below—“Tilted”, “Rotated”, “Curved”, “Neither or only one iliac crest is visible”, “Incorrect intervertebral markers”, “Incorrect vertebral edges”, “Incorrect vertebral numbering”, “Shifted (high/low)”, and “Shifted (left/right)”. The defects of hip scans included “Shifted (high/low)”, “Shifted (left/right)”, “Incorrect neck box ROI”, “Leg is not internally rotated”, “Abducted over 12°”, “Adducted”.

Results: From January to June, the total rate of suboptimal spine and hip scans before educational training was 3.43% (spine and hip suboptimal scans were rated 2.5% and 4.76%, respectively). The total rate declined to 0.49% (suboptimal rates of spine and hip scans were 0.33% and 0.71, respectively) in July and August after the educational training. Suboptimal images decreased by the rate of 2.94% from the pre-training phase to the post-training phase.

Conclusion: Improper positioning by radiologic technologists was the major cause of suboptimal BMD scans. Technologists are required to be familiar with the basic principles of dual-energy absorptiometry, correct positioning and image analyses for reducing the risk of suboptimal image-misled diagnoses and therapies.
Explore the Relationship between the Degree of Compression and Image Quality in Mammography

Chia-Yun Liang¹  Hsing-Fen Hsiao¹  Shu-Ru Tseng¹  Min-Szu Yao¹²  Shee-Yen Tay¹
1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Breast compression shortens the distance between the illuminated tissues and the film/radiography detector and reduces geometric blurs. The compression enables separation of sub-organ structures of breast tissues as well as decrease in imaging thickness, leading to less required radiation dose. This study aims to investigate the relationship between the degree of compression and image quality as well as to find out whether reduction in the level of compression would lead to differences in the image quality of breasts with different densities.

Methods: This study was conducted from November 2014 to April 2015 and assessed based on the report level of radiologists. Subjects were divided into two categories, i.e., patients with fatty breast tissues (n=50) or patients with dense breast tissues (n=50). Examination results were not adopted if the levels of breast density were different from two times of radiologists’ reports. To compare with the compression effect resulted last time, technologists had to make sure the compression force applied last time and execute the compression with the other way (through either less than 15 daN hand compression or 19 daN machine compression) this time. Mammographic images acquired with different compression forces were assessed by two independent radiologists blindly. Items assessed by radiologists included the clarity of calcification, the symmetry of glandular tissues, and the resolution and the contrast of the overall images. Finally, the effects of compression forces and tissue densities on image quality were analyzed by radiologic technologists.

Results: The qualities of the differentially acquired mammographic image were more distinctive to senior radiologist than junior radiologist. Greater amounts of images acquired with 19 daN-compression was assessed with superior clarity of calcification, symmetry of glandular tissues, and the resolution and the contrast of the overall mammographic images of fatty breasts were assessed by the senior radiologist. For dense breasts, both radiologists agreed that symmetry of glandular tissues, and the resolution and the contrast of the overall mammographic images were superior with 19 daN machine compression.

Conclusion: This study demonstrated that the overall quality of mammographic images of both fatty and dense breasts were better when 19 daN machine compression was applied. Therefore, the maximum compression force of 19 daN is recommended to be reached for the assurance of image quality.
An audit of iodinated contrast media allergy of a medical center in Taiwan

Chia-Hsun Lu  Chia-Yuen Chen  Wing P. Chan
Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Previous literatures revealed that mild hypersensitivity reactions (e.g. skin rashes, urticaria, nausea etc) to radiologic contrast media incidence was &lt; 3%, and moderate to severe (e.g. laryngeal edema, tachycardia or bradycardia, cardiac failure, etc) incidence was &lt; 0.04%. Mortality is less than one death per 100000 patients. The audit report aims to determine the frequency, management, and outcomes of allergy of intravenously injected iodinated contrast medium.

Methods: Between 2008 and 2014, a total of 4384 patients in Group A (ionic contrast) (vs. 51654, Group B, non-ionic) received contrast medium examinations (CT and intravenous urography) were analyzed. The incident reports, radiology reports, and medical records of patients in whom contrast medium extravasations occurred were reviewed.

Results: There were 134 injections in Group A (ionic, 4384 injections) and 244 injections (non-ionic, 51654 injections) in Group B. Allergic-like reaction rates were 0.68% [n=378]: mild, 2.6% [n=114] and in Group A vs 0.40% [n=207] in Group B; moderate/severe, 0.46% [n=20] and in Group A vs 0.07% [n=37] in Group B.

Conclusion: The frequency of allergy decreases with use of non-ionic contrast media. The use of nonionic iodinated contrast medium has lesser in moderate or severe adverse effects than ionic contrast medium.
An audit of iodinated contrast media extravasation of a medical center in Taiwan

Chia-Yuen Chen  Hsiu-Chin Chang  Wing P. Chan  
Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan 
Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: Previous literatures reported that the rate of extravasation of radiologic contrast medium during CT scan with hand injection was estimated to be 0.03%– 0.17%, and 0.25% to 0.9% by automated mechanical injectors. The audit report aims to determine the frequency, management, and outcomes of extravasations of intravenously injected iodinated contrast medium by hand (Group A) vs. by auto-injector (Group B).

Methods: Between 2008 and 2014, a total of 21170 patients in Group A (vs. 34868, B) received contrast medium examinations (CT and intravenous urography) were analyzed. The incident reports, radiology reports, and medical records of patients in whom contrast medium extravasations occurred were reviewed.

Results: Extravasations occurred in 4 (0.02%) of 21170 patients in Group A, and 17 (0.05%) out of 34868 patients in group B. Follow-up information was available for 21 adults (7 women, 14 men) and 0 children. Extravasated volumes ranged from 20 to 90 mL; 18 had minimal or no adverse effects, 3 had moderate adverse effects (skin blister), and none had a severe complication (e.g. compartment syndrome). For large volume extravasation (&gt;20cc) (n=21), plastic surgeons, neurologists and dermatologists were consulted for 6 adults and none of these patients admitted hospitalization.

Conclusion: The frequency of extravasation increases with use of automated mechanical injectors. The use of nonionic iodinated contrast medium has lesser in moderate or severe adverse effects than ionic contrast medium.
Optimization of Collimation System Parameters in Reducing Radiation Dose and Improving Image Quality in Digital Radiography

Han-Pin You  Chih-Feng Lui  Min-Fang Lin  Yuan-Hao Lee  
Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan

Background and Aims: Collimation has been implemented in digital x-ray imaging for shielding body parts from unnecessary radiation exposure while minimizing viewing flares caused by the unexposed area. The lack of regulatory standards in collimation may pose a risk of increased radiation exposure with respect to the fact that most of x-ray systems do not have exposure control systems designed in collaboration with the collimation systems. In regards, this report aims to emphasize the importance of collimation in reducing radiation dose as low as reasonably achievable (ALARA) and improving image quality.

Methods: Instrument: A digital X-ray imager (ddRVersa, Swissray), planned with optimal fields of view (FOVs) for different imaging regions, was employed for investigating effects of different FOVs on image quality and radiation exposure. Design: Under different sizes of fields of view, image quality was assessed in presence or absence of step wedges by calculating the contrast-to-noise ratios of kidneys (versus soft tissues) using a human phantom, whereas the radiation doses were acquired from the calculation of dose-area products. Statistical methods: Densitometry measurements were analyzed with the regression analysis for the statistic significance at \( p \leq 0.05 \).

Results: The quality of images acquired with step wedges was better when the minimal 50% FOVs were applied. In absence of step wedges, the contrast-to-noise ratio at 50% of the maximal FOV was nine times higher than that at the maximal FOV, hence resulting in 56% of radiation dose reduction from the maximal FOV.

Conclusion: Radiographers are encouraged to consolidate the optimization of collimation. Collimation only decreases the potential of unnecessary tissue/organ exposure to radiation but also reduces photon scattering and image noise for obtaining better imaging quality.
An audit of incident reports of radiologic procedures of a medical center in Taiwan

Yih-Ling Hsieh  Chia-Yuen Chen  Wing P. Chan
Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

**Background and Aims:** Encouragement of reporting incidents can identify strategies to reduce the risk of their re-occurrence. This audit report aims to determine the type and nature of incidents during radiologic examinations in one medical center in Taiwan.

**Methods:** Between 2009 and 2015, there were 109 incidents related to Radiology Events Register. Detailed classification and analysis of incidents were undertaken to identify the most prevalent types of error and to make corrections about patient safety initiatives in radiology department.

**Results:** The incidents occurred most frequently as follow: inadequate handover and communication with patients (14.3%, n=13), complaints about exam process problems (39.6%, n=36) and unsafe or unprofessional care services by staff members (9.9%, n=9), exam reporting errors (2.2%, n=2), equipment or environmental inadequate (6.6%, n=6), and unprofessional attitudes (27.5%, n=25).

**Conclusion:** Clinical handover and communication errors/problems and exam process problems remain the most frequent incidents in radiologic examinations. Corrective strategies to address safety concerns related to these key issues are relevant to healthcare settings.
An audit of corrected radiology diagnosis discrepancy by radiology trainees in a teaching hospital emergency department in Taiwan

Chi-Wen Huang1 Po-Yen Chang1,2 Chien-Ju Huang1 Wing P. Chan1,2
1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: To determine radiological diagnosis discrepancies by radiology trainees and Attending radiologists on emergency or in patients department patients.

Methods: We audited consecutive cases over a 12-month period (2014) in a medical center of Taiwan where clinical physicians requested provisional reports. The initial diagnoses by radiology trainees were compared to the final diagnosis of the attending radiologists and discrepancy rates were recorded. Major and minor impact of the discrepancies was reviewed. Major discrepancies were considered as those that require immediate alterations in treatment such as callback after discharge, admission, immediate use of medication and/or surgical intervention. Minor discrepancies were considered as those that require further treatment or follow up that were not emergent including those that did not affect overall treatment, requires further consultation by specialists or outpatients department follow up.

Results: There was an overall of 75 provisional report requests in 2014. 6 discrepant reports were identified, representing 8% initially interpreted and reported by trainees. All revisions were dictated by attending radiologists within 24hrs. The most frequently reported provisional discrepant diagnosis was Abdominal and Pelvis CT (66.7%, n=4), Chest CT (16.7%, N=1) and Brain CT (16.7%, n=1). The impact of revised diagnosis was deemed major in one case (1.3% of all provisional reports, 16% of the discrepant reports), in which patient required admission and close monitoring. The impact of revised diagnosis was deemed minor in 5 cases (1.3% of all provisional reports). All 5 cases were admitted due to their overall condition however the issue of discrepancy itself did not require immediate treatment. Overall no discrepancies caused altered long-term outcome or mortality.

Conclusion: Relatively few clinically important discrepant reads were reported. Revised diagnosis was associated with major clinical impact in only one patient in the year 2014 in our hospital, but there were few in which patients were notified for further follow up. Few patients experienced increased morbidity, and none increased mortality. The importance of expedient communication of discrepant reports by staff radiologists is stressed, as is verification of patient contact information prior to discharge.
An audit of corrected radiology diagnosis discrepancy by radiology trainees in a teaching hospital emergency department in Taiwan

Chi-Wen Huang
Po-Yen Chang
Chien-Ju Huang
Wing P. Chan

1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: To determine radiological diagnosis discrepancies by radiology trainees and attending radiologists on emergency or in patients department patients.

Methods: We audited consecutive cases over a 12-month period (2014) in a medical center of Taiwan where clinical physicians requested provisional reports. The initial diagnoses by radiology trainees were compared to the final diagnosis of the attending radiologists and discrepancy rates were recorded. Major and minor impact of the discrepancies was reviewed. Major discrepancies were considered as those that require immediate alterations in treatment such as callback after discharge, admission, immediate use of medication and/or surgical intervention. Minor discrepancies were considered as those that require further treatment or follow up that were not emergent including those that did not affect overall treatment, requires further consultation by specialists or outpatient department follow up.

Results: There was an overall of 75 provisional report requests in 2014. 6 discrepant reports were identified, representing 8% initially interpreted and reported by trainees. All revisions were dictated by attending radiologists within 24hrs. The most frequently reported provisional discrepant diagnosis was Abdominal and Pelvis CT (66.7%, n=4), Chest CT (16.7%, N=1) and Brain CT (16.7%, n=1). The impact of revised diagnosis was deemed major in one case (1.3% of all provisional reports, 16% of the discrepant reports), in which patient required admission and close monitoring. The impact of revised diagnosis was deemed minor in 5 cases (1.3% of all provisional reports). All 5 cases were admitted due to their overall condition however the issue of discrepancy itself did not require immediate treatment. Overall no discrepancies caused altered long-term outcome or mortality.

Conclusion: Relatively few clinically important discrepant reads were reported. Revised diagnosis was associated with major clinical impact in only one patient in the year 2014 in our hospital, but there were few in which patients were notified for further follow up. Few patients experienced increased morbidity, and none increased mortality. The importance of expedient communication of discrepant reports by staff radiologists is stressed, as is verification of patient contact information prior to discharge.

An audit of MRI diagnostic performance of ACL tears of the knee at Wan-Fang Hospital (Taiwan)

Zhen-An Hwang
Chee-Hwee Lee
Min-Szu Yao
Chiau-Yi Fan
Wing P. Chan

1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: To perform an audit of MRI diagnostic performance of ACL tears of the knee and to compare our results between 2000-2005 and 2010-2013.

Methods: We analyzed and compared outcomes of 71 (vs. 204) consecutive patients performed MRI of the knee during 2000-2005 (vs. 2010-2013), respectively. To minimize bias, all arthroscopy was performed by one senior orthopedic surgeon was audited. Approximately 95% (vs. 80%) MRI films were interpreted by the same two MSK radiologists during 2000-2005 (vs. 2010-2013), respectively.

Results: The diagnostic sensitivity, specificity and accuracy for full-thickness tears of ACL were as follows: 88% (vs. 90%), 100% (89%), 94% (90%).

Conclusion: MRI diagnostic performance of ACL tears of the knee was concordant with the published literatures. The reason for the slightly decrease diagnostic sensitivity and specificity rates recently could be due to increase contribution of film interpretation by junior radiologists.
An Audit of Pneumothorax after Ct-Guided Transthoracic Needle Biopsy of Lung Masses

Chih-Hsiang Ko¹  Chi-Wen Christina Huan¹  Zhen-An Hwang¹  Po-Yen Chang¹,²  Chien-Ju Huang¹
Wing P. Chan¹,²
1. Department of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan
2. Department of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Background and Aims: CT-guided transthoracic lung biopsy is a well established procedure in the diagnosis of patients with suspicious lung masses. The most common complications in lung biopsy are pneumothorax and pulmonary hemorrhage. This report aims to present rate and risk factors for the development of pneumothorax and pulmonary hemorrhage in patients undergoing CT-guided lung biopsy.

Methods: We used computed-based search to collect cases who underwent CT-guided biopsy of lung in 2014. The rate of development of pneumothorax after CT-guided biopsy detected on CT scan images was reviewed.

Results: A total of 61 patients underwent this procedure, among them, 28 patients (45.9%) developed pneumothorax, with use of 18G needles. Biopsy of lower lung zone (11 out of 24 cases, 45.8%) developed pneumothorax more frequently than upper lung zone (13 out of 31 cases, 41.9%). And biopsy of the central located lung mass (21 out of 46 cases, 45.7%) developed pneumothorax more frequently than upper lung zone (7 out of 25 cases, 28%).

Conclusion: The rate of pneumothorax after CT guided transthoracic lung biopsy of lung masses is not low; and the complication occurs more frequently in the lower lung zone and the central location.
Reduce radiation dose of CT scan lung screening by using lower tube voltage

You-Cheng Lin  Ming-Jhih Chen  Jyun-Peng Lai  Ji-Da Tsai  Yi-Rung Lin
Department of Radiology, Taichung Veterans General Hospital, Taichung, Taiwan

Background and Aims: Lung cancer is the most common cause of cancer-related death in men and women. The major screening is chest radiographs or computed tomography scans. Even CT can provide accurate information for diagnosis, but still need to consider the risks of radiation dose. This study aimed at reducing the tube voltage to reduce the dose under 1mSv.

Methods: This study collected twenty patients within standard body mass index. Ten patients scanned by Philips iCT 256 slice by using 120kV tube voltage and the otherwise tube voltage is 100 kV. Tube current is set based on body width, respectively 20mAs, 25mAs, 30mAs etc. The image thickness is 3mm that reconstructed by iterative reconstruction technology iDose4 Level 3 and Level 5 both sharp C spatial filter kernel. Three anatomic location is selected for evaluate image noise, contrast, sharpness and the overall diagnostic acceptable by using mean opinion analysis, respectively aortic arch, pulmonary trunk, above diaphragm.

Results: The mean age of patient were 54.4 ± 10.4 and 49.7 ± 6.7 (P>0.05). The average dose of 120kV protocol is 1 mSv and 100kV protocol is 0.7 mSv (P>0.05). No significant differences in subjective tests of the three anatomic location of image. The overall diagnostic score of two group is 4.90 ± 0.31 (100kV) and 4.97 ± 0.18 (120kV) (P>0.3).

Conclusion: This study indicates that even if the tube voltage is decreased and without increased mAs, the image quality still maintain by using Iterative reconstruction technology in low dose lung scan.
To prevent the contrast agent leakage with mobile camera monitoring for CT angiography

Chia-Chun Lin  I-Jung Tsai  Min-Chi Chen  Chun-Peng Lai  Gi-Da Lee
Department of Radiology, Taichung Veterans General Hospital, Taichung, Taiwan

Background and Aims: With the rapid development of Multi-Detector Computed Tomography, the application of computed tomography angiography grows as well. The injection rate of contrast medium is a key factor affecting image quality. However, under the circumstances of fast injection, the risk of leakage raises relatively. The purpose of this study is to compare the contrast injection situations under stationary camera of the wall and mobile camera while executing automatic bolus tracking, and to analyze the results.

Methods: From 2011 to 2014, there are 56 case of contrast leakage under automatic bolus tracking and with contrast injection rate 2mL/sec. Furthermore, we used the stationary camera of the wall in 2011, the car’s side mirror to reflect the injection site on the mirror and the stationary camera in 2012. In 2013, we designed equipment that CCD camera with clamp to let it place everywhere we want to observe. In 2014, the same equipment keeps working. Their age, gender, part of examination, catheter size, flow rate of contrast medium, camera type and location of catheter were recorded. After analyzing every part involved, we compare the leakage rate and condition in the years of 2011, 2012, 2013 and 2014.

Results: In the years of 2011 and 2012, there were 15 and 17 cases of severe contrast leakage and to be followed. After mobile camera was set in Aug. 2013, after two year there were only 3 and 5 cases of severe contrast leakage (over 20mL).

Conclusion: The car’s side mirror reflects the portion of the contrast medium injection, so some injection site can clearly be monitored. However, it needs to spend a period of time to adjust the angle of reflection, and other injection site is still not able to show. After the mobile camera designed, we compared the data with those of past years, we can sure that using mobile camera can complement the blind angle of stationary camera of the wall, and reduce the occurrence of sever contrast leakage.
Comparison of Image Quality between Iterative Reconstruction and Filtered Back Projection in Brain CT

Shan-Ju Yeh, Ji-Da Lee, Meng-Yu Lin, Shu-Kun Huang, Chi-Chang Clayton Chen
Department of Radiology, Taichung Veterans General Hospital, Taichung, Taiwan

Background and Aims: To assess iterative reconstruction (IR) and filtered back projection (FBP) with different brain filter kernels on brain CT image quality.

Methods: Using Philips iCT 256, we received adult brain CT scan. 10 consecutive raw data sets of clinical routine native brain CT scans with pre- and post-contrast were reconstructed with IR level 0 (filtered back projection), 2 and 5; 3 different brain filter kernels (smooth/standard/sharp) were applied respectively. Detailed ROI analysis of image contrast, noise, contrast-to-noise ratio and Signal-to-noise ratio in white matter (WM) and gray matter (GM) was performed. Statistical analysis was carried out by applying a random intercept model.

Results: In pre-contrast brain scan, the mean GM and WM attenuation values were 34.37 and 27.24 HU. After using contrast, the mean GM and WM attenuation values were 37.04 and 28.45 HU. Objective measurements revealed an overall increase in contrast-to-noise ratio and signal-to-noise ratio at higher IR levels, which was highest when applying the soft filter kernel. But contrast-to-noise ratio and signal-to-noise ratio at filtered back projection, which was lowest when applying the shape filter kernel. The absolute grey and white contrast decreased with an increasing IR level and was highest when applying the sharp filter kernel.

Conclusion: Different combinations of IR level and filter kernel substantially influence image quality of brain CT. The largest improvement using IR might result for radiologists normally preferring high contrast at the expense of increased noise. In such a setting, IR could become an additional instrument of controlling particular image characteristics. Using IR iDose Level 5 and smooth filter kernel can be of acceptable diagnostic quality for some routine clinical applications.
Intravenous Urogram to Confirm Safe Approach of Percutaneous Nephrostomy: A Case Report

Bing-Chung Wu¹ Yu-Ting Pan¹ Jia-Wei Lyu² Yao-Liang Chen¹
1. Department of Diagnostic Radiology, Keelung Chang Gung Memorial Hospital, Keelung, Taiwan
2. Department of Medical Imaging and Intervention, Linkou Chang Gung Memorial Hospital, Taoyuan, Taiwan

**Background and Aims:** Share experiences of uncertain percutaneous nephrostomy for staghorn stone by feasible intravenous urogram without moving exam table to other imaging modality.

**The Case(s):** A 52 year-old female was a victim of right staghorn stone, Mishra type 3, without hydronephrosis but presented repeated urinary tract infections. She came to undergo percutaneous nephrostomy (PCN) in radiology department and percutaneous nephrolithotripsy (PCNL) monotherapy in urology department. The oblique posterolateral approach along the Brödel’s line into the upper end of posterior calyx was done smoothly and guidedwire passed smoothly down to pelvis. However, the course of guidedwire located away from pelviccalycyeal axis that was outlined by staghorn stone. Initially, multi-angle projections unveiled the guidedwire remaining out of the axis. Then, we try to give intravenous urogram (IVU) and to confirm the guidedwire in safe route, surrounding by opacified contrast medium (CM). The following balloon dilatation of the approaching route was done uneventfully.

**Conclusion:** PCN and IVU are common procedures respectively in radiological department but rarely became combined approaches. Although staghorn stone fits the contour of renal pelvis, some non-opacified space left the passage of CM and guidedwire. IVU is a feasible and safe method for confirmation in such scenario.
An adverse event of oxygen tank flied into MRI scanner room

Kuei-Yuan Hou  Yung-Cheng Wang  Chieh-Kuan Chou
Department of Radiology, Cathay General Hospital, Taipei, Taiwan
School of Medicine, Fu Jen Catholic University, New Taipei, Taiwan

Background and Aims: This article aims to report an adverse accident of oxygen tank being into MRI scanner room.
The Case(s): Case History: The accident occurred when an eight-years old girl on the wheeled stretcher was sent for brain MRI. An one-month new orderly and pediatric resident passed through the registration and went to the scanner room directly about one meter far. Magnetic field jerked a metal oxygen tank across the room, crushing the head coil and was stuck at the middle of the gantry. No one hurt in this accident, but some plastic fragment fell on the young patient's face. We put a blanket between the oxygen tank and the gantry. When the blanket covered the whole bottle, eight staffs pulled out the metal tank successfully. We reported the adverse incidents to the Patient-safety Reporting system in our hospital. We analyzed the causes of this accident. Four factors were discussed: incomplete training for new staffs, inappropriate space design, the higher registration counter, absence of standard operating procedure (SOP) to secure the entrance of MRI scan room. This accident could have been avoided if the orderly was well trained, the pediatric resident remembered the cautions of high magnetic field, correct design and proper zoning, and the staff in the registration was not answering the phone without seeing people entered. This is a typical Swiss cheese model that barriers, and safeguards may be penetrated by an accident trajectory. We put forward four methods to improve this. First, upload the lessons of MRI safety to e-learning system, and appoint all new staffs to finish it exactly. Second, well designed zoning, according to the ACR Guidance Document-2013, the MR site is conceptually divided into four Zones. We have only three zones, and non-MRI personnel including attendants of patients can enter the scan room directly. Because we will establish a new MR suit in two months, we can have proper design and zoning to avoid the mistake. Third, we will lower the reception counter, because of the height of the counter may block off the staff in the counter. They may go into the scanner room by themselves. Fourth, set up a clear SOP to secure the entrance of MRI scanner room, and drill every year.

Conclusion: The incident provides an opportunity to rectify the inadequacies in MR safety. To avoid incidence of accidents that occur in the MRI setting, it is vital to provide MRI safety training to all healthcare professionals related to MRI technology.
Accidental findings of metallic foreign body during MRI examination: cases report

Feng-Yu Lin¹  Yu-Chun Lin¹,²  Chun-Huang Hsieh¹  Ta-Fu Liao¹,²  Li-Jen Wang¹,²
1. Department of Medical Imaging and Intervention, Linkou Chang Gung Memorial Hospital, Taoyuan, Taiwan
2. Department of Medical Imaging and Radiological Sciences, Chang Gung University, Taoyuan, Taiwan

Background and Aims: Strong static magnetic field has been regarded as an important issue in MRI safety, which might cause hazards to patient if a ferromagnetic object in the patient is attracted during MRI examination. We retrospectively reviewed our patients enrolled from September 2014 to August 2015 and found 3 cases with accidental findings of metallic foreign objects in their bodies during MRI examinations.

The Case(s): Case 1: A 70 year-old male with rectal cancer post neoadjuvant CCRT underwent pelvis and abdomen MRI examination in September 2014. During the MRI examination, a susceptibility artifact was found in his abdomen, which was suspected to be a metal object. The patient underwent a KUB x-ray and an abdominal CT examination, which showed a linear radiopaque density foreign body within left upper pelvis cavity at the ilia bone level. Case 2: A 36 year-old male suffered from left knee pain about two months and underwent MRI examination in May 2015. A susceptibility artifact was noticed in his left knee, which was suspected to be a metallic foreign body. The patient was removed immediately from the MRI scanner and a plain x-ray and a CT examination were performed for a further inspection of the foreign body. The x-ray and CT exam showed two metallic foreign bodies in his left lateral tibial plateau and infrapatellar fat pad. Case 3: A 74 year-old male with prostate cancer after completed treatment was referred for a follow up MRI examination in July 2015. A metallic artifact was found at his abdomen in the initial localizer of the MRI series. By a careful inspection of his previous CT films, an unknown metal object was found in his lower abdomen. Subsequently, the patient was removed from scan room and the exam was canceled.

Conclusion: Conclusion: Before examination, all cases had signed the informed consent agreement. A written screening questionnaire has been reviewed by MRI personnel item by item, which states no history of surgery, trauma, or any known medical device implanted. A handheld metal detector was used but failed to detect small metal objects in these cases, therefore it cannot be regarded as a reliable tool for the screening. A ferromagnetic detection system could be an alternative is in the future. The report suggests that technologists should pay more attention on patients during MRI examination even when he or she had completed all the MRI safety screening procedures.
A CT screw view of injection region after test volume as a method to reduce large volume of contrast extravasation

Yung-Cheng Wang  Wei-Min Tasi  Jui-Ying Lee  Li-Wei Chen
Department of Radiology, Sijih Cathay General Hospital, New Taipei City, Taiwan
Department of Radiology, Cathay General Hospital, Taipei, Taiwan

Background and Aims: Contrast media extravasation is a well-known complication of contrast-enhanced CT scanning. The reported incidence of intravenous contrast media extravasation related to power injection for CT has ranged from 0.1% to 0.9%. Extravasation can occur during hand or power injection. Extravasation occurring with dynamic bolus CT may involve large volumes of contrast media. Extravasated iodinated contrast media are toxic to the surrounding tissues, particularly to the skin, producing an acute local inflammatory response that sometimes peaks in 24 to 48 hours. The acute tissue injury resulting from extravasation of iodinated contrast media is possibly related primarily to the hyper-osmolality of the extravasated fluid.

The Case(s): As there is a patient suffered from compartment syndrome due to larger contrast medium extravasation in our hospital. We decided to do a CT screw view at injection region after 5 cc contrast medium injection by power injector. A 59 years old male who suffered from hepatoma at post-TAE status, received a follow up abdominal CT study with contrast enhancement by power injector. A 20 gauge needle was put over his right wrist. There is no obvious swelling or pain at the injection region after the test volume given by power injector. We found leakage and stasis of contrast medium at subcutaneous tissue of the wrist.

Conclusion: In order to reduce the chance of larger contrast medium extravasation by power injector, we do a screw view of injection region after 5 cc test volume injection in the patient with high risk of extravasation. If stasis of contrast medium in soft tissue, we are sure there is leakage of contrast medium. We stop the following injection and re-do a venous puncture, then we repeat the test volume injection and screw view for the patient. We do find extravasation by the screw view and avoid the larger volume contrast medium leakage. To do a screw view after the test volume of contrast medium injected by power injection really can help to reduce the chance of larger contrast medium leakage. We suggest it had better to do it by every case, at least do it if there is any doubt about the contrast leakage.
GENTLE IMAGING.

Big Innovations for Little Patients.

WE’RE COMMITTED TO SAFE PEDIATRIC IMAGING – NOW AND IN THE FUTURE.

ACHEIVING A HEALTHY BALANCE.

You always want the best diagnostic images possible at the lowest dose achievable, especially when the patient is a child.

That’s why Carestream developed our pediatric x-ray solutions – integrated hardware and software tailored to the specific demands of pediatric imaging. These solutions deliver all the efficiency and quality you require, while helping you meet the recommendations of government agencies, the Image Gently Alliance for Radiation Safety in Pediatric Imaging, and the radiation safety principles of As Low As Reasonably Achievable (ALARA).

Carestream

carestream.com/pediatrics

© Carestream Health, Inc., 2013. CARESTREAM is a trademark of Carestream Health. CA’ 200.0029 01/14
Gain Greater Confidence in Soft Tissue Imaging.

Visualizing soft tissue in a chest radiograph can be difficult when images of the ribs interfere with tissue image clarity. Our Bone Suppression Software automatically generates a companion image with the posterior ribs and clavicles suppressed. This allows clearer visualization and assessment of pathologies such as lung nodules. The software generates the companion image without additional exposure for the patient or additional set-up for the technologist.

The Bone Suppression Software is a major step forward in the clinical efficacy of chest radiographs. A clinical study showed that the inclusion of the bone-suppressed companion image allowed improved visualization of the lung parenchyma, confidence in reporting the presence of pathology, and preference.* The software is designed for compatibility with all chest images, including those captured with mobile units.

This option is available for all DRX products as well as DIRECTVIEW Classic, Elite and Max CR running DIRECTVIEW v5.7 Software or higher.
1964

洽泰願成為您的抗癌盟友
Your Partner. Fight against Cancer!

品質與服務的完美組合放射科專業合作首選
我們提供先進醫療儀器及完善之服務支援，為癌症病患提供新的療癒希望，找回健康，未來更加銳利無損。強大優良售後服務團隊(16位硬體工程師、4位軟體工程師及4位醫學物理師)。

洽泰代理之世界領先品牌

全球最知名之放射腫瘤設備製造廠，全球市佔率60% 美國市佔率67% 之NO.1廠每年治療百萬以上的癌症病患

- ProBeam 負子治療系統
- TrueBeam STx 條平滑光刀
- Trilogy, Clinacix, Unique 醫用直線加速器
- BrachyTherapy 逆行治療
- Eclipse 放射治療計劃系統
- ARIA 腫瘤整合資訊系統

放射手術同步監控系統

- 3D立體光學定義系統
- 整合加速器呼吸門控治療系統
- Non-Coplanar 立體定位治療技術

專業之放射線劑量測量設備生產公司

- Blue Water Phantom 三維水模體
- MyQA 放射治療品質校驗多機能整合平台
- COMPASS & MatriXX 三維立體定位劑量驗證系統
- 醫用雷射立體定位系統

- Red/ Green/ Blue Laser 紅/綠/藍光雷射
- CT-Sim Laser System 電腦斷層模擬攝影雷射定位系統
- MR-Sim Laser System 磁振造影雷射定位系統

病患定位輔助系統

- SDX 呼吸調控輔助系統
- Breast Access 仰臥/俯臥式乳房定位系統
- Stradivarius™ SBRT 體部立體定位系統

洽泰企業有限公司
Cooperative C. L. Enterprise Co.

台灣唯一深耕放射科醫療長達40餘年的老字號，發展專業合作案
經營規劃2002年迄今。重視商譽、誠信、正派、永續經營，只
推薦為病患帶來療癒希望的優質設備。

客服專線：02-2705-6000
www.coopcl.com.tw
手持掌握的~

夢幻

台灣愛格發科技股份有限公司
Tel:02-82280936  Fax:02-82280937
Benefits

High quality support for patient care
- Gives automatic alerts when the dose exceeds DRL, to minimize patients’ radiation exposure
- Offers systematic dose management support throughout a patient’s entire life cycle

Collective effective dose calculation
- Establishes a radiation reduction plan through dose management by medical institution

Support for modality QC & QA
- Limits unnecessary radiation doses by comparing and analyzing modality doses by study
- Optimizes study protocols and manages the degree of modality wear

Graphing patient dose, study dose, and modality dose
- Provides cumulative graphs based on effective doses by patient
- Offers dose viewing of particular periods of imaging studies
- Provides dose lists on modality
- Extracts meaningful graphs through data analysis

Offers statistics by condition and supports modality QC
- Statistics by patient (by radiation dose, number of studies, type of studies, etc.)
- Statistics by conducted study (by protocol, modality, exam room, etc.)
- Graphs of annual cumulative dose
- Convenient and intuitive graphs on sex, age, and modality

DRL management
- Viewing of a list of studies with doses exceeding DRL
- Detailed viewing of study items with doses exceeding DRL and adding comments
- Viewing of dose distribution graphs and swing DRL
- DRL history graphs

DoseM Workflow

Export Value

DoseM Server

DICOM Images

RDSR

MPPS

DICOM Header

OCR Capture

CTDose / DLP [ CT ]

DAP [ DR / KA / RF ]

AOI / OD [ MG ]

Conversion

Effective Dose

Absorbed Dose

By Patient

By Study

By Modality

By Room
The Fine Art of Liver Imaging

Defining Liver Imaging

Mastership in detection, classification and characterization

Masterpieces of clear imaging support increasing diagnostic confidence

Master’s degree in tolerability

Primovist®
Gadoxetic Acid

台灣拜耳股份有限公司
拜耳醫療保健事業群
北市信義區松高路1040214100
使用前請詳閱說明書警語及注意事項
Asia-Pacific Forum on Quality and Safety of Medical Imaging
Nov. 14-15, 2015, Taiwan