



MUSC Health

RADIOLOGY SERVICES

DEPARTMENT OF RADIOLOGY AND RADIOLOGICAL SCIENCES PATIENT CARE SAFETY AND QUALITY 2013 ANNUAL REPORT



INTRODUCTION



There are many opportunities within a radiology department to improve the performance and processes related to diagnostic and interventional procedures. The need for quality assessment and assurance in radiology has become central to safe and efficient patient care. Key components of quality in radiology involve examination appropriateness, accuracy of interpretation, result communication, and measuring performance improvement in quality, safety, and efficiency.

Our first departmental quality report highlights several important ongoing quality initiatives that involve technologists, nursing staff, radiology residents, radiologists, and administration. MUSC Radiology is committed to quality improvement with the goal of doing the right thing for every patient. Through recognizing the successes of committed team members we hope to sustain these efforts and engage greater levels of participation.

Philip Costello, M.D.

Philip Costello, M.D., F.A.C.R.
Professor and Chairman
Department of Radiology & Radiological Science

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REFERRING PHYSICIAN SATISFACTION SURVEY



Tonya Pilkenton, Susan Ackerman, MD, Mike Ricciardone

A baseline satisfaction survey of 700 attending physicians at MUSC was conducted on October 29, 2009. A total of 73 responses were obtained from faculty using this data which showed opportunities for improvement in report turnaround time, patient scheduling and access, radiologist interpretation skills, and overall reputation. Follow up physician satisfaction surveys were conducted on February 14, 2012 to 827 attending physicians with 93 responses and 949 attending physicians on December 10, 2013 with 95 responses.

Physician satisfaction survey results were presented during monthly Radiology operations meetings in November 2009 and March 2012 and action plans were implemented. The physician satisfaction survey results were presented and discussed during attending faculty meetings in November 2009, March 2012, January 2014 and March 2014.

REFERRING PHYSICIAN SATISFACTION SURVEY

IMPROVEMENTS

- Increased report results turnaround time due to widespread use of voice recognition.
- For CT and MRI, increase in satisfaction for timeliness of reports, quality of reports and responsiveness of radiologists.
- For scheduling of radiology services, an increase in satisfaction for ease of scheduling services, courtesy of staff and the overall scheduling process.
- Increase in satisfaction for referrals/access due in regards to appointment availability, radiologist reputation and latest technology.
- There was an increase in satisfaction of all radiology services from 2009 to 2013.

ACTION PLANS IMPLEMENTED

- Providing better access through our outreach sites (e.g., MUSC Health East) created more exam volume and improved appointment availability. This enabled us to provide our patients with quicker access to MRI, CT and mammography.
- Changing how our referring physicians receive their results from mail, fax, Practice Partner to EPIC has helped with our report timeliness.
- To provide better report turnaround time and opportunities for consults with our referrals, there was an increase in our subspecialized faculty. Additional subspecialized faculty have improved availability for procedures and consultations.
- State-of-the-art imaging has improved image quality and rapid exam time.
- Implementation of EPIC has improved availability of results compared to prior practice of reports from mail, fax and Practice Partner.

Quality Improvement	October 2009		December 2013
Timeliness of Reports	35%		52.6%
Quality of Reports	41%		54%
Radiologists Responsiveness	50%		64%
Ease of Scheduling	21%		33%
Courtesy of Staff	25%		37%
Overall Scheduling Process	23%		28%
Appointment Availability	18%		28%
Radiologist Reputation	53%		63%
Latest Technology	51%		52%
Overall Rating Excellent	32%		46%

QUALITY ASSURANCE THROUGH PEERVUE FOR FACULTY & RESIDENTS

The Department of Radiology and Radiological Sciences uses a quality metrics system for peer review called Peervue. This system measures the individual attending the radiologist's performance rate in interpretation of imaging studies in their subspecialty. Radiologist's reports are reviewed by their peers on 10 randomly assigned cases per week. Each radiologist's report is assigned a category as follows:

Category 1 - concur with interpretation

Category 2 - discrepancy in interpretation/not ordinarily expected to be made (understandable miss)

Category 3a - discrepancy in interpretation should be made most of the time (unlikely to be significant)

Category 3b - discrepancy in interpretation should be made most of the time (likely to be significant)

Category 4 - discrepancy in interpretation/should be made almost every time - misinterpretation of findings

In this system, only category 3b and 4s are considered missed cases or misinterpretations of cases.

A quarterly review is performed of each individual radiologist.

Individuals have access to view their own data at any time. If their rate of category 3b & 4 are 5% or above, an internal peer review of cases for that individual will be done. If any areas of weaknesses are identified, an action plan of remediation will be assigned to the individual radiologist.



Lashonda Soma, MD (4th year resident), John Hungerford, MD (2nd Year resident), Philip Costello, MD

QUALITY ASSURANCE THROUGH PEERVUE FOR FACULTY & RESIDENTS

Preliminary reads for emergency department studies are provided by on call residents from 9 p.m. to 7:30 a.m. backed up by on-call subspecialty attendings. Peervue is utilized by the attending radiologist the following morning when reports are finalized. Significant discrepancies are immediately communicated to the ED attending, and patients requiring non-urgent follow up are contacted by MUHA Radiology staff. Residents receive feedback immediately, and all category 3b and 4 cases are reviewed at bimonthly conferences for all residents conducted by Dr. Costello. Radiology misinterpretations and errors are reviewed with opportunities for education and continuous improvement. A recent review of 11,573 ED cases revealed only 98 category 3b and 12 category 4 cases. This represents a discrepancy rate of less than 1% which is below nationally reported data for resident discrepant reads.

Given that the neurointerventional division and vascular interventional divisions work differently, those radiologists have a different set of metrics. Neurointerventional radiologists will monitor groin hematomas post catherization and incidence of stroke complications after diagnostic angiography. Additionally, they participate in monthly M & M conferences held by neurosurgery. Interventional radiology also has a different system specific to their specialty to monitor quality called the HI-IQ system.

Results and examples of category 3a, 3b and 4 cases are presented quarterly at the Radiology department faculty meeting. Results are relayed quarterly to the medical staff office by Dr. Susan Ackerman, Vice Chair of Clinical Affairs in Radiology and Dr. Philip Costello, Chairman of Radiology.

A similar quality metrics system is used for evaluating resident performance. Attending radiologists review and assign category for all ED cases read by the residents. Results and examples of cases are reviewed monthly with the residents at a QA meeting by Dr. Costello, Chairman of Radiology.

VASCULAR INTERVENTIONAL TEAM IMPROVE PROJECT



PROJECT TEAM

Champions: Sally Potts, Bayne Selby, MD and Mike Ricciardone

Process Owners: Lou D'Eugenio and Marcelo Guimaraes, MD

Facilitator: Scott Brady

Team Members: Ron Hosey, Shannon Shuler, Erica Gorby, Charlene Pruitt, Ricardo Yamada, MD, Robert Cardell, Tracy Robinson, Maribeth Harrison, Rob Finch, Heather Sodee, Monica Mumme, Molly French.

Scott Brady, Marcelo Guimaraes, MD, Rob Finch, Ron Hosey, RT(R), Erica Gorby, RT(R)
Kelly Howard, RT (R), Charlene Pruitt, RT (R), and Lou D'Eugenio, RN

PROJECT OBJECTIVE

Improve patient flow through Vascular Interventional.

PROBLEM IDENTIFICATION: In the Main Hospital and ART IR Departments, the average percentage of patients who were tabled at their scheduled procedure time is 20% for December FY13. This has resulted in patient dissatisfaction, patient delays, and increased staff overtime. The goal is to increase the percentage of patients who are tabled at their scheduled time from 20% to 90%.

MEASURE THE IMPACT (Metric(s) and Goal):

- % of Patients tabled at their scheduled procedure time (Baseline=20%)(Goal=90%)
- % Room Utilization Rate for all IR beds (MH and ART) monthly (Baseline=55%) (Goal=85%)
- Time from patient arrival to patient tabled (Baseline=179 min.) (Goal=120 min.)
- Time from patient arrival in Prep to patient discharge from Prep (Baseline=294 min.) (Goal= 220 min.)
- Lead time for Patients arrival to discharge (Baseline = 332 min.) (Goal = 249 min.)

VASCULAR INTERVENTIONAL TEAM IMPROVE PROJECT

PROBLEM ANALYSIS(Root Causes):

- Unclear roles and responsibilities
- Process inefficiencies and wasteful tasks
- Inadequate communication between departments and staff
- Lack of staff accountability
- Lack of process and procedure standardization for patient workflow

REMEDY SELECTION:

- List of roles and responsibilities for all staff involved in patient workflow
- Eliminate waiting waste in VIR Registration waiting room and Prep & Recovery
- Eliminate duplication of tasks between departments
- Develop standardized processes and procedures for staff involved with patient workflow
- Standardized handoffs and “Attack Team” rounds with patients
- MDs review patient cases and needs prior to day of procedure
- Implementation of Nurse Manager, Prep and Recovery Charge Nurses and Radiology Manager
- Development of workflow performance dashboard (time stamps) for patient workflow
- Develop specific staff expectations and corrective action plan for non-compliance

PRELIMINARY RESULTS:

Vascular and Interventional Radiology (VIR) worked on the Performance Improvement project for 14 months. The VIR patient flow was analyzed by a process that evaluated every single step of the patients' pre, during and post procedures. Several improvements were made in the patients' flow, safety, in the documentation, in the procedure supplies, and in the restructuring of the way VIR operates. The improvements resulted in increased safety (lower complications related to procedures and moderate sedation, contrast use), reduction of operational costs, increased efficiency (no duplication of documentation, patients are spending less time in the hospital), and increased employee and patient satisfaction scores. Two objective variables (patient on time on the table and room utilization) were re-analyzed recently and remarkable improvement was shown in the streamlining of patient care in Vascular and Interventional Radiology.

CONTRAST SAFETY & CONTRAST SIMULATION TRAINING LAB EXTRAVASATION PROJECT



Melissa Picard, MD, Lashonda Soma (4th year resident), Nancy Curry, MD, Jeanne Hill, MD

In 2007-2008, when Dr. Curry was President of the Society of Uroradiology, she was approached by officials of the American College of Radiology requesting that our society develop a practice quality improvement project. Their intent was to establish a database to collect data from multiple institutions across the US which would provide a meaningful way to compare practice performance in areas of quality and patient safety with other facilities nationwide.

Maintenance of certification for the specialty of radiology was in its earliest stages at that time. Dr. Curry appointed and worked with a committee, chaired by Dr. Tom Dykes at Hershey Medical Center with significant contribution by Dr. Jim Ellis from the University of Michigan, to develop a patient safety project whose purpose was to identify and reduce the frequency of intravenous extravasation events occurring with CT examinations. Although the usual consequence of such an event is pain and swelling, the extreme adverse outcome can be loss of limb function.

The resulting ICE (intravenous contrast extravasation) project was officially approved and MUSC was one of the first institutions nationwide to participate in this patient safety initiative. We collected and analyzed two six month periods of data from February 2011 through July 2011 and then again from March 2012 through August 2012. Our results showed that we were consistently at or below national benchmarks for the total overall number of extravasation events although in both study periods we showed a greater number of moderate volume events. In both data collection periods, however, all these events were minor with no long term consequences. Eighty two percent were associated with catheters placed by non-radiology personnel and 6.5% were associated with deep brachial placements. Feedback was given to ER personnel (Dr. Geoffrey Hayden) and Risk Management for further investigation with the intent to reduce incidence further.

CONTRAST SAFETY & CONTRAST SIMULATION TRAINING LAB EXTRAVASATION PROJECT

Another safety issue in radiology is the rare but serious **adverse contrast agent** reaction which can be life threatening for our patients. In July 2011, Drs. Nancy Curry, Jeanne Hill, Leonie Gordon and Melissa Picard had an idea to investigate the utility of using the **simulation laboratory** at MUSC to teach the appropriate response to and treatment of intravenous contrast reactions. Dr. Picard spearheaded the successful development and implementation of this project. With the assistance of Dr. Lashonda Soma, a senior radiology resident, multiple scenarios of the more common and of the rare but life-threatening reactions were authored within the Radiology Department. In conjunction with the Simulation Center, these scenarios were programmed for use with the high-fidelity mannequins located there. Every radiology resident spent time during several contrast reactions in a “hands-on” environment. They have just finished the data collection, comparing traditional didactic lectures versus hands-on laboratory simulation of contrast reaction scenarios and are in the first stages of manuscript preparation, intending to submit to the *Journal of the American College of Radiology*. The residents have responded favorably to the laboratory simulations with the general feeling that they are better prepared to respond quickly and appropriately in the recognition and treatment of potentially life threatening contrast reactions.

RADIATION SAFETY & ACR ACCREDITATION

RADIATION SAFETY

In the interest of providing excellent patient care, x-ray imaging at the department is always done with the ALARA principle (As Low As Reasonably Achievable). CT imaging protocols at the department use specialized software such as CareDose4D, Auto mA, and Care kV to reduce patient dose without compromising diagnostic image quality. Imaging protocols for various body parts have been optimized and standardized

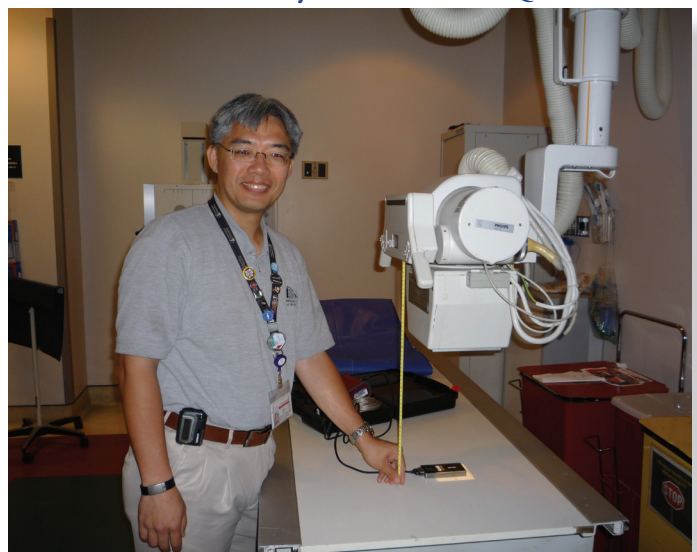
on all CT scanners across campus to help achieve consistent image quality. Special care is taken to ensure that pediatric patients are imaged with the lowest possible doses that can yield diagnostic images. The department closely follows the guidelines recommended by the “**Image Wisely**” (adult imaging) www.imagewisely.org and “**Image Gently**” (pediatric imaging) <http://imagegently.dnnstaging.com/>



Melissa Dutton, Randal Hinson, Sameer Tipnis, PhD, DABR

ACR ACCREDITATION High quality imaging requires well-maintained equipment and strict quality control by technologists. The department is fully accredited via the ACR (CT, MR, Mammography) and ICANL (Nuclear Medicine). All x-ray producing units, MRI machines, Mammography units, and nuclear medicine scanners have dedicated daily and routine QC tests and are monitored for any deviation from set performance limits. To ensure that they are operating properly, these units are rigorously tested for their radiation output and image quality by board certified medical physicists.

<http://www.acr.org/Quality-Safety/Accreditation>



Eugene Mah

DEPARTMENTAL BACTERIAL BURDEN REDUCTION



Paul Thacker, MD, Alex Harvin, MD (1st year resident), Jeanne Hill, MD

REDUCTION OF THE BACTERIAL BURDEN IN THE DEPARTMENT OF RADIOLOGY:

Our project included quantifying and qualifying the bacterial burden of the most commonly touched surfaces in the radiology department to include resident/technologist workstations as well as patient imaging areas. All surfaces will be re-swabbed at 6 months after educating residents, faculty and technologists with these initial results and providing numerous visual reminders to clean work areas frequently. There was a significant reduction in the resident workstation bacterial burden at follow-up after resident education and implementation of visual and digital reminders.

Preliminary data at technologist workstations and imaging areas showed bacterial burden paralleling that previously seen in MUSC and VA ICUs.

No MRSA or VRE was isolated on ANY surface sample.

Radiology technologists have been educated via visual and visual reminders placed around the department. We will perform follow up cultures at six months time to determine interval improvement in bacterial bulk in these technologist and imaging areas.

PEDIATRIC DOSE REDUCTION

PEDIATRIC PICC SERIES DOSE REDUCTION:

We observed that greater than 3 radiographs (up to 15 maximum) are often taken to confirm the initial replacement of a PICC in neonates, thus resulting in unnecessary radiation exposure to this particularly vulnerable population. By educating the neonatal and PICC nurses on the radiographic anatomy and proper PICC placement, our goal is to reduce the number of radiographs taken to 3 or less.

Larger studies with education for radiology staff is being conducted.

RESIDENT QUALITY IMPROVEMENT PROJECTS: CRITICAL RESULTS REPORTING



Brian Flemming, MD (2nd year resident), Rebecca Leddy, MD, Leonie Gordon, MD, Adam Rogers, MD (3rd year resident)

PROBLEM STATEMENT:

- Documentation of critical results reporting was not at goal in the department
- At the beginning of the project only approximately 30% of critical results were reported and documented within 30 minutes of result availability, which is the time set by department policy

BACKGROUND:

- Each residency program has been asked to complete a quality improvement project this year
- Each resident must participate
- Pulmonary Embolism and Acute Intracranial Hemorrhage are being followed
 - * ICD-9 codes

IMPLEMENTATION PLAN

- “Critical Result” macro has been created and added to the clinic list
 - * Includes when reader became aware of finding as well as when that finding was communicated
- Continued resident education and reminders
- Signs have been placed in reading rooms
- Review of data

RESIDENT QUALITY IMPROVEMENT PROJECTS: CRITICAL RESULTS REPORTING

FIRST QUARTER:

- Prior to intervention (July 1 - September 30)
- Acute Intracranial Hemorrhage - 13/45 (29%)
- Pulmonary Embolism - 20/44 (45%)

SECOND QUARTER:

- After intervention (October 1 - December 31)
- Acute Intracranial Hemorrhage - 38/39 (97%)
- Pulmonary Embolism - 31/37 (84%)
- Quarter Total - 69/76 (91%)

THIRD QUARTER:

- After intervention (January 1 - March 31)
- Acute Intracranial Hemorrhage - 59/61 (97%)
- Pulmonary Embolism - 50/52 (96%)
- Quarter Total - 109/113 (96%)
- Year Total - 178/189 (94%)

RESIDENT PARTICIPATION

- Each resident is required to make one of these diagnoses
- Currently 34/35

GOALS

- Ensure 100% resident participation
- Continue high performance for the remainder of the year

BREAST IMAGING: MQSA DATA AND QUALITY ASSURANCE

The performance of radiologists and the entire group are evaluated throughout the year and discussed as a medical audit at the end of the year.

Total Screening Mammograms Read by Radiologists with Recall Rate A CMS Quality Initiative (Jan. 1, 2013 to Dec. 30, 2013)

	Total # screening mammograms read	Overall recall rate
Overall section	16749	15%

Weekly Quality Assurance and Safety Meetings

All breast imagers meet every Wednesday morning at 8 a.m. for breast biopsy concordance conference. The previous week's biopsy results are evaluated for concordance and for further management for each case. Any previous false negative results (missed cancers) are evaluated by the group.

Elapsed Time from Screening Mammogram to Additional Imaging is Monitored the Entire Year and Evaluated Quarterly A CMS Quality Initiative

Time Elapsed Between Screening Callback and Additional Images (Last Quarter 2013)

Total # Patients with BIRADS 0	Additional Imaging within 45 days	Average Time
328	100%	8.4 days



Teresa Harrison, Ibad Irshad, MD, Susan Ackerman, MD

NEUROINTERVENTIONAL SURGERY & ACUTE STROKE THERAPY ADAPT PROJECT



Back row (L to R): Megan Fulton, PA, Sarah Denham, Yolanda Elbert, Diane York, Diana Grant, Emily Young, Jasmine Tatman, Brian Thompson, Teena Wyatt, Bryan Croy
Front row (L to R): Mary Williams, Harris Hawk, MD, Jonathan Lena, MD, Imran Chaudry, MD, Aquilla Turk, DO, Raymond Turner, MD, Alex Spiotta, MD, Max Donohoe, Joshua Fought, Adrian Parker

Comparison of Endovascular Treatment Approaches for Acute Ischemic Stroke: Cost Effectiveness, Technical Success, and Clinical Outcomes.

BACKGROUND:

The use of mechanical thrombectomy for treatment of acute ischemic stroke has significantly advanced over the last 5 years. Little data is available comparing the cost and clinical angiographic outcomes of the available techniques. The aim of this study was to compare the cost and efficacy of current stroke therapy at MUSC.

METHODS:

A retrospective review of the chart and hospital financial database of all ischemic stroke cases from 2009-2013 was performed. Three discreet treatment methodologies used during this time were compared: traditional Penumbra System (PS), stent retriever with local aspiration (SRLA) and A Direct Aspiration first Pass Technique (ADAPT). Statistical analysis of clinical and angiographic outcomes and costs for each group was performed.

NEUROINTERVENTIONAL SURGERY & ACUTE STROKE THERAPY ADAPT PROJECT

RESULTS:

222 patients (45% male) underwent mechanical thrombectomy from 1/2009 - 12/2013. Successful revascularization was defined as TIC12b/3 and was achieved with use of PS in 79% of cases, 83% of SRLA cases, and 95% of ADAPT procedures. The average total cost of hospitalization for patients treated with PS was \$51,599, SRLA was \$54,700 and ADAPT \$33,611 ($p < 0.0001$). Similar rates of good functional outcomes were seen in group PS (36%) as group SRLA (43%) and ADAPT (47%) ($p = 0.4$).

CONCLUSION:

The ADAPT technique represents the most technically successful, yet cost effective, approach to revascularization of large vessel intracranial occlusions.

This abstract is from a manuscript being submitted for peer review publication. This demonstrates that the ADAPT technique, a novel technique developed by the NES doctors at MUSC, provides similar or better angiographic and clinical outcomes with a significantly lower cost and shorter length of stay. This translates to an average savings of approximately \$20,000 per patient.

TECHNOLOGIST QUALITY ASSURANCE REPORTING - USING PEERVUE

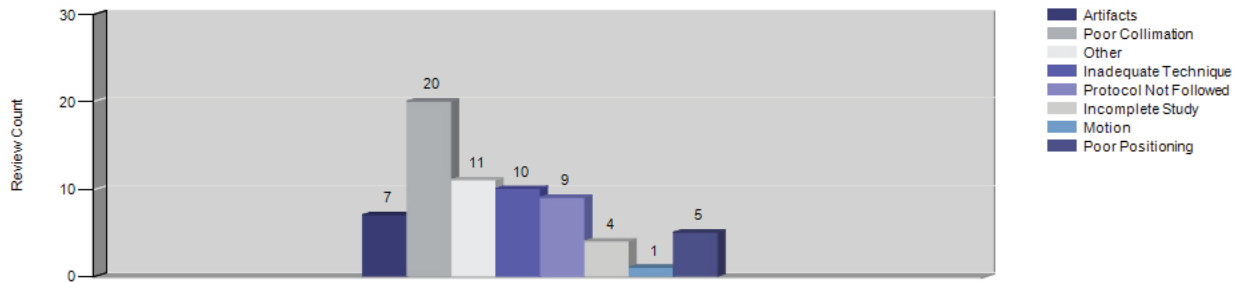
Total Exams Listed for April 1, 2014 to April 30, 2014

Total Exams	Identified Concerns	% Identified Concerns
196,749	67	0.034%

Commonly repeated errors are identified and reviewed with staff at monthly meeting. Below is a recent example of detailed radiologist identified quality concerns.

Quality assurance for technologists exams are reviewed by the radiologists. Areas for improvement such as annotating films correctly, proper positioning and following protocols are then reviewed by radiology managers and staff.

SAMPLE REPORT AS ILLUSTRATED BELOW:

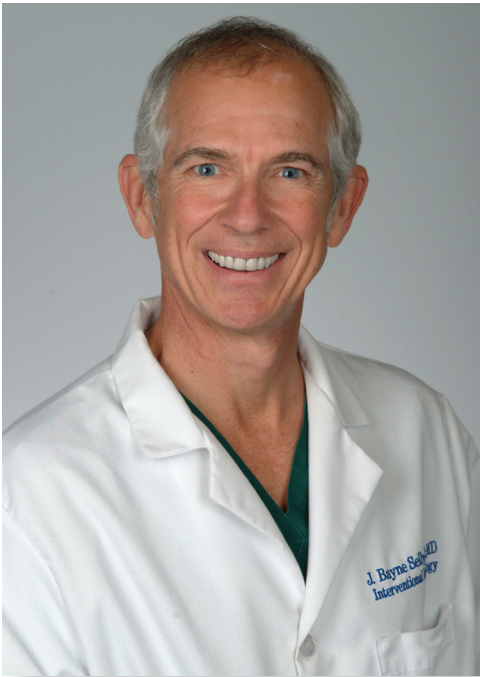


Modality	Attributable Value	Comment	Reviewer	Reviewed
MR	Poor Positioning	VIBE not copied to perform subtraction	Hardie, Andrew MD	XXXXXX
CT	Other	No coronal brain MIPS were provided	Roberts, Donna MD	XXXXXX
CR	Protocol Not Followed	Pediatric patient scheduled as an adult	Hill, Jeanne, MD	XXXXXX
US	Inadequate Technique	Please watch the placement of the cursor for Doppler imaging.	Keslar, Paula, MD	XXXXXX



Back row (L to R): David Dechant, Robin Brothers, Jody Williamson, Alden Finlayson, Wanda Baker.
Front row (L to R): Maggie Carter, Teresa Harrison, Joy Lutz, Kelly Howard

VASCULAR INTERVENTIONAL DATABASE HI-IQ PROGRAM



Bayne Selby, MD

HI-IQ is a comprehensive patient procedure and tracking program that was developed in the early 1990's by Interventional Radiologists for Interventional Radiologists. All staff working in the Interventional Radiology have access to the program. Every patient that undergoes a procedure is entered into the program. Important information entered includes Type of Procedure, Referring Physician, Performing Physicians, Complications, Radiation and Contrast Usage, as well as many other variables. Importantly, any specific variable can be searched on to yield an instantaneous report.

Residents and Fellows can easily access this to create procedure logs, reports to identify most common referring physicians can be generated, and complications can be tabulated and followed.

SERVICE ACTIVITY ANALYSIS

Service Activity	Serves	Enctrs	Pts	Success	Success Rate %
Arteriography, Diagnostic	1136	575	484	1136	100.00
Arterial Intervention	845	533	408	845	100.00
Venography	750	529	488	750	100.00
Venous Intervention	4099	3461	2368	4099	100.00
Dialysis Shunt Management	1450	653	345	1450	100.00
Biliary Intervention	605	274	124	605	100.00
GI Intervention	327	195	139	327	100.00
GU Intervention	1527	654	268	1527	100.00
Biopsy/DX Fluid Aspiration	615	557	530	615	100.00
Drainage General	209	199	187	209	100.00
Misc Intervention	13	13	13	13	100.00
Pulmonary Intervention General	2	2	2	2	100.00
Tumor Therapy General	50	49	45	50	100.00
	11628	6922	4072	11628	100.00

VASCULAR INTERVENTIONAL DATABASE HI-IQ PROGRAM

FELLOWSHIP CASE LOG

	# Procedures	Complications	
		Minor	Major
<u>Vascular Diagnosis</u>			
CTA	0	0	0
MRA	0	0	0
Noninvasive vascular lab (duplex, color flow, PVRs)	0	0	0
Cardiac Imaging	0	0	0
Arteriography (all, peripheral, renal, mesenteric, carotid)	188	0	0
Venography (all)	163	0	0
Dialysis access evaluation	96	0	0
Carotid artery imaging	7	0	0
<u>Vascular Intervention</u>			
Venous access (all, tunneled, nontunneled, ports)	529	0	0
IVC filter placement, retrieval	25	0	0
Venous ablation (vericose veins)	0	0	0
Dialysis access intervention	106	0	0
TIPS & TIPS evaluation/revision	14	0	0
Angioplasty/stents/covered stents: arterial (peripheral, renal, mesenteric)	109	0	0
Angioplasty/stents/covered stents: venous (all)	594	2	0
Carotid stenting	2	0	0
Thrombolytic therapy (all, thrombectomy)	55	0	0
Aortic endografting (Thoracic and/or abdominal)	2	0	0
Embolization, emergency (trauma, GI bleed, bronchial bleed, other)	1	0	0
Embolization, elective (uterine fibroids, PAVMs, peripheral AVMs, varicoceles)	84	0	0
Chemoembolization	0	0	0
Radioembolization (selective internal radiotherapy)	0	0	0
Other	0	0	0

COMPLICATION ANALYSIS

Service	Complication	Outcome
Stent SMA	Hematomal bleed	Observation
BX/Asp Liver Focal Abn	Hematomal bleed	Minor hospitalization
Venous Access with Port	Local infection	Observation
Bx/Asp Hepatobiliary	Hematomal bleed	No consequence
Venous Access with Port	Malposition	Observation

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