Implementing a Process for Establishing and Sharing Standardized Imaging Protocols to Improve Cross-Enterprise Workflow and Quality

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Disclosures

- Institutional research agreement with Philips Healthcare and Siemens Healthineers
- Dr. Browning: Luminary relationship with McKesson
- Dr. Toomay: Research relationship with Philips Healthcare

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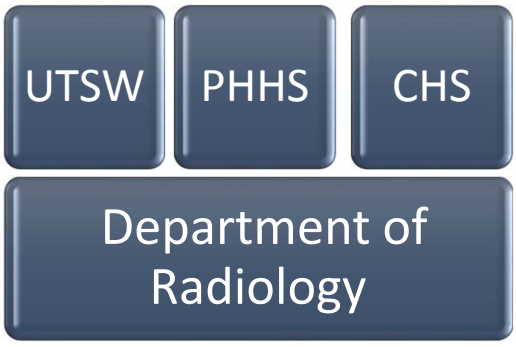
Background

- Value-Based imaging requires
  - Delivery of high quality, consistent imaging at an acceptable cost
- Challenges to overcome include
  - Implementing standardized imaging protocols, workflows, policies, and practices
  - Geographically dispersed sites managed by differing partner institutions
  - Imaging performed on variety of vendor equipment and software
- Quality control calls for
  - Creation of a "source of truth" for information
  - Ensuring process adherence by the performing technologists
  - Supported by effective communication with multiple radiologists and technologists

Case Presentation

- Our imaging enterprise consists of –
  - University of Texas Southwestern Health System (UTSW)
  - Parkland Health and Hospital System (PHHS)
  - Children's Health System (CHS)
- Studies across the three systems are interpreted by one large radiology group with expertise in various subspecialties



Case Presentation

- Clinical Sites
  - UT Southwestern Health System
    - Clements University Hospital: 460 beds
    - 5 Outpatient Imaging Centers
  - Parkland Heath and Hospital System
    - Parkland Hospital: 862 beds
    - 9 Outpatient Facilities
  - Children's Health System
    - Dallas: 592 beds, Plano: 72 Beds
    - 2 Outpatient Facilities
- UT Southwestern Department of Radiology
  - 133 Clinical Radiology Faculty, 35 PhD Research Faculty
  - 52 Radiology Residents and 27 Fellows
  - 1482 Clinical Residents, 959 Medical Students

Challenges I

- Three different healthcare systems
  - Each with a mix of ED, inpatient, onsite outpatient, and distant outpatient facilities
- Each location operated under local imaging protocols governed by the local administrative body
- Three separate technical and network infrastructures

Implication: A patient may undergo different imaging protocols based simply on site of imaging rather than the nature of imaging indication

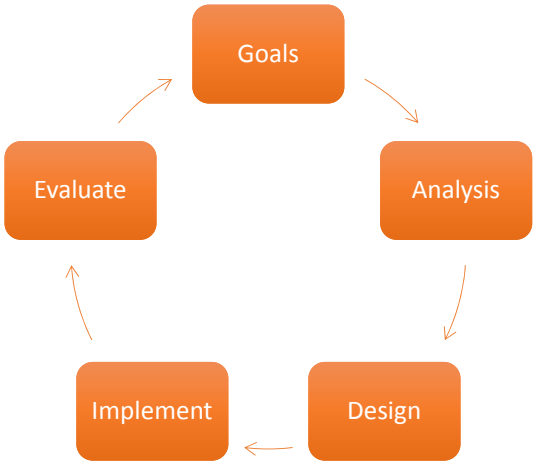
Challenges II

- Problem compounded by
  - Multiple vendors
  - Individual machine limitations which might prohibit use of an otherwise optimized protocol
  - Vendor support introduced variation due to uncoordinated support and machine updates (different software levels)

Images from top to bottom are courtesy of: GE Healthcare (1,3), Siemens Healthineers (2), and Philips (4)

Approach to Process Redesign

- Develop Goals
- Analyze existing state
- Design future state
  - Standardized protocols
  - Develop method for delivery and updating
- Implement
- Evaluate

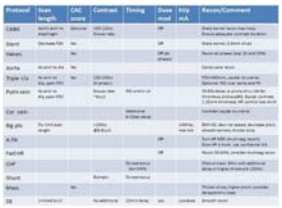


Initial goals

- Eliminate the heterogeneous approach to imaging patients across our system
- Provide a consistent level of care to our patients for a given clinical indication irrespective of the imaging center they choose within our system
- Deliver consistent, readily available imaging protocols as a source of truth to our technologists, radiologists and other medical staff
- Ensure adherence to imaging protocols
- Deliver consistent image acquisition and quality to streamline interpretation by the Radiologist

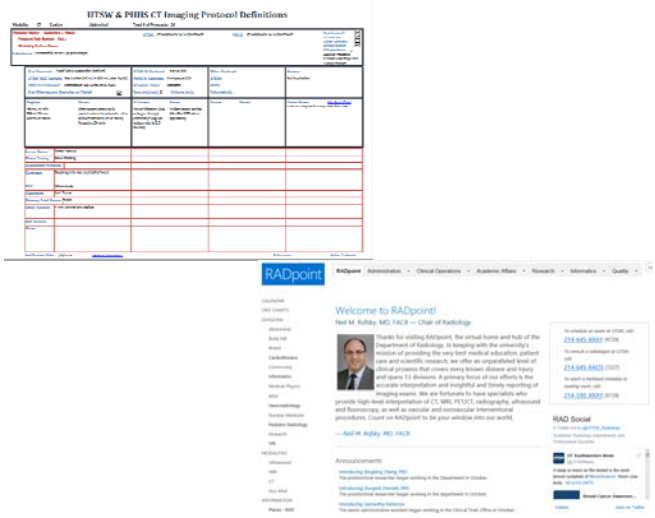
Existing State Analysis

- Individual locations maintained protocol guides (both paper and electronic) with varying degree of rigor
- Extremely difficult to readily obtain the protocol from another location without making a phone call or by other communication method
- Major barrier to rotating radiologists who cover different imaging locations



Future state design

- Standardized imaging protocols
- Imaging protocols which reflect specific modalities and available equipment
- All imaging protocols available uniformly at all points of care
- All sites of care have most recent and updated protocols

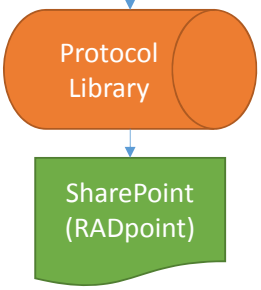


Implementation I

- Imaging protocols defined by subspecialty radiologist teams
- Modality specific (e.g. CT, MR, NM, US) operation committees were developed
- Represented by radiologists professional group, administrative leaders, technologists and physicists

Implementation II

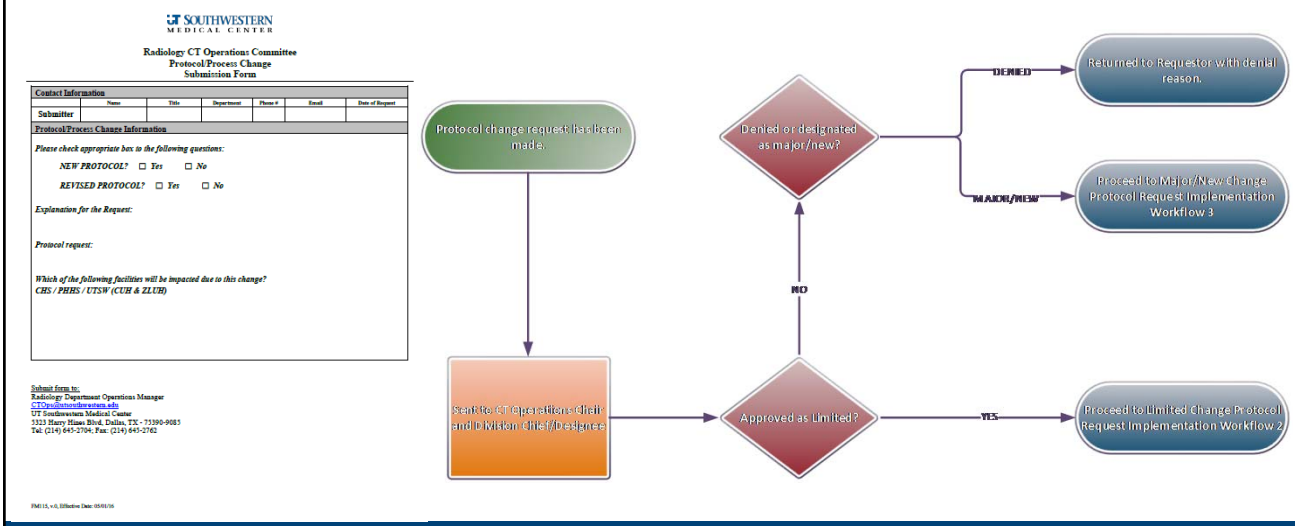
- Protocols centrally managed and maintained by a “protocol czar”
- Creation of a database linking clinical imaging protocols to machine specific acquisition protocols
- Delivery of the clinical imaging protocols from our protocol library as the “Source of Truth” to all our users regardless of their location



Implementation III

- For any given modality, once the imaging protocol is finalized by the operations team, lead technologist will make the necessary changes to the imaging acquisition protocols across all scanners.
- Lead technologist communicates back to the clinical managers as well as to the “Protocol Czar”
- “Protocol Czar” posts the new / modified protocol on RADpoint
- Clinical managers sent out communication to all the staff technologists regarding the new or updated protocols

Workflow for Protocol Request



SOUTHWESTERN MEDICAL CENTER

Radiology CT Operations Committee
Protocol/Process Change
Submission Form

Contact Information						
	Name	Title	Department	Phone #	Email	Date of Request
Submitter						

Protocol/Process Change Information

Please check appropriate box to the following questions:

NEW PROTOCOL? ☐ *Yes* ☐ *No*

REVISED PROTOCOL? ☐ *Yes* ☐ *No*

Explanation for the Request:

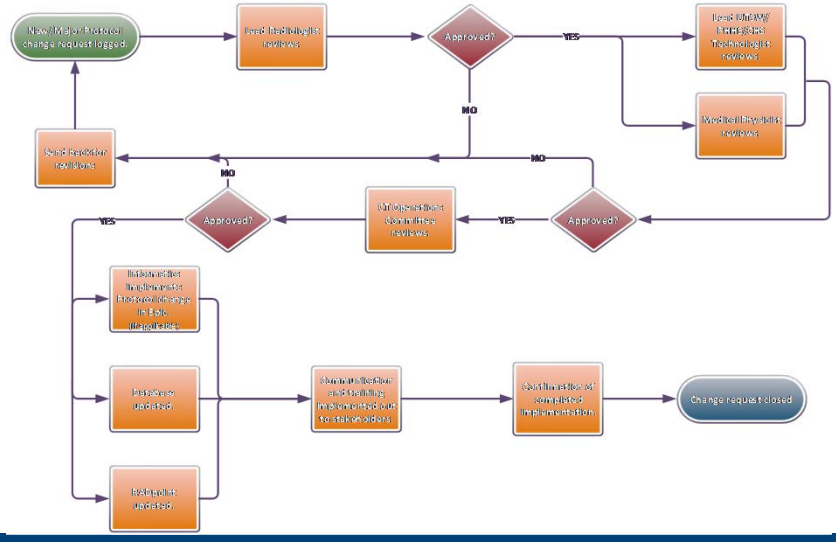
Protocol request:

Which of the following facilities will be impacted due to this change?
CHS / PHHS / UTSW (CUH & ZLUH)

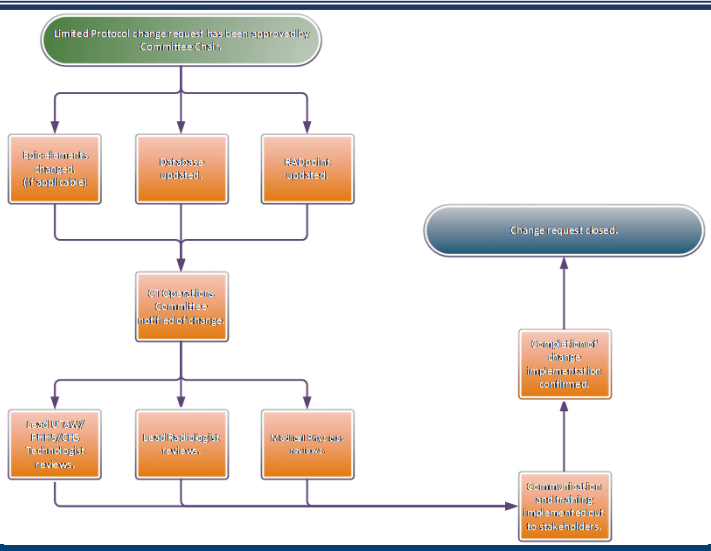
Submit form to:
Radiology Department Operations Manager
CTOps@utsouthwestern.edu
UT Southwestern Medical Center
5323 Harry Hines Blvd, Dallas, TX - 75390-9085
Tel: (214) 645-2704; Fax: (214) 645-2762

FM115, v.0, Effective Date: 05/01/16

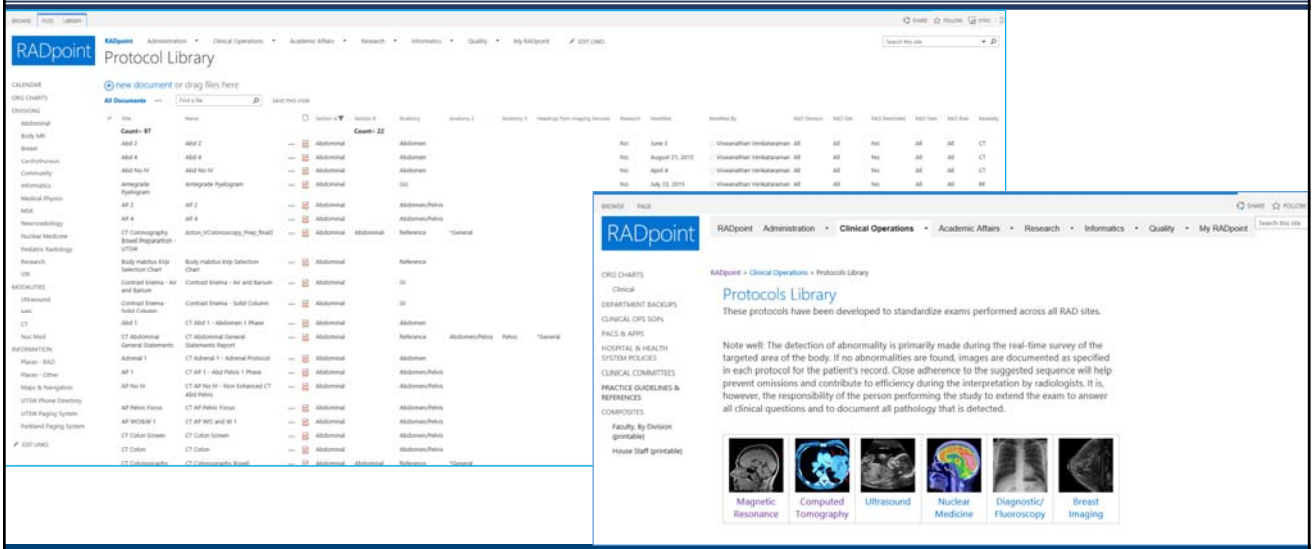
Workflow for New/Major Protocol Change



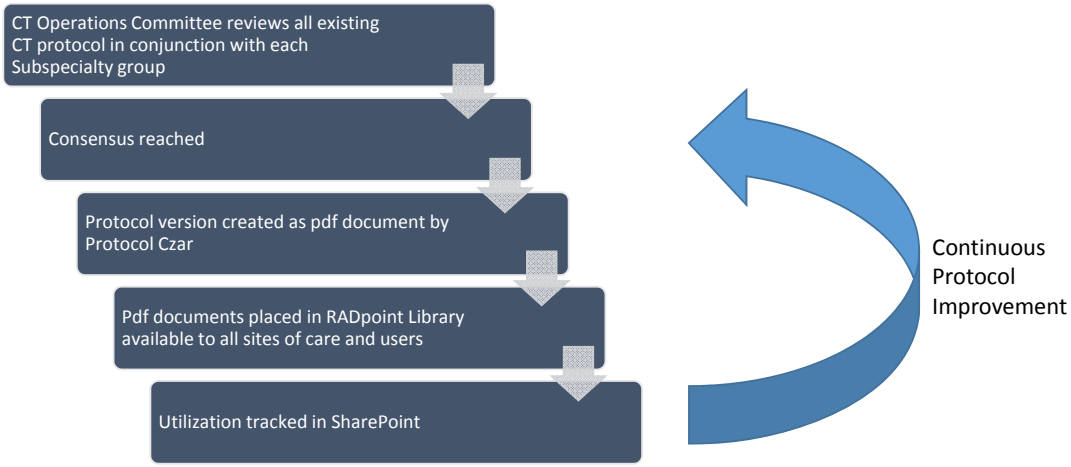
Workflow for Minor Protocol Change (Fast)



Delivery – Microsoft SharePoint as Platform



Protocol Standardization Process

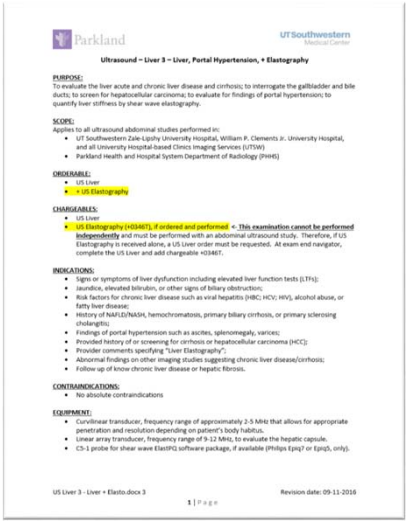


Analysis of Existing State

- Analysis of our existing protocols confirmed the inconsistent approach across different institutions
  - 900 protocols (all modalities)
  - Marked variation
    - Outdated versions
    - Site unique protocols
    - No naming convention

Effect of Protocol Standardization

- Overall reduction in total number of protocols from over 900 to 622
- US standardization team consolidated the protocols from 84 to 52
- MR from 372 to 268
- CT from 222 to 136
- NM from 141 to 96
- Others including Fluoroscopy from 80 to 64



Parkland — UTSouthwestern Medical Center

Ultrasound – Liver 3 – Liver, Portal Hypertension, + Elastography

PURPOSE:
To evaluate the liver acute and chronic liver disease and cirrhosis; to interrogate the gallbladder and bile ducts; to screen for hepatocellular carcinoma; to evaluate for findings of portal hypertension; to quantify liver stiffness by shear wave elastography.

SCOPE:
Applies to all ultrasound abdominal studies performed in:
- UT Southwestern Zale Lipshy University Hospital, William P. Clements Jr. University Hospital, and all University Hospital-based Clinics Imaging Services (UTSW)
- Parkland Health and Hospital System Department of Radiology (PHHS)

ORDERABLE:
- US Liver
- + US Elastography

CHARGEABLES:
- US Liver
- US Elastography (+03467), if ordered and performed. < This examination cannot be performed independently and must be performed with an abdominal ultrasound study. Therefore, if US Elastography is received alone, a US Liver order must be requested. At exam end navigator, complete the US Liver and add chargeable +03467.

INDICATIONS:
- Signs or symptoms of liver dysfunction including elevated liver function tests (LTFs);
- Jaundice, elevated bilirubin, or other signs of biliary obstruction;
- Risk factors for chronic liver disease such as viral hepatitis (HBC; HCV; HIV), alcohol abuse, or fatty liver disease;
- History of NAFLD/NASH, hemochromatosis, primary biliary cirrhosis, or primary sclerosing cholangitis;
- Findings of portal hypertension such as ascites, splenomegaly, varices;
- Provided history of or screening for cirrhosis or hepatocellular carcinoma (HCC);
- Provider comments specifying "Liver Elastography";
- Abnormal findings on other imaging studies suggesting chronic liver disease/cirrhosis;
- Follow up of know chronic liver disease or hepatic fibrosis.

CONTRAINDICATIONS:
- No absolute contraindications

EQUIPMENT:
- Curvilinear transducer, frequency range of approximately 2-5 MHz that allows for appropriate penetration and resolution depending on patient's body habitus.
- Linear array transducer, frequency range of 9-12 MHz, to evaluate the hepatic capsule.
- C5-1 probe for shear wave ElastPQ software package, if available (Philips Epiq7 or Epiq5, only).

US Liver 3 - Liver + Elasto.docx 3 — Revision date: 09-11-2016

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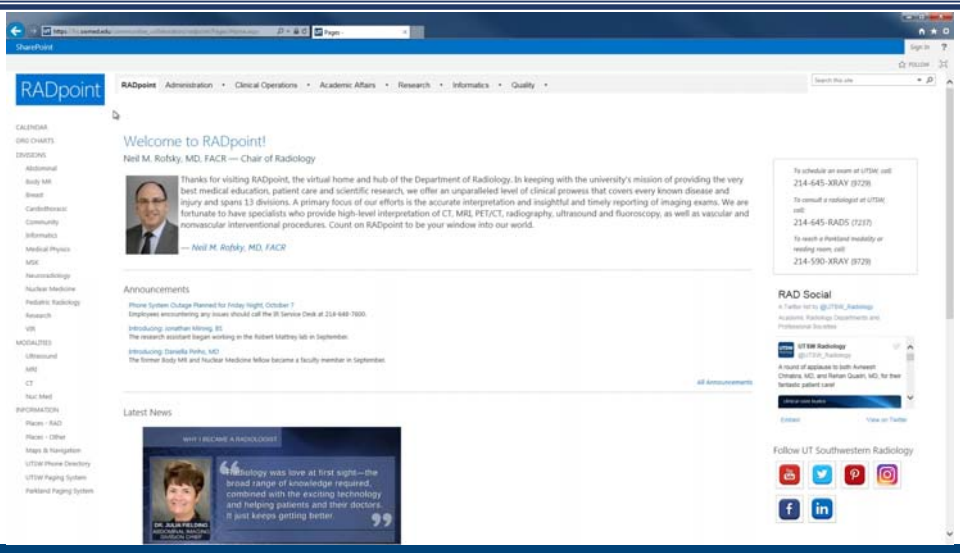
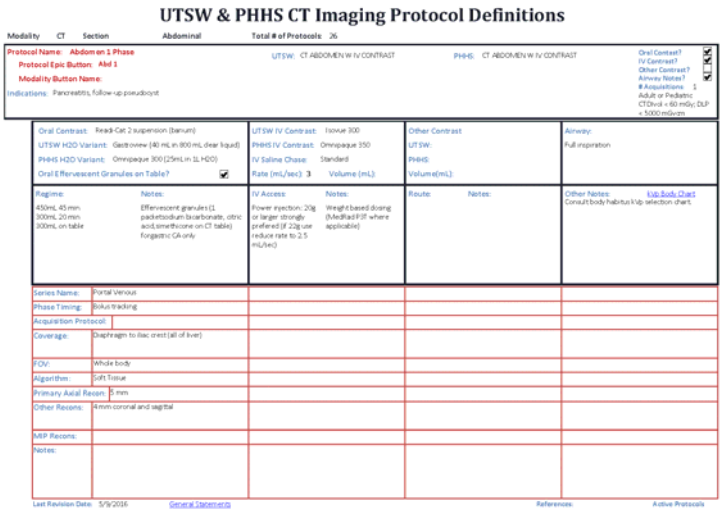
This is How It Works



Example of a Protocol



UTSW & PHHS CT Imaging Protocol Definitions

Modality CT Section Abdominal Total # of Protocols 26

Protocol Name: Abdom on 1 Phase
Protocol Epic Button: Abd 1
Modality Button Name:
Indications: Pancreatitis, follow-up pseudocyst

UTSW: CT ABDOMEN W IV CONTRAST PHHS: CT ABDOMEN W IV CONTRAST

Oral Contrast? IV Contrast? Other Contrast? Airway Notes? # Acquisitions: 1
Adult or Pediatric
CTDIvol < 60 mGy; DLP < 5000 mGy-cm

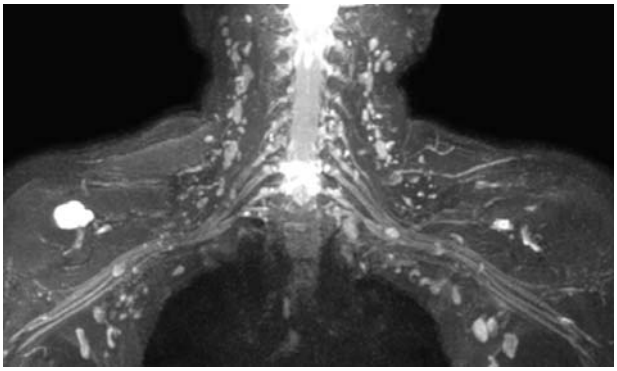
Oral Contrast: Readi-Cat 2 suspension (barium) UTSW H2O Variant: Gastroview (40 mL in 800 mL clear liquid) PHHS H2O Variant: Omnipaque 300 (25mL in 1L H20) Oral Effervescent Granules on Table? ☑	UTSW IV Contrast: Isovue 300 PHHS IV Contrast: Omnipaque 350 IV Saline Chase: Standard Rate (mL/sec): 3 Volume (mL):	Other Contrast UTSW: PHHS: Volume(mL):	Airway: Full inspiration
Regime: 450mL 45 min 300mL 20 min 300mL on table Notes: Effervescent granules (1 packet sodium bicarbonate, citric acid, simethicone on CT table) Forgastric CA only	IV Access: Notes: Power injection: 20g or larger strongly prefered (if 22g use reduce rate to 2.5 mL/sec) Weight based dosing (Medicaid PIF where applicable)	Route: Notes:	Other Notes: Kub Body Chart Consult body habitus kub selection chart.

Series Name:	Portal Venous
Phase Timing:	Bolus tracking
Acquisition Protocol:	
Coverage:	Diaphragm to iliac crest (all of liver)
FOV:	Whole body
Algorithm:	Soft Tissue
Primary Axial Recon:	5 mm
Other Recons:	4mm coronal and sagittal
MIP Recons:	
Notes:	

Last Revision Date: 5/9/2016 General Statements References: Active Protocols

Impact

- SharePoint site utilization
  - Accessed 11,207 times over 3 month period
  - Protocol Library was utilized 53,717 times from July 1, 2015 – Oct. 21, 2016 averaging 3357 clicks per month
  - Number of unique users has varied from 54 being the lowest and 121 being the highest over the past six months
  - Highest use:
    - Complicated protocols (e.g., MR Brachial Plexus)
    - New / recently changed protocols (e.g., CT Chronic Aortic Dissection / TEVAR)
  - Average number of protocol changes: 2 per month per modality



Conclusion

1. We successfully instituted a process for the development, implementation and delivery of standardized imaging protocols in a complex, multi-institution healthcare system.
2. Key elements are –
   a. Strong, effective modality specific operations committees
   b. A "Protocol Czar" to manage the process efficiently
   c. Electronic publishing of the protocols to facilitate ease of access and use
   d. A mechanism to monitor compliance

Questions?