Measuring Quality Improvement in IR

In today's ever-changing IR world, knowledge is power. Facts and figures provide critical information that will help define the current direction of the department and plan for the future. It is essential to determine service trends, physician and location variances, identify potential revenue opportunities, monitor physician and staff caseloads, and ensure you are meeting service-related teaching requirements. It's a seemingly overwhelming task, collecting all the data an interventional radiology (IR) department needs to justify itself as a cost center and prove patients are receiving the highest quality care. Not to mention meeting regulatory and certification requirements which seem to change on a daily basis.

Quality is not a static measure, it's an iterative process of meeting a standard of excellence, studying it, and applying pressure to improve it. In its most basic form, documenting quality requires that steps are taken to ensure standard, consistent data collection without bias. Many IR practices lack even the basic tools to allow this type of data collection and are therefore unable to progress into the iterative Quality Improvement feedback cycle, where improvement occurs.

Implementing a Quality Improvement process may be a daunting task when you do not have the tools available to measure the progress toward your goal. To help with the process, HI-IQ, software that is designed to measure quality in Interventional Radiology, recommends setting up a "Quality Scorecard" to evaluate your performance (Figure 1). There are three steps in the basic Quality Improvement process. Steps 2 and 3 are intended to be repeated as processes are refined, allowing you to make iterative progress toward your goal.

1. Set a goal and measure baseline performance
2. Implement an improvement process
3. Re-measure the outcome; refine the process; repeat

Figure 1: Quality Improvement Scorecard using HI-IQ Insight Reports

| METRIC | MEASUREMENT TOOL | STEP 1 | | | STEP 2 | STEP 3 |
		GOAL	START DATE	BASELINE RESULTS	MONTH 3 RESULTS	MONTH 6 RESULTS
Reduce infection rate for PICC's	HI-IQ Adverse Event Analysis filtered by service PICC	%		%	%	%
Decrease Fluoro delivered during "X" procedure	HI-IQ Average Radiation by Service Report filtered by "X" procedure					
Decrease Adverse Event Rate	HI-IQ Adverse Event Analysis Report	%		%	%	%
Increase the percentage of cases that start on time	HI-IQ On-Time Encounters Report	%		%	%	%
Reduce Patient Wait Times	HI-IQ Clinical Event Analysis Report	%		%	%	%

When looking for an exceptional representation of tracking quality and outcomes in an IR department, one needs to look no further than the Hospital University of Pennsylvania (HUP). In this high-throughput department that focuses on teaching IR residents, HI-IQ captures the data needed to ensure quality and efficiency, while simultaneously meeting the requirements needed for Ongoing Professional Practice Evaluation (OPPE). HI-IQ is utilized across the HUP Enterprise to report and track all key elements needed to meet these requirements. *"Having detailed real-time data about procedural volumes and complications is a game changer. The reporting capabilities of HI-IQ make required tasks such as OPPE a breeze. Being able to respond to a request for IR data from a business manager with a few keystrokes is phenomenal",* declares Scott Trerotola, MD., Associate Chair and Chief of Interventional Radiology at HUP. Dr. Trerotola utilizes the Service Activity Analysis in HI-IQ to pull individual detail and summary reports on all procedures performed by residents at all the HUP locations. The Analysis looks similar to the two examples below (Figures 2 and 3), which show detailed services performed as well as an overall trend of services performed by residents in the department.

Figure 2: Detailed Service Activity Analysis per Resident

Disclaimer: Totals at the top will be lower because there may be multiple services recorded per encounter

	Final Totals:	Services 50	Encounters 33	Patients 24	Success 49	Failure 0	Pending 0	Unspecified 1	Success Rate 98.00 %
Service	Patient Name	Patient Nbr	DoS	Encounter Nbr	Emergent	Service Freq	Outcome	Sedation Plan	Operator(s)
Angio Upper Extremity Selective		Patients: 3, Encounters: 3, Services: 5							
01.02.01	Galway, Kevin	MRN:	03/09/2022	3460		2	Success	Minimal Sedation (Anxiolysis)	Anderson, Tyler M.D. (P)
01.02.01	21, 12	MPI: 21	08/09/2022	3842		2	Success	(Not Specified)	Miller, Shannon (P), Mondavi, Martin D.O. (S)
01.02.01	Perez, Perez	MRN: EP9876	10/11/2022	3890		1	Success	(Not Specified)	Anderson, Tyler M.D. (P)
Angio Lower Extremity Selective		Patients: 7, Encounters: 7, Services: 12							
01.02.02	Summers, June	MRN:	02/03/2022	3555		2	Success	General Anesthesia	Anderson, Tyler M.D. (P)
01.02.02	Jones, Jenna	MRN: abc09876543	03/04/2022	3753		2	Success	(Not Specified)	Coldwell (Vascular), Patricia M.D. (P)
01.02.02	Olsen, Ethan	MPI: 99900084923	03/09/2022	3774		2	Success	(Not Specified)	Anderson, Tyler M.D. (P)
01.02.02	Taylor, Sean	MPI: 124587	07/12/2022	3831		1	Success	General Anesthesia	Anderson, Tyler M.D. (P), Coldwell (Vascular), Patricia M.D. (S)
01.02.02	Brown, Amanda	MPI: 99900084572	08/19/2022	3874		1	Success	(Not Specified)	Anderson, Tyler M.D. (P)
01.02.02	Galway, Keith	MRN:	10/03/2022	3908		2	Success	(Not Specified)	Anderson, Tyler M.D. (P), Resident (IR), Michael M.D. (1)
01.02.02	Redford, Jane R	MPI: 6558723	12/20/2022	3921		2	Success	General Anesthesia	Anderson, Tyler M.D. (P)
Embolization Artery General		Patients: 1, Encounters: 1, Services: 1							
02.06	Brown, Amanda	MPI: 99900084572	08/19/2022	3874		1	Success	(Not Specified)	Anderson, Tyler M.D. (P)
Embolization Uterine Artery		Patients: 2, Encounters: 2, Services: 2							
02.06.05.05.01	Ford, Maddie	MPI: 15687	08/18/2022	3862		1	Success	No Sedation	Nogueira (Cardiac), Heather (P), Mondavi, Martin D.O. (S)
02.06.05.05.01	EMily, Notsure	MPI: 1254789	11/01/2022	3897		1	Success	(Not Specified)	Anderson, Tyler M.D. (P)
Venography		Patients: 1, Encounters: 1, Services: 1							
03	Ford, Maddie	MPI: 15687	08/16/2022	3854		1	Success	(Not Specified)	Coldwell (Vascular), Patricia M.D. (P)

Figure 3: Service Volume Trend over three years
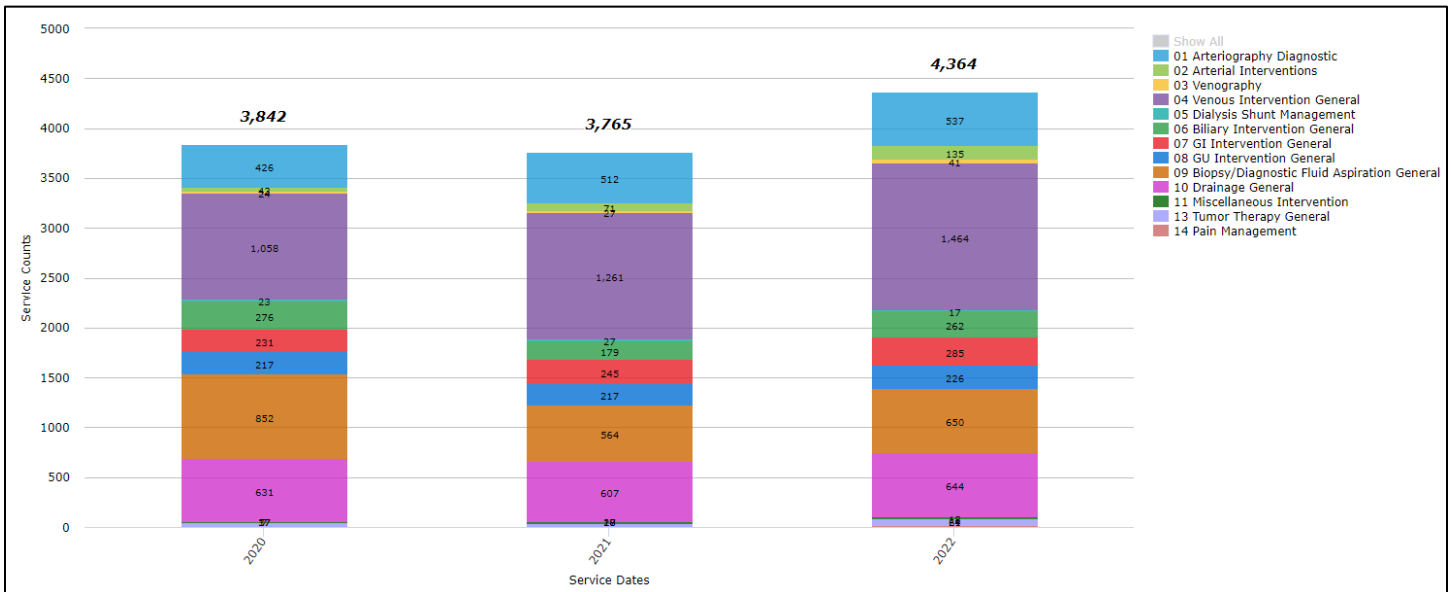
In today's healthcare environment with a focus on value versus volume, it is increasingly important to be aware of complication trends and outcomes to evaluate where quality and/or educational improvements will have an impact on department performance. A study published in the *Journal of the American College of Radiology*, Dagli, Mandeep S., et al, "Impact of a Monthly Compliance Review on Interventional Radiology" Volume 16. Issue 1 (2019): Pages 73-78, found that simply requiring a monthly review of major and minor adverse events (AEs) led to better rates of reporting. By tracking Adverse Events in accordance with the SIR Standards of Care Committee updated outcomes classification, you can drive quality discussions using real data at department M&M meetings. Five data points can be used to calculate metrics for use in analyzing risk and evaluating outcomes, as in the HI-IQ example below, also used in the HUP IR department (Figure 4):

**Figure 4: Adverse Event Analysis**

Encounter	Services	Encounters	Performed Procedures	Patients	Data Pending	Encounters w/ Mild Adverse Events		Encounters w/ Moderate Adverse Events		Encounters w/ Severe Adverse Events		Encounters w/ Life-Threatening or Disabling Adverse Events		Encounters w/ Patient Death or Unexpected Pregnancy Abortion		Encounters w/ Pending Adverse Events		Total Encounters with AE		Total Encounters without AE	
						%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
Totals	61	39	44	28	3	5.13%	2	12.82%	5	7.69%	3	2.56%	1			5.13%	2	25.64%	10	69.23%	27
3523	1	1	1	1	0				1										1		
3555	3	1	2	1	0		1		1										1		
3765	1	1	1	1	0		1												1		
3817	1	1	1	1	0						1								1		
3831	2	1	2	1	0						1								1		
3874	2	1	2	1	0				1										1		
3876	1	1	1	1	1												1				
3897	1	1	1	1	0				1										1		
3920	1	1	1	1	1				1								1		1		
3921	2	1	1	1	0								1						1		
3922	1	1	1	1	0						1								1		

In addition to service and adverse event analysis, concerns about repetitive holds in the workflow are a common occurrence but often lack evidence. Transport delays, patient consent, labs, and room turnover all block an IR workflow. Delays and holds in the process can cost staff and resources valuable time, which can also affect patient care and satisfaction. Providing proof of bottlenecks inspires conversations to improve the quality of the IR workflow. Utilize the data captured during a procedure to identify an increased need for additional staff and room resources. Calculation of room utilization and turnaround time as well as the percentage of on-time encounters can be the information needed to support your requisition (Figures 5 and 6)).

Figure 5. Room Utilization Analysis

Hospital	The Medical Center	The Medical Center	The Medical Center
Department	Interventional Radiology	Interventional Radiology	Interventional Radiology
Room	IR 1	IR 2	CT
Total Encounters	13	14	7
Avg Enc Per Day	2.6	2.8	1.4
Total Encs w/Wheels In & Out	13	14	7
Avg Wheels In-Out Time	2:17	1:26	1:44
Total Wheels In-Out Time	29:45	20:07	12:08
Earliest Wheels In Time	8:00AM	8:00AM	8:16AM
Latest Wheels Out Time	5:00PM	5:00PM	5:00PM
Encs w/Procedure Start & End	13	12	7
Avg Procedure Start - End	1:18	0:47	0:38
Total Procedure Start - End	16:56	9:27	4:27
Earliest Procedure Start Time	8:12AM	8:34AM	8:55AM
Latest Procedure End	5:00PM	5:00PM	4:47PM
Encs w/Turnaround Time	10	12	6
Avg Room Turnaround	0:27	0:15	0:10
Avg Room Empty per Day	03:12	04:44	06:42
Room Utilized	66%	45%	27%
Room Utilized w/Turnaround	64%	47%	25%

Figure 6. On-Time Encounters
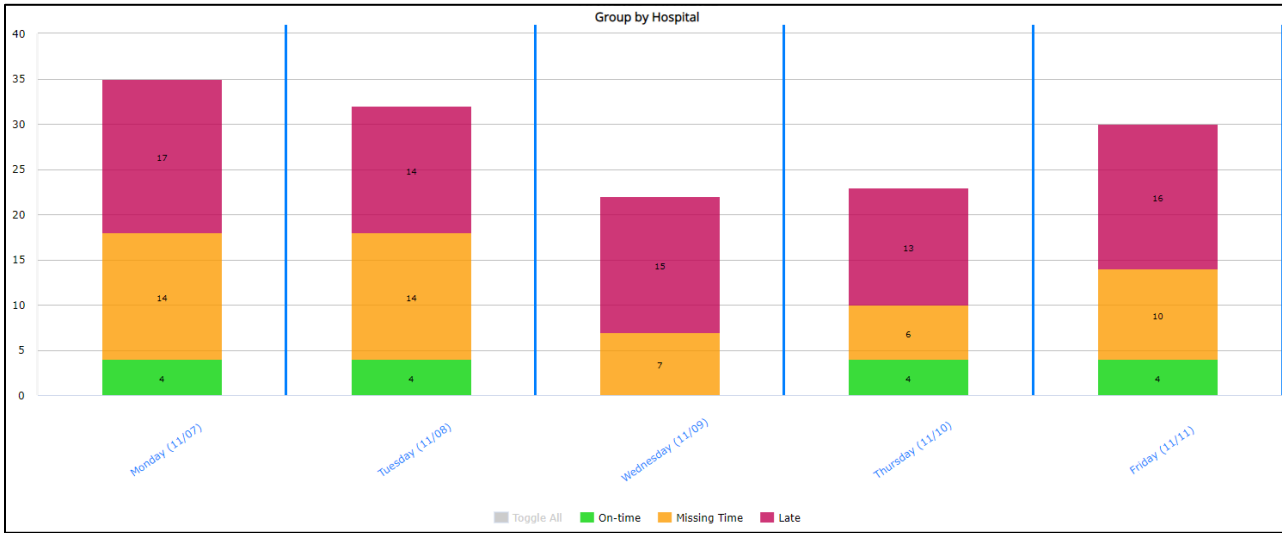
The first step toward improving quality in an IR department is measurement. If you desire to improve the quality and outcomes in your Interventional Radiology department, ensure that you have the appropriate tools available to collect and analyze the data required to help prove the value of your IR department.