WHITE PAPER

Practical Improvement Metrics for IR

Measuring the Value of an Interventional Radiology Department While Minimizing Data Collection Requirements - Real World Applications of Metrics Developed Collecting 10 Fields Per Encounter.

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.

Sharing the benefit of 25 years' experience helping IR departments improve, the HI-IQ Team has distilled the most compelling metrics into this easy-to-use guide. Each metric is described in detail, gleaned from our work with over 200 hospitals nationwide, using sample analyses from HI-IQ. However, you need not use HI-IQ to benefit from the information contained herein.

This guide is designed to share practical improvement metrics for IR, which will demonstrate IR's value in the following domains:

- Quality
- Cost
- Efficiency
- Outcomes
- Compliance
- Safety

Of critical importance, these metrics rely upon collection of only ten (10) data points.

For IR practices who may find the burden of collecting 10 data points is too much, take heart, the guide also provides a detailed Index showing how collection of only a subset of this information can still yield useful metrics for improvement and compliance.

After being introduced to the concepts in this guide, readers typically find themselves in one of two categories:

1. These metrics sound great, but I don't have a way to collect and analyze this data
2. These metrics sound great, we collect this data in our EMR, but I don't have a way to analyze it

Readers in both categories are invited to contact the HI-IQ Team to solve these challenges. If you already use HI-IQ, the guide provides instruction on how to produce each metric in your HI-IQ system.

Warm regards,

The HI-IQ Team
866-604-4447
Support@HI-IQ.com

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"Excellence is never an accident. It is always the result of high intention, sincere effort, and intelligent execution; it represents the wise choice of many alternatives - choice, not chance, determines your destiny."

- Aristotle

QUALITY METRICS

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 or "cherry picking." In our experience, 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.

The metrics which follow establish minimal data collection requirements, yet deliver powerful analyses that can drive improvement in some of the highest-profile domains for IR. As you read, consider the power of combining these analyses with those found in the Inventory and Efficiency sections of this white paper to demonstrate the true value of IR in providing low cost, highly effective care.
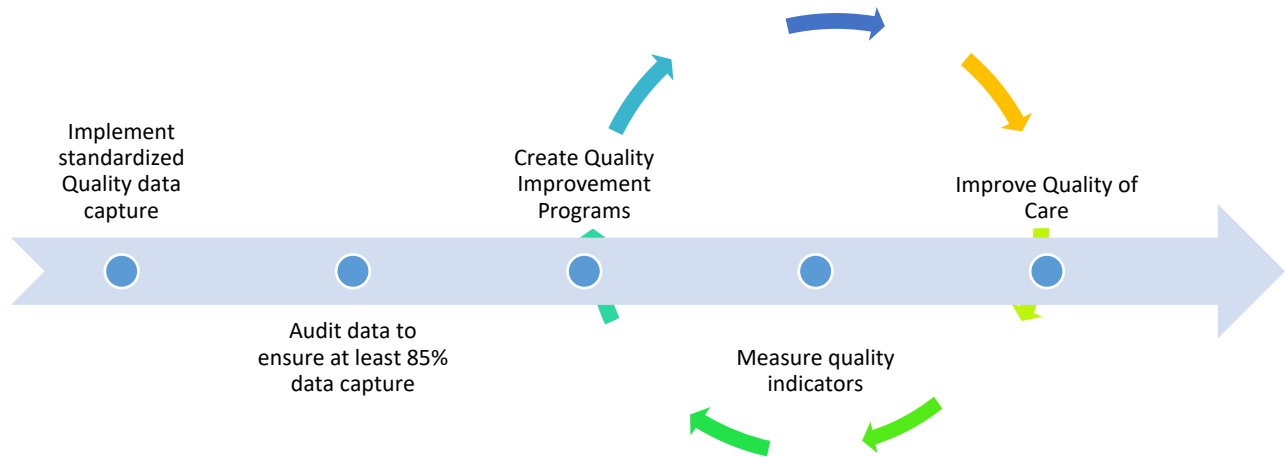
Implement standardized Quality data capture

Create Quality Improvement Programs

Improve Quality of Care

Audit data to ensure at least 85% data capture

Measure quality indicators

DIAGRAM 1: *The Quality Improvement Process*

➢ <u>Metric:</u>

Radiation dosage tracking compliance comes in many forms, at its most basic, IR departments need to document patient radiation dosage within an electronic system. Federal, state and institutional regulations are in place to help protect patients and clinical professionals working with radiation. The following metrics will aid users in discovering potential problem areas where education and peer review may reduce the overall radiation utilized during procedures in general or while targeting a specific procedure, as with a PICC line insertion.

Reviewing fluoroscopic and CT radiation utilized by service and/or by physician to find outliers where high amounts of radiation have been delivered is an important tool in ensuring quality outcomes. Further, ensuring that radiation use is documented for all cases provides assurance that quality measures are accurate. These metrics will help confirm compliance standards have been achieved while promoting safety through radiation delivery awareness.

<u>Data Points You'll Need to Collect:</u>

1. Encounter Date
2. Service(s) Performed
3. Operator(s)
4. Radiation Dose Values

Pro Tip: Explicitly document 'No Radiation Used' when procedures are performed without radiation. Doing so will allow you to quickly identify encounters with missing dosage details.

<u>Business Value:</u>

✓ Compliance: Meet regulatory compliance requirements for radiation documentation
✓ Improve Outcomes: Monitor radiation delivered to patients to help limit future exposure
✓ Safety: Ensure operators deliver the best care with minimal radiation utilization
✓ Quality Improvement: Implement a Practice Quality Improvement project (see Appendix 1)

> Extend the usefulness of this data by using it to initiate quality and safety projects. For a specific example, see Goal #2 in Appendix 1.

HI-IQ Report Name: Average Fluoroscopy Radiation by Service

In this example, a single service (PICC) is selected to display average dosages and find encounters which should be revisited to document missed dosage data.

HI-IQ

All Hospitals

Interventional Radiology

Average Fluoroscopy Radiation By Service

3/12/2019 - 3/12/2019

Service Desc.	Encounter # - Patient Name DoS	Patient ID-DoB	Operator(s)	Encounter Total (w/Radiation)	AK (normalized to Gy)			KAP (normalized to Gy-Cm2)			FT (normalized to MM:SS)			No Radiation Used	No Radiation Documented
					Max	Min	Avg	Max	Min	Avg	Max	Min	Avg		
Total:				**5(3)**	**0.019**	**0.007**	**0.0127**	**1.9**	**0.7**	**1.2667**	**3:12**	**0:42**	**1:52**	**1**	**1**
04.11.01.02 Ven Acc Peripheral Insert (PICC)				5(3)	0.019	0.007	0.038	1.9	0.7	1.2667	3:12	0:42	1:52	1	1
	2743 - 3/12/2019	Piccone, David	MPI: 987889 - 05/22/2012	Tyler Anderson (P)			0.012			1.2			1:03		
	2744 - 3/12/2019	Traver, Cathy	MPI: 36985 - 05/30/1963	Michael Fellow M.D. (P), Shannon Miller (S)			0.019			1.9			05:00		
	2745 - 3/12/2019	Galway, Kevin	MRN: 3345345 - 03/01/1987	Kevin Tyler (P)			0.007			0.7			0:42		
	2746 - 3/12/2019	James, Jones	MPI: 45634156 - 09/22/1992	Donald Smith M.D. (P)										1	
	2747 - 3/12/2019	L'Enfant, Kelly	MPI: 369258741 - 04/07/2017	Shannon Miller (P)											1
Total:				**5(3)**	**0.019**	**0.007**	**0.0127**	**1.9**	**0.2**	**1.2667**	**3:12**	**0:42**	**1:52**	**1**	**1**

HI-IQ Report Name: Average CT Radiation by Service

In this example, a single performed procedure (CT Lung Biopsy) is selected to display average dosages and find encounters which should be revisited to document missed dosage data.

HI-IQ

All Hospitals

All Departments

Average CT Radiation By Performed Procedure

3/12/2019 - 3/12/2019

Performed Procedure	Encounter # -DoS	Patient Name	Patient ID-DoB	Operator(s)	Encounter Total (w/Radiation)	DLP (normalized to cGy-Cm)			CTDI vol (normalized to mGy)			No Radiation Used	No Radiation Documented
						Max	Min	Avg	Max	Min	Avg		
CT Lung Biopsy					4(3)	900.000	4.300	305.733	5000.000	12.000	1688.666	0	1
	2748 - 3/12/2019	Tunkey, Ross	MPI: 3698712 - 06/16/2014	Martin Mondavi D.O. (P)			4.3			12			
	2749 - 3/12/2019	Jeffery, Jackie	MPI: 737373737337 - 02/05/2002	Patricia Coldwell M.D. (P)			12.9			54			
	2750 - 3/12/2019	Dwayne, Dawkins	MPI: 345 - 10/10/2000	Heather Nogueira (P), Karen Smith (S)			900			5000			
	2751 - 3/12/2019	King, Joe	MPI: 111111 - 04/07/1958	Karen Smith (P)									1

"Without data you're just another person with an opinion."

- W. Edward Deming

➢ Metric:

In today's ever-changing IR world, knowledge is powerful. Facts and figures provide critical information that will help define the current direction of the department and plan for the future. Use this tool to determine service trends, physician-level and location variances, identify potential revenue opportunities, monitor physician and staff caseloads, ensure you are meeting service related teaching requirements, and more.

Data Points You'll Need to Collect:

1. Encounter Date
2. Encounter Location
3. Service(s) Performed
4. Operator(s)

Optional field:
5. Service Outcome

Business Value:

✓ Monitor physician trainees to ensure they meet competencies
✓ Analyze service volumes to create and/or promote high-volume services
✓ Compare service volumes across locations and use data to create new service initiatives and new revenue opportunities
✓ Trend service volumes over time to ensure department service and revenue goals
✓ Identify unsuccessful service-level outcomes and create improvement-related quality initiatives

HI-IQ Report Name: Service Activity Analysis

In the example below, viewing service volumes between physicians for a specified period highlights discrepancies in case load. The same data can also help predict annual budgeting requirements concerning staff and expenses.

Test Hospital

All Hospitals

All Departments

Service Activity Summary Analysis

1/1/2019 - 1/31/2019

Sorted by Operator

			Services	Encounters	Patients	Success	Failure	Unspecified	Success Rate
		Final Totals	173	141	112	1	0	172	0.58%

Service Code	Service Description	Operator	Services	Encounters	Patients	Success	Failure	Unspecified	Success Rate
01.01.02	Abdominal Aorta Inject	Totals	1	1	1	0	0	1	100%
		Jeffrey Jones, M.D.	1	1	1	0	0	1	100%
01.02.02	Lower Ext Ang Sel	Totals	13	13	12	0	0	13	100%
		Steven Smith, MD	4	4	4	0	0	13	90%
		Jeffrey Jones, M.D.	1	1	1	0	0	13	100%
		David Doctor, M.D.	4	4	4	0	0	13	100%
		Daniel Doc	4	4	3	0	0	13	100%
01.03	Neuro Ang (selective)	Totals	6	6	6	0	0	6	100%
		Leslie Lion	1	1	1	0	0	6	100%
		Isabella Iowa	5	5	5	0	0	6	100%
01.03.02	Carotid Ang Sel	Totals	3	3	3	0	0	3	100%
		Isabella Iowa	3	3	3	0	0	3	80%
01.03.02.02	ICA Ang Sel	Totals	1	1	1	0	0	1	90%
		Isabella Iowa	1	1	1	0	0	1	100%

➢ Metric:

> 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.

> By collecting five (5) key pieces of data, metrics to analyze complication rates by physician, procedure and outcome can be calculated.

Data Points You'll Need to Collect:

1. Encounter Date
2. Service(s) Performed
3. Operator(s)
4. Complication
5. Outcome

Business Value:

✓ Analyze risk: Evaluate outcomes to determine which services are at a higher risk of complication
✓ Improve quality: Review complication rates of fellows and residents to determine if additional competency training is required.
✓ Identify patterns: Research extraordinary complications to examine root cause, e.g. room ventilation system needs maintenance
✓ Peer review: Drive quality discussions using real data at department M&M meetings

> *Pro Tip*: A recent 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.

 HI-IQ Report Name: Complication Analysis

The example below calculates the overall complication rate of the department as well as individual complication rates for each operator. How easy is it to calculate your complication rate?

Operator	Service Desc.	Complication	Encounters	Patients	Major		Minor		Pending		Total Complicated Encounters		Total Non-Complicated Encounters		Total Not Documented Encounters	
					%	Total	%	Total	%	Total	%	Total	%	Total	%	Total
Total:			**14**	**10**	**21.4%**	**3**	**21.4%**	**3**			**42.9%**	**6**	**42.9%**	**6**	**14.2%**	**2**
Michael Jones M.D (P)			2	2												
	01 Arteriography, Diagnostic	Not Documented	2	2											100%	2
Patricia Coldwell M.D. (P)			10	8	30%	3	30%	3			60%	6	40%	4		
	01 Arteriography, Diagnostic	Allergic/Anaphylactoid reaction	1	1			100%	1			100%	1				
	02.05.05.05.01 Embol Uterine A	No Complication	4	1									100%	4		
	04.11.01.02 Ven Acc Peripheral Insert (PICC)	Intimal injury/dissection	1	1			100%	1			100%	1				
	07.01.01 Gastrostomy	Hemat/Bleed at needle, device path: nonvascular procedure	1	1	100%	1					100%	1				
		Local infection	1	1			100%	1			100%	1				
	09.04.01 Bx/Asp Bone	Abscess	1	1	100%	1					100%	1				
		Contamination of pleural cavity (urine, bile, malignancy, empyema, other)	1	1	100%	1					100%	1				
		Intimal injury/dissection	1	1			100%	1			100%	1				
Michael Fellow M.D. (1)			2	2	100%	2					100%	2				
	09.04.01 Bx/Asp Bone	Abscess	1	1	100%	1					100%	1				
		Contamination of pleural cavity (urine, bile, malignancy, empyema, other)	1	1	100%	1					100%	1				
Total:			**14**	**10**	**21.4%**	**3**	**21.4%**	**3**			**42.9%**	**6**	**42.9%**	**6**	**14.20%**	**2**

EFFICIENCY METRICS

Transport delays, patient consent, labs, and room turnover all block an IR workflow. Delays and holds on the process can cost staff and resources valuable time, which can also effect patient care and satisfaction.

Tracking clinical milestones creates opportunities to educate staff in procedure and scheduling efficiency. This data collection supports identification of workflow bottlenecks to provide data-driven, communication-focused solutions.

➢ Metric:

> Measuring actual procedure length can provide eye-opening insights into overall department efficiency. Many IR departments schedule using standard procedure duration time-blocks, without the benefit of data to inform optimization opportunities.

> Real-time data capture is ideal, but collection of data for this metric can be accomplished post-procedure if necessary.

Data Points You'll Need to Collect:

1. Encounter Date
2. Encounter Location
3. Service(s) Performed
4. Operator(s)
5. Procedure Start Time
6. Procedure End Time

Business Value:

✓ Optimize Workflow: Compare physicians and procedures times to make informed schedule adjustments
✓ Reduce Costs: Reduce overtime costs via efficient scheduling
✓ Improve Patient Satisfaction: Reduce patient wait times through accurate scheduling

> *Pro Tip:* Consider capturing the additional data point of Anesthesia Used to enable studies of procedure duration for cases with and without anesthesia.

<u>HI-IQ Report Name:</u> Room Utilization Analysis

In the example below, Procedure Time is highlighted on the Room Utilization Analysis. The number of encounters is shown to provide insight into the numerator driving the calculation of average duration. This example shows Procedure Time for all encounters, and can be further filtered to examine Procedure Time by type of procedure, by Operator, or numerous other factors.

HI-IQ

Room Utilization Analysis

All Hospitals
All Departments

3/13/2019 - 3/13/2019

Hospital	LifeLines Hospital	LifeLines Hospital
Department	Interventional Radiology	Interventional Radiology
Room	IR-1	IR-2
Total Encounters	8	4
Avg Enc Per Day	8	4
Room Time - Calculated using all encounters containing both Wheels In and Wheels Out events		
Total Encs w/Wheels In & Out	7	4
Avg Wheels In-Out Time	0:47	1:41
Total Wheels In-Out Time	5:32	6:45
Earliest Wheels In Time	3/13/2019 7:00 AM	3/13/2019 7:00 AM
Latest Wheels Out Time	3/13/2019 3:15 PM	3/13/2019 3:50 PM
Procedure Time - Calculated using all encounters containing both Procedure Start and Procedure end key events		
Encs w/Procedure Start & End	8	4
Avg Procedure Start - End	0:26	0:55
Total Procedure Start - End	3:34	3:41
Earliest Procedure Start Time	3/13/2019 7:12 AM	3/13/2019 7:30 AM
Latest Procedure End	3/13/2019 4:15 PM	3/13/2019 3:30 PM
Turn Around Time - Calculated using all encounters containing both Wheels Out and Room Ready end key events		
Encs w/Turnaround Time	7	4
Avg Room Turnaround	0:12	0:26
Room Utilization		
Avg Room Empty per Day	02:30	01:00
Room Utilized	58%	71%
Room Utilized w/Turnaround	74%	89%

➢ Metric:

Concerns about repetitive holds in the workflow are a common occurrence, but often lack evidence. Staff, process, or other delays can easily create a disruption and cost valuable time. Tracking two customized start and end events allows data collection for analysis and provides assurance beyond anecdotal concerns to support process changes. Providing proof of bottlenecks inspires conversations to improve the IR workflow.

Data Points You'll Need to Collect:

1. Encounter Date
2. Encounter Location
3. 2 Clinical Events*

Be sure to have an easily recognizable start clinical event and end clinical event in order to compile a total time for your bottleneck measure.

Business Value:

✓ Improve efficiency: Identify inefficiencies in workflow
✓ Encourage communication: Improve workflows and cultivate productive interdepartmental communication
✓ Identify outliers: Triage clinical workflow and make improvements

"HI-IQ helped the IR program evolve to look at quality indicators that:

reduce risk, decrease health care cost, and improve outcomes."

- Doug Sutton, RN, MSN, IR Division Manager
@ University of VT Medical Center

HI-IQ Report Name: Event Analysis

The example below shows two event pairs. Examining the minimum, maximum and average time for each pair, grouped by procedure room.

HI-IQ

Event Analysis

All Hospitals

All Departments

3/01/2019 - 3/15/2019

Clinical Event Start	Clinical Event End	Room	Minimum	Maximum	Average	# of Completed Records	Compliance %
Procedure Started	Procedure Ended	IR-1	0:27	2:15	0:52	24	97.5%
		IR-2	0:32	3:23	0:49	46	86.2%
		Total	**0:27**	**3:23**	**0:50**	**70**	**88.8%**
Consent Needed	Consent Obtained	IR-1	0:08	2:03	0:36	22	95.0%
		IR-2	0:12	0:32	0:21	48	89.3%
		Total	**0:08**	**2:03**	**0:30**	**70**	**93.0%**

INVENTORY METRICS

Catheters, guidewires, coils, stents, balloons, and the list goes on. Devices that facilitate access and treatment targeted to every organ system in the human body are maintained on-hand in IR departments for use at a moment's notice. Inventory is a major contributor to department overhead, procedure cost, outcomes and staff morale.

Explicit tracking of the inventory used in each and every procedure, along with a few key details of the procedure, yields significant returns.   Many hospitals focus on supply charge capture via charge codes in the RIS, but the use of generic, categorical, charge codes provides limited insight into true procedure costs, and little to no benefit in terms of reducing these costs, or identifying supply usage trends and habits. Manual methods of maintaining on-hand levels contribute to the problem, resulting in overstock, expiration and sub-optimal patient care when the right tool for the job is not available.

The metrics below capitalize on the benefits of discrete, procedure-based inventory documentation. Inventory usage data is made exponentially more powerful when it is captured in real-time to ensure accuracy, and associated with the patient and procedure where it was used. Putting inventory data to work will reduce costs, increase charge capture, and most importantly, improve quality.

➢ Metric:

   A simple analysis of products used, by day, by procedure and/or by physician can be a useful auditing tool, to help quickly identify missed charges or missed on-hand deductions, which could lead to reordering mistakes.

   Data Points You'll Need to Collect:

   ➢ Encounter Date
   ➢ Service(s) Performed
   ➢ Operator(s)
   ➢ Products Used
   ➢ Encounter Location

   Business Value:

   ✓ Reduce costs: Analyze product usage by procedure to determine average procedure cost, identify outliers, and educate staff to reduce variation
   ✓ Increase revenue: Monitor tracking of products used to ensure all charges are captured and billed
   ✓ Decrease overhead (space and costs): Compare what's been used to what's been ordered to gauge on-hand supply reduction opportunities

> *Pro Tip:* Capture the serial number of supplies as they're used to meet new and evolving FDA requirements for Unique Device Identifier (UDI) documentation.

HI-IQ Report Name: Product Usage Report

In this example, a month's worth of data is populated into Excel, where it can then be compared to the month's billing, last month's products used, how much was spent (i.e. ordered) that month, and more.

HI-IQ

All Hospitals

All Departments

Product Usage Analysis

12/1/2018 - 12/31/2018

Vendor Item Number	Product Name	Vendor	Category	Lot	DoS	Patient	Patient #	Service	Quantity	Cost	Extended Cost	Operator
G09489	5FRX7CM YUEH CATHETER NEEDLE	Cook Inc (H698)	Abscess	7A234	12/6/2018	Mike, Michaels	MRN: 12345	BX/Asp Pleural	1	$ 14.95	$ 14.95	David Doctor, M.D.
G09489	5FRX7CM YUEH CATHETER NEEDLE	Cook Inc (H698)	Abscess	33390	12/7/2018	Mays, Maggie	MRN: 67890	Bx/Asp Thoracic Gnl	1	$ 14.95	$ 14.95	Jeffrey Jones, M.D.
G09312	5FRX80CM MIK CATHETER	Cook Inc (H698)	Diagnostic	01-345	12/8/2018	Jackson, Jack	MRN: 23456	Visceral Ang Sel	1	$ 25.00	$ 25.00	Steven Smith, M.D.
10712005	5FRX80CM SOS OMNI 1 CATHETER	AngioDynamics (H787)	Diagnostic		12/9/2018	Thompson,	MRN: 78901	Visceral Ang Sel	1	$ 22.80	$ 22.80	Steven Smith, M.D.
10712005	5FRX80CM SOS OMNI 1 CATHETER	AngioDynamics (H787)	Diagnostic		12/10/2018	Howe, Howard	MRN: 13579	Visceral Ang Sel	1	$ 22.80	$ 22.80	Steven Smith, M.D.
1610560	6FR CELLO BALLOON GUIDE CATHETER	Medtronic (H675)	Radiology		12/11/2018	Joes, Jerry	MRN: 46802	Thrombect Neuro Art	1	$930.00	$ 930.00	Isabella Iowa, M.D..
27-133	6FR LOCKING APD DRAIN CATHETER	Boston Scientific (M001)	Abscess		12/12/2018	Perry, Penny	MRN: 55577	Drain Superficial NonInf	1	$ 90.20	$ 90.20	Steven Smith, M.D.
46-805	014/182 TRANSEND GUIDEWIRE	STRYKER NEUROVASCULAR	Wires	23456	12/1/2018	Donald, Dons	MRN: 12345	Visceral Ang Sel	1	$225.00	$ 225.00	Steven Smith, M.D.
46-805	014/182 TRANSEND GUIDEWIRE	STRYKER NEUROVASCULAR	Wires	45778	12/2/2018	Jane, Janeson	MRN: 67890	Lower Ext Ang Sel	1	$225.00	$ 225.00	Daniel Doc
2641	014/200 SYNCHRO2 STD GUIDEWIRE	STRYKER NEUROVASCULAR	Wires	223344	12/3/2018	Walter, Wires	MRN: 23456	Neuro Ang (selective)	1	$432.00	$ 432.00	Leslie Lion
2641	014/200 SYNCHRO2 STD GUIDEWIRE	STRYKER NEUROVASCULAR	Wires	667788	12/4/2018	Joe, Joseph	MRN: 78901	Neuro Ang (selective)	2	$432.00	$ 864.00	Leslie Lion
82902-02	014/300 CONFIANZA PRO 12 GUIDEWIRE	Abbott	Wires	353535	12/5/2018	Maria, Manson	MRN: 13579	Lower Ext Ang Sel	1	$170.00	$ 170.00	Jeffrey Jones, M.D.
GW1420040	014X200 TRAXCESS GUIDEWIRE	MICROVENTION	Specialty Wires	1234321	12/6/2018	Abe, Apples	MRN: 46802	Thrombect Neuro Art	1	$380.00	$ 380.00	Isabella Iowa, M.D..
1610560	6FR CELLO BALLOON GUIDE CATHETER	Medtronic (H675)	Radiology		12/11/2018	Joes, Jerry	MRN: 46802	Thrombect Neuro Art	1	$930.00	$ 930.00	Isabella Iowa, M.D..
27-133	6FR LOCKING APD DRAIN CATHETER	Boston Scientific (M001)	Abscess		12/12/2018	Perry, Penny	MRN: 55577	Drain Superficial NonInf	1	$ 90.20	$ 90.20	Steven Smith, M.D.
46-805	014/182 TRANSEND GUIDEWIRE	STRYKER NEUROVASCULAR	Wires	23456	12/1/2018	Donald, Dons	MRN: 12345	Visceral Ang Sel	1	$225.00	$ 225.00	Steven Smith, M.D.
46-805	014/182 TRANSEND GUIDEWIRE	STRYKER NEUROVASCULAR	Wires	45778	12/2/2018	Jane, Janeson	MRN: 67890	Lower Ext Ang Sel	1	$225.00	$ 225.00	Daniel Doc
G09489	5FRX7CM YUEH CATHETER NEEDLE	Cook Inc (H698)	Abscess	7A234	12/6/2018	Mike, Michaels	MRN: 12345	BX/Asp Pleural	1	$ 14.95	$ 14.95	David Doctor, M.D.
G09489	5FRX7CM YUEH CATHETER NEEDLE	Cook Inc (H698)	Abscess	33390	12/7/2018	Jane, Janeson	MRN: 67890	Bx/Asp Thoracic Gnl	1	$ 14.95	$ 14.95	Jeffrey Jones, M.D.
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10712005	5FRX80CM SOS OMNI 1 CATHETER	AngioDynamics (H787)	Diagnostic		12/9/2018	Joe, Joseph	MRN: 78901	Visceral Ang Sel	1	$ 22.80	$ 22.80	Steven Smith, M.D.
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82902-02	014/300 CONFIANZA PRO 12 GUIDEWIRE	Abbott	Wires	353535	12/5/2018	Perry, Penny	MRN: 13579	Lower Ext Ang Sel	1	$170.00	$ 170.00	Jeffrey Jones, M.D.
GW1420040	014X200 TRAXCESS GUIDEWIRE	MICROVENTION	Specialty Wires	1234321	12/6/2018	Donald, Dons	MRN: 46802	Thrombect Neuro Art	1	$380.00	$ 380.00	Isabella Iowa, M.D..

➢ <u>Metric:</u>

The pressure to cut costs is pervasive in IR and throughout the healthcare industry. For IR, inventory is a high-profile target and examination can often yield significant cost reductions. Analysis of supply charge codes lacks resolution, therefore this metric is based on discrete products used, revealing true encounter cost.

Metrics analyzing costs per encounter can aid in supply consolidation, physician education and even billing changes. Collecting and analyzing the data required for calculation of encounter supply cost by physician and by procedure highlights opportunities to reduce supply costs, identify billing errors and save valuable shelf space through supply consolidation.

<u>Data Points You'll Need to Collect:</u>

1. Encounter Date
2. Service(s) Performed
3. Operator(s)
4. Products Used

Optional field(s):

5. CPT

<u>Business Value:</u>

✓ Lower costs: Evaluate your highest cost encounters to determine if there is a way to cut costs through supply consolidation and vendor negotiation
✓ Increase revenue: Audit encounter costs to ensure supply charge capture and downstream billing accuracy
✓ Improve quality: Examine encounter cost data by procedure and complications data to make quality correlations

<u>HI-IQ Report Name:</u> Encounter Cost Analysis

The following data sample displays a summary of costs associated with procedures performed in a department sorted from highest to lowest cost, and is grouped by physician.

Operator(s)	Operator Position	Encounter Nbr	DoS	Performed Procedure(s)	Service Code/Desc	Qty	Qty CPT	Cost Per Enc	Total Cost
		Total Encounters: 11		**Avg Cost per Enc: $1175.10**	**Max Cost per Enc: $2885.67**	**Min Cost per Enc: $103.39**			**Total Cost: $12926.09**
Jones, Michael MD	Primary			Total Encounters: 4	Avg Cost per Enc: $1754.74 Max Cost per Enc: $2885.67	Min Cost per Enc: $103.39			Total Cost: $ 7018.94
		12344	10/1/2018	Fistula/Graft thrombectomy	05.01 Dialysis Shunt Angio 05.02 Dialysis Shunt PTA 04.05.01 Venous Embol Peripheral	18	4	2885.67	
		23456	10/1/2018	Veno, Upper	03.01.02 Veno, Upper Ext	2	3	103.39	
		65432	10/1/2018	Fistula/Graft thrombectomy	05.05.02 Dialysis Shunt Thrombectomy 05.02 Dialysis Shunt PTA 05.04 Dialysis Shunt Stent	18	3	2322.31	
		13214	10/1/2018	TACE W/ Oil	02.05.05.08.01 Hepatic artery chemoembolization 01.04.03 SMA Ang Sel 01.04.02.01 Hepatic A Angio Select	12	13	1707.57	
Smith, John M.D.	Primary			Total Encounters: 1	Avg Cost per Enc: $2215.25 Max Cost per Enc: $2215.25	Min Cost per Enc: $2215.25			Total Cost: $ 2215.25
		12567	10/1/2018	Cerebral Angio	02.06.04 Inf Neuro A Gnl	14		2215.25	
Brown, Robert M.D.	Primary			Total Encounters: 2	Avg Cost per Enc: $281.99 Max Cost per Enc: $445.00	Min Cost per Enc: $118.97			Total Cost: $ 563.97
		34723	10/1/2018	Permcath with fluoro,	04.11.02 Ven Acc Tunneled Placement	5	3	445	
		75443	10/1/2018	Port	04.11.02.01 Ven Acc w Port (sub q)	3	3	118.97	
Valvo, Mark M.D.	Primary			Total Encounters: 2	Avg Cost per Enc: $807.99 Max Cost per Enc: $1187.01	Min Cost per Enc: $428.97			Total Cost: $ 1615.98
		54534	10/1/2018	GASTROSTOMY TO GJ	07.01.02.01 G to J conversion	15	1	1187.01	
		96543	10/1/2018	Permcath with fluoro,	04.11.02 Ven Acc Tunneled Placement	3	3	428.97	
		Total Encounters: 11		**Avg Cost per Enc: $1175.10**	**Max Cost per Enc: $2885.67**	**Min Cost per Enc: $103.39**			**Total Cost: $12926.09**

➢ Metric:

Product expiration metrics impact costs and quality.   Reviewing and taking action on products that will soon expire ensures viable inventory is available when it's needed and can save tens of thousands of dollars lost to product waste when expired inventory is discarded.

A simple analysis of on-hand products, from current day up to 180 days out, will allow quick identification and management of expiring products long before they become unusable, and must then be written-off.

Data Points You'll Need to Collect:

1. Products Used (inclusive of their expiration dates)

Business Value:

✓ Reduce waste: Analyze expiring products to reposition product storage, and educate staff to utilize these products before others in stock
✓ Decrease costs: Identify possible product exchange/return possibilities well before their expiration dates
✓ Minimize overhead: Compare quantities of soon to expire products vs. their par levels to gauge on-hand supply reduction opportunities
✓ Ensure quality: Expired inventory can't be used on a patient; ensure expired supplies aren't masking out-of-stock conditions

> *Pro Tip:* Record the cost of implantable devices to track value and savings made by managing expiring products.

<u>HI-IQ Report Name:</u> Expired Product Report

This example includes products expiring within the next 90 days for all vendors, by department. Use the data to help reduce inventory write-off costs, on-hand inventory value, and over-ordering. Improve quality by ensuring the right tools for the job are available for use.

HI-IQ

All Departments

Expiring Products

Department	Room	Item Description	Product Number	Category	Vendor	Lot Nbr	Expiration Date	Days Until Expiration	Quantity	Total Amt
IR	N/A	ASPIRE MECH THROMBEC PUMP	30-ASP	Catheters	Control Medical	18371905	5/31/2019	80	4	$2,148
IR	N/A	ANGIOJET ZELANTE DVT THROMBEC CATH	114610-001	Catheters	Boston Scientific	20645290	4/30/2019	49	3	$8,445
IR	N/A	7X30X135 PRECISE RX STENT	PC0730RXC	Stents	Cardinal Health	17656551	2/28/2019	-12	2	$4,300
IR	N/A	1.5x3.0MM (MVP) Microvas Plug	MVP-3Q	Coils	Medtronic	170226	3/31/2019	19	2	$3,500
IR	N/A	6X60 TIGRIS VASCULAR STENT	PHA060602A	Stents	Gore	15340791	3/23/2019	11	1	$1,495
IR	N/A	4X20 TREVO XP PROVUE RETRIEVER	90182	Stents	Stryker	62351	5/28/2019	77	1	$7,695
IR	N/A	12X40 LUTONIX DRUG COATED BALL	LX35751240V	PTA	Bard Periph Vasc	GFBS2140	5/16/2019	65	3	$5,100
IR	N/A	AORTIC EXTENDER 26X3.3	PLA260300	Grafts	Gore	14978115	4/15/2019	34	1	$2,304
IR	N/A	3.4FR VISIONS PV .018 F/X IVUS CATH	86700	Catheters	Volcano	3500969890	3/31/2019	19	4	$2,600
IR	N/A	5X20X135 PRECISE RX STENT	PC0520RXC	Stents	Cardinal Health	17650729	2/28/2019	-12	1	$2,150
IR	N/A	6FRX120CM SOLENT OMNI POSSIS CATH	109681-001	Catheters	Boston Scientific	20853620	4/30/2019	49	3	$4,860

APPENDIX 1

Special Supplement –

Resolve to Improve the Value of Your IR Department

It's that time of year again – countless promises and wishes are made in the name of the healthier individual we resolve to be in this upcoming year. Yet how many of us have focused our resolutions on our working habits, and decided to institute a few "changes for the better"? The New Year should also be a time to look at and measure metrics in your departments and document needed improvements. Make a decision this year to not only focus on bettering your personal life, but your department's as well. To get you started, we've provided an example of metrics to show improvements in IR with the use of software.

There are three steps in the process of measuring improvements that will determine whether your process was a success or failure:

1. Measure the baseline
2. Implement the process
3. Re-measure the outcome.

GOAL #1: Reduce Patient Wait Times:

Why are your patients waiting so long? Is it a lack of transport? Are there not enough resources? Are the rooms not being turned around fast enough? Are you waiting on the physician? The following is a formula you can use to diagnose what is at the root of the problem:

1. In January, estimate the average wait time of patients per procedure.
2. In HI-IQ, begin to document the statuses "patient called for" and "patient arrived".
3. In March, pull the Event Timeline Analysis Report to view if patient wait times have reduced.
4. If they have not – take further action.
   a. Pull the Room Turn Around Time Report. Is this holding you up?
   b. Pull the Event Timeline for "Physician called" to "Physician Arrived". Is this where you are waiting?
   c. Do you have enough justification to allow for additional transport personnel?
   d. Is there a difference between your general anesthesia and conscious sedation cases?
5. After implementing new processes, re-measure. By now patient wait times should have been reduced, and you now have a baseline plus documentation to prove it.

GOAL #2: PQI Project: Document and Reduce Fluoroscopy Time:

CMS instructs that exposure time or radiation exposure be reported for procedures using fluoroscopy.[1] SIR has additional recommendations.[2] The reasoning behind this mandate is due to data

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1 https://qpp.cms.gov/docs/QPP_quality_measure_specifications/Claims-Registry-Measures/2018_Measure_145_Claims.pdf

2 https://www.jvir.org/article/S1051-0443(09)00344-3/pdf (page 8 'Recommendations for Quality Assessment')

which suggests that the lifetime risk for cancer may be increased with frequent or repeated exposure to ionizing radiation, including procedures using fluoroscopy. This system should be utilized in the following manner:

1. In January, as a baseline, run the Average Fluoroscopy Radiation by Service report for the previous quarter for all physicians.
    a. The report will document the physicians that are utilizing radiation, those indicating that are not utilizing radiation, as well as those that are not documenting their radiation usage at all.
    b. The reports run for each operator will allow a physician to monitor radiation used for a specific procedure.
2. Issue a protocol that all radiation administered must be documented in HI-IQ, according to CMS and SIR standards.
3. Set a goal for target radiation exposure for a specific procedure.
4. In March, pull the reports to view several items:
    a. Review for reduction in fluoroscopy times by physicians
    b. Review for documentation compliance
5. If the fluoroscopy time has not decreased or there is a lack of radiation documentation, you can research particular cases where fluoroscopy times were particularly high or radiation wasn't documented.
6. Continue to monitor the Average Fluoroscopy Radiation by Service report on a monthly basis for compliance and reduced radiation dosages.

Additional PQI Project:
https://www.rsna.org/uploadedFiles/RSNA/Content/Science_and_Education/Quality/Capturing%20Dose%20Indicators%20From%20Fluoroscopically%20Guided%20Interventions.pdf

APPENDIX 2

Track Your Improvement –

The simple table on the next page of this white paper can be used to document progress against Quality Improvement goals. Chose one or more goals which are important to you, and measure using the metrics provided in this guide to guage progress at regular intervals.

Metric	Baseline	Date Captured	Goal	Date Captured	Actual @ 3 months	Date Captured	Actual @ 6 Months	Date Captured
Reduce infection rate for PICC's	%		%		%		%	
Decrease fluoro delivered during _____ procedure								
Decrease overall complication rate:	%		%		%		%	
Decrease cost for _____ procedure:	$		$		$		$	
Increase room utilization percentage	%		%		%		%	
# days per week that 1st case starts on-time:	#		#		#		#	
Reduce patient wait times	minutes		minutes		minutes		minutes	
Decrease dollar value of expired inventory on shelf	$		$		$		$	
Reduce dollars invested in inventory	$		$		$		$	
Increase the number of cases where radiation is documented	%		%		%		%	
(Customize your own metric here)								

Index

This index can be used three ways, by domain, by metric or by data point, depending on which domain you'd like to improve, what data you have available or which metric you'd like to calculate.

DOMAIN Quality	Cost	Efficiency	Outcomes	Compliance	Safety	METRIC	PAGE NUMBER	1. Encounter Date	2. Service/Performed Procedure	3. Operator	4. Radiation dose	5. Complication	6. Outcome	7. Products Used	8. Procedure Location	9. Procedure Start Time	10. Procedure End Time
X			X	X	X	Meet regulatory compliance requirements for radiation documentation	4	X	X	X	X	X					
			X	X	X	Monitor radiation delivered to patients to help limit future exposure and ensure proper follow-up care	4	X	X	X	X						
X		X	X		X	Ensure operators deliver the best care with minimal radiation utilization	4	X	X		X						
X			X	X	X	Implement a Practice Quality Improvement project	22	X	X	X	X			X			
X				X	X	Monitor physician trainees to insure they meet competencies	8	X	X	X					X		
		X			X	Analyze service volumes to create and/or promote high-volume services	8	X	X	X					X		
	X	X				Compare service volumes across locations and use data to create new service initiatives and new revenue opportunities	8	X	X	X					X		
			X			Trend Service volumes over time to ensure department service and revenue goals are met	8	X	X	X					X		

DOMAIN						METRIC	PAGE NUMBER	DATA POINT									
Quality	Cost	Efficiency	Outcomes	Compliance	Safety			1. Encounter Date	2. Service/Performed Procedure	3. Operator	4. Radiation dose	5. Complication	6. Outcome	7. Products Used	8. Procedure Location	9. Procedure Start Time	10. Procedure End Time
X					X	Identify unsuccessful service-level outcomes and create improvement-related quality initiatives	8	X	X	X			X				
X			X		X	Evaluate outcomes to determine which services are at a higher risk of complication	8	X	X	X		X	X				
X			X		X	Review complication rates of fellows and residents to determine if additional competency training is required	10	X	X	X		X	X				
X			X		X	Research complications to examine root causes	10	X	X	X		X	X				
X			X		X	Drive quality discussions using real data at department M&M meetings	10	X	X	X		X	X				
X		X				Compare physicians and procedures times to make informed schedule adjustments	12, 14	X	X	X					X	X	X
	X	X				Reduce overtime costs via efficient scheduling	12, 14	X	X	X					X	X	X
X		X	X			Improve Patient Satisfaction by reducing patient wait times	12, 14	X	X	X					X	X	X
	X	X				Identify inefficiencies in workflows	12, 14	X	X	X					X	X	X
X		X			X	Improve workflows and cultivate productive interdepartmental communication	12, 14	X	X	X					X	X	X
X	X				X	Identify outliers to triage clinical workflow and make improvements	12, 14	X	X	X					X	X	X

Quality	Cost	Efficiency	Outcomes	Compliance	Safety	METRIC	PAGE NUMBER	1. Encounter Date	2. Service/Performed Procedure	3. Operator	4. Radiation dose	5. Complication	6. Outcome	7. Products Used	8. Procedure Location	9. Procedure Start Time	10. Procedure End Time
X	X					Analyze product usage by procedure to determine average procedure cost, identify outliers, and educate staff to reduce variation	16	X	X	X				X	X		
	X					Monitor tracking of products used to ensure all charges are captured and billed	16, 18	X	X	X				X	X		
	X	X				Compare what's been used to what's been ordered to gauge on-hand supply reduction opportunities, decreasing costs and physical storage requirements	16, 18	X	X	X				X	X		
X	X			X	X	Analyze expiring products to reposition product storage, and educate staff to utilize these products before others in stock	20	X	X	X				X	X		
X	X			X	X	Identify product exchange/return possibilities well before their expiration dates to reduce waste	20	X	X	X				X	X		
X		X				Minimize overhead by comparing quantities of soon to expire products vs. their par levels	20	X	X	X				X	X		
X			X		X	Ensure quality by eliminating expired inventory, ensure expired supplies aren't masking out-of-stock conditions	20	X	X	X				X	X		