



# RISK REDUCTION INITIATIVE IN THE CONGENITAL CATHETERIZATION LAB

## The Boston Experience & C3PO-QI

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# DISCLOSURE

Consultant for 480 Biomedical Inc.

# THE BOSTON HEART CENTER EXPERIENCE



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*The Boston Children's Hospital experience is enmeshed with C3PO-QI*



\*Data collection for QI initiative began in 2014 at 15 participating sites

## Goals

\*Reduce radiation exposure at BCH  & participating sites 

# RISK REDUCTION PROJECT

- \* Record data on all procedures
- \* Measure outcomes & identify differences
- \* Conduct collaborative QI initiative

 **Improve care and outcomes for patients** 



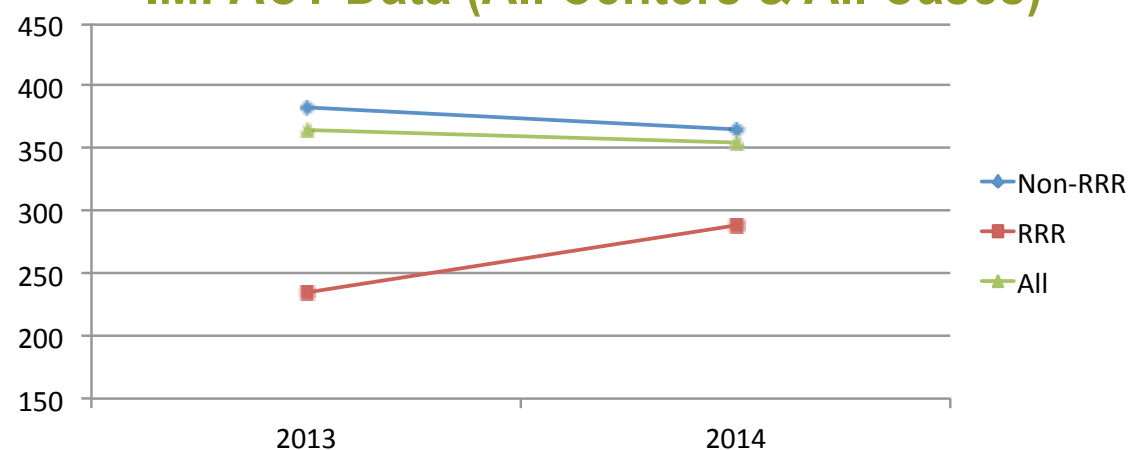
# IMPACT

IMPROVING PEDIATRIC AND ADULT CONGENITAL TREATMENT

Launched in 2010

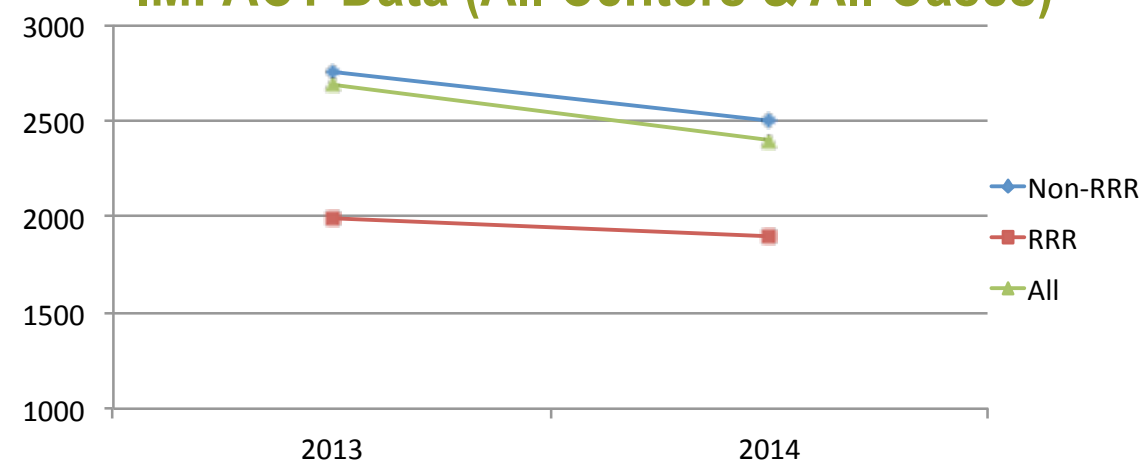
90 Participating hospitals and 60,000 + procedures

Mean Cumulative Air Kerma (mGy)  
IMPACT Data (All Centers & All Cases)



MARCH 14 - 16, 2015  
SAN DIEGO  
CALIFORNIA

Mean DAP ( $\mu\text{Gy}\cdot\text{m}^2$ )  
IMPACT Data (All Centers & All Cases)



MARCH 14 - 16, 2015  
SAN DIEGO  
CALIFORNIA

**Goal:** Reduce radiation exposure by 25% in 1 year & cultivate a culture of quality improvement in congenital catheterization programs

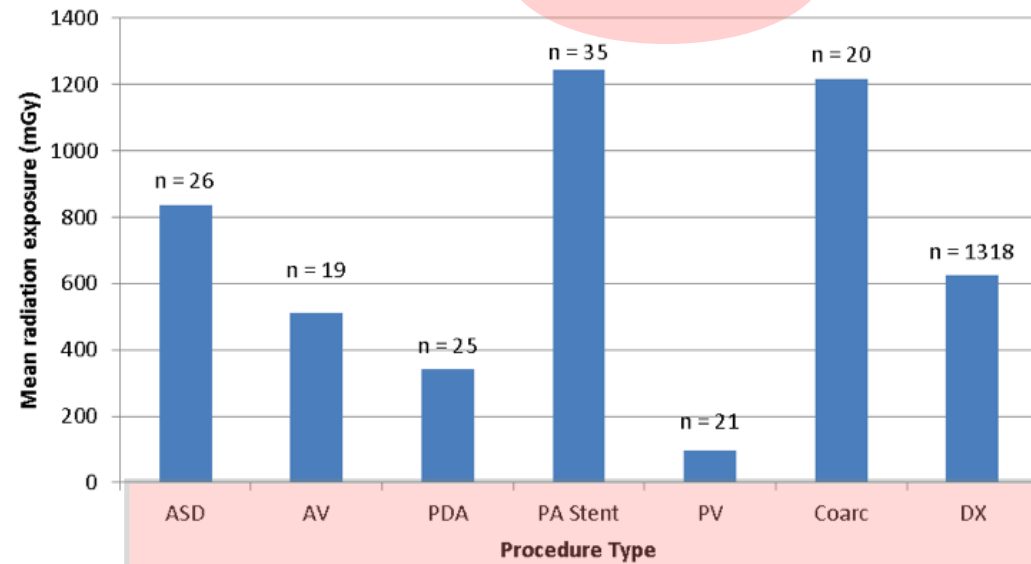
\* Graphs provided by IMPACT with permission from Aimee Armstrong, MD

# IMPACT - BOSTON HEART CENTER

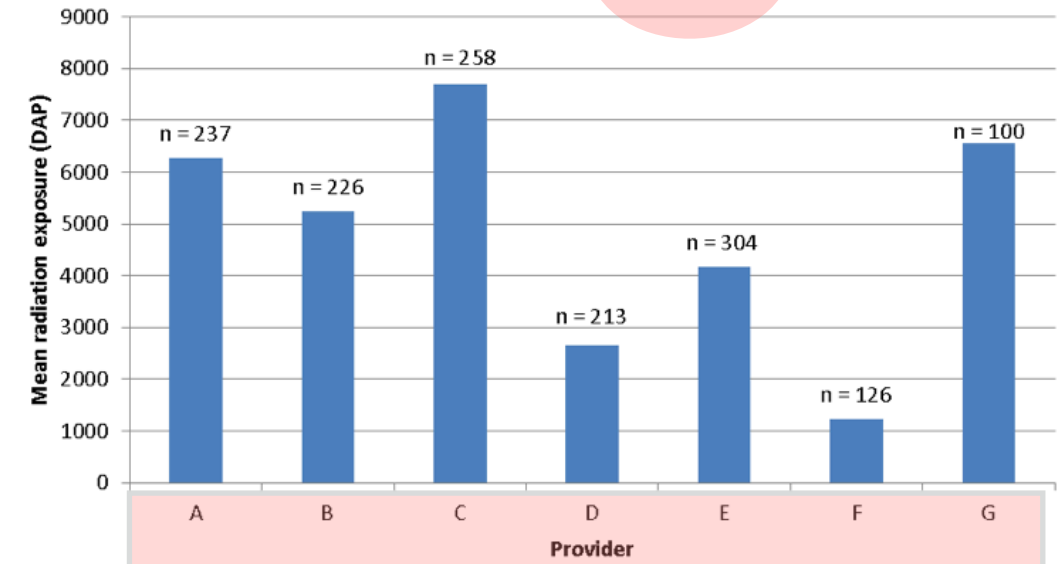
- \* We generate institutional reports at BCH based on quarterly data received from the NCDR-IMPACT registry*

# IMPACT - BOSTON HEART CENTER

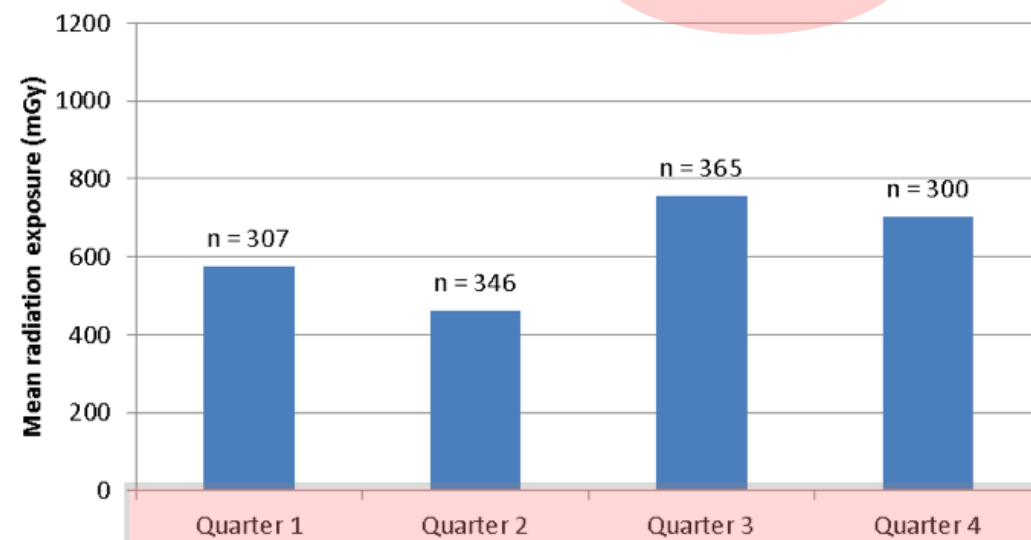
## Radiation Exposure by Procedure Type - 2015



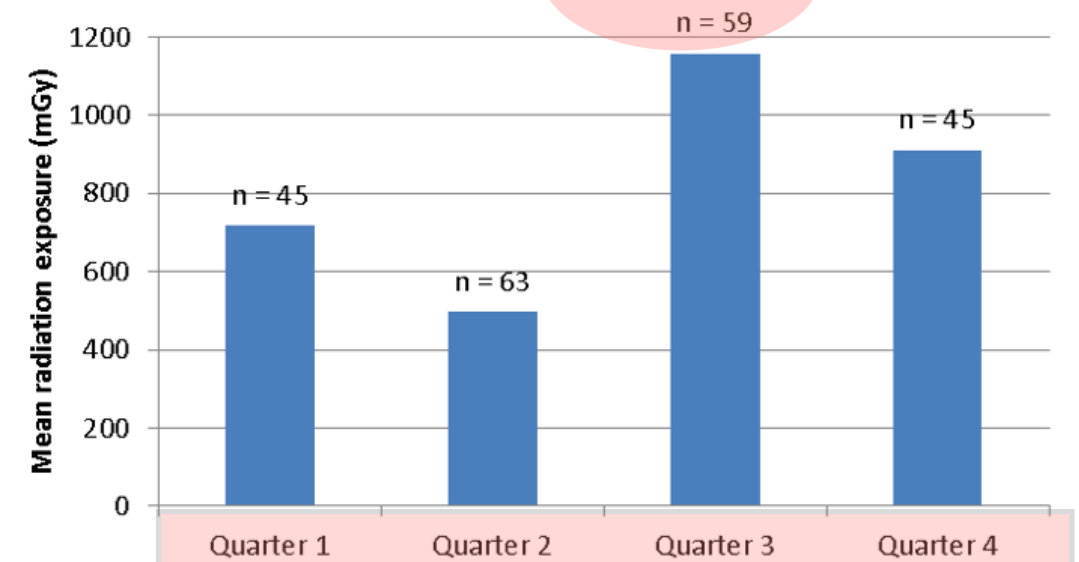
## Radiation Exposure by Provider - 2015



## Radiation Exposure - 2015 Diagnostic Caths



## Radiation Exposure, Provider A - 2015



# IMPACT - BOSTON HEART CENTER

- \* Overall summaries are provided by IMPACT, however radiation outcomes are not reported stratified by age or weight to allow case mix adjustment of the radiation outcome*





# C3PO-QI

*Congenital Cardiac Catheterization Outcomes Project - Quality Improvement*

What **tools** do we utilize for measurement & reporting?

## C3PO-QI Website

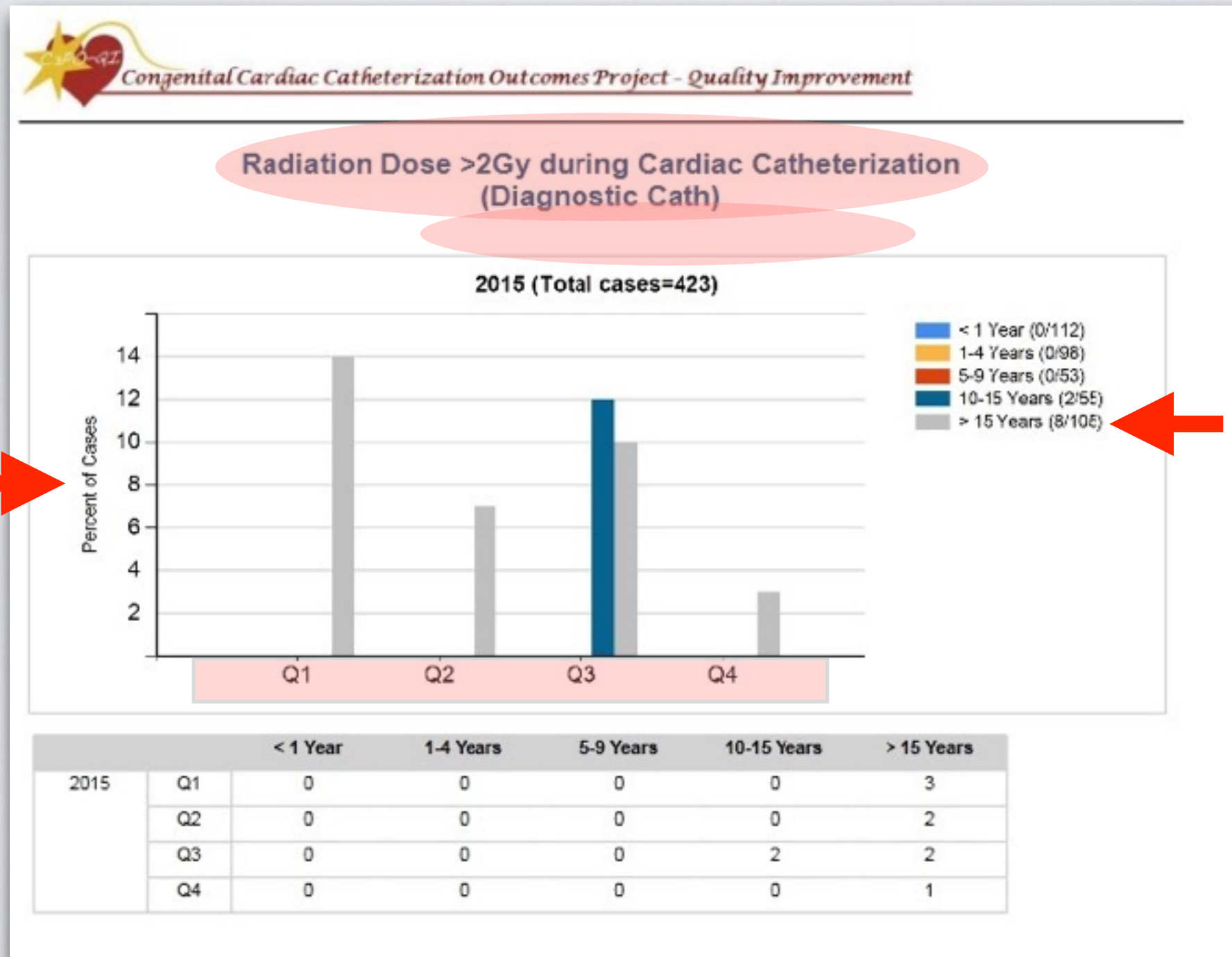
- ★ Procedure specific outcomes based on ACC Quality Metric
- ★ Comparative site to C3PO-QI aggregated data
- ★ Site threshold dose reports

## Tableau Data Review

- ★ Bi-monthly webinars with C3PO collaborative and BCH site conference at division M&M using customized Tableau dashboards which allow real-time manipulation of dataset

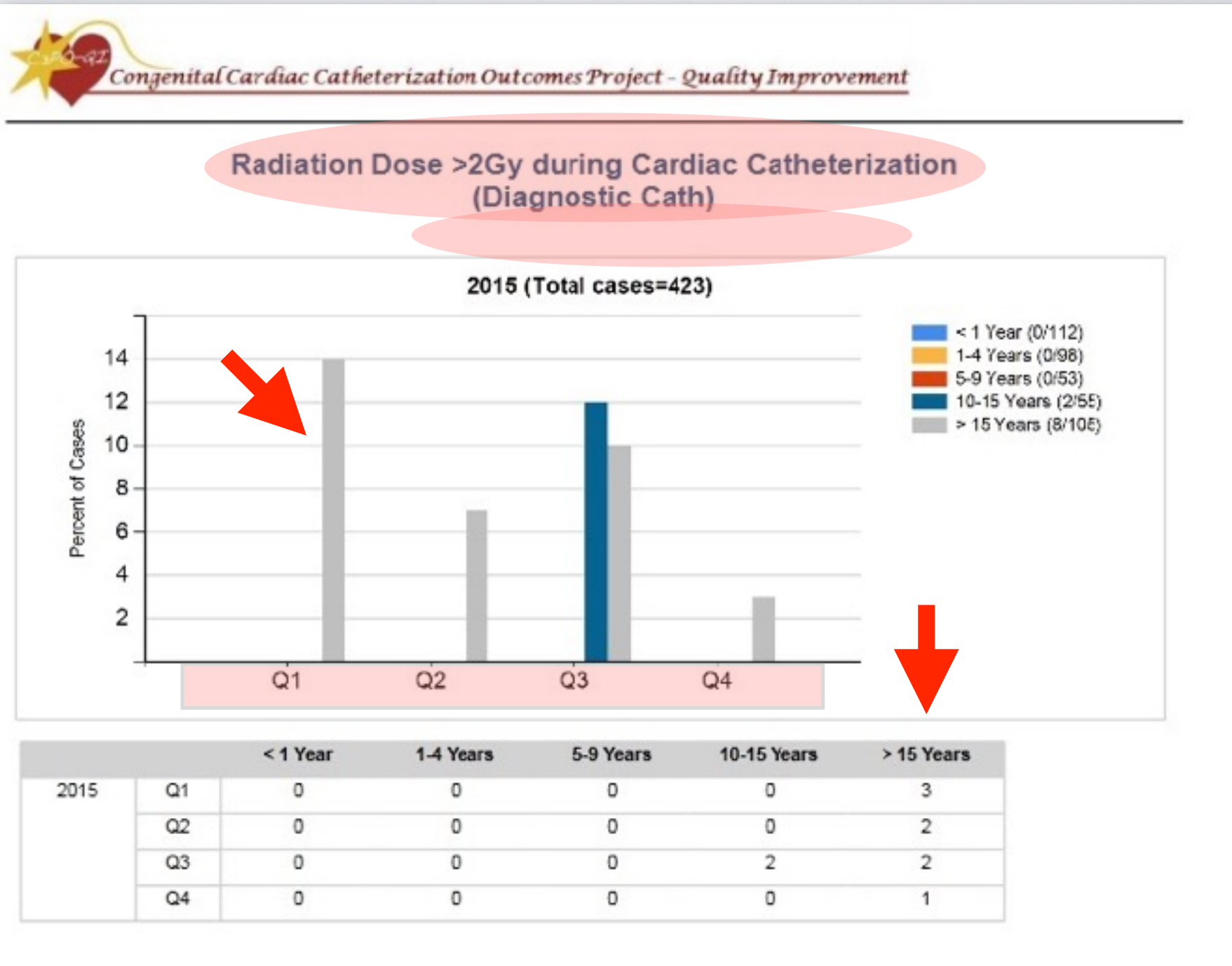
# C3PO-QI ONLINE REPORTING

## Threshold Dose Report



# C3PO-QI ONLINE REPORTING

## Threshold Dose Report





# Radiation Dose Benchmarks used for Quality Metric

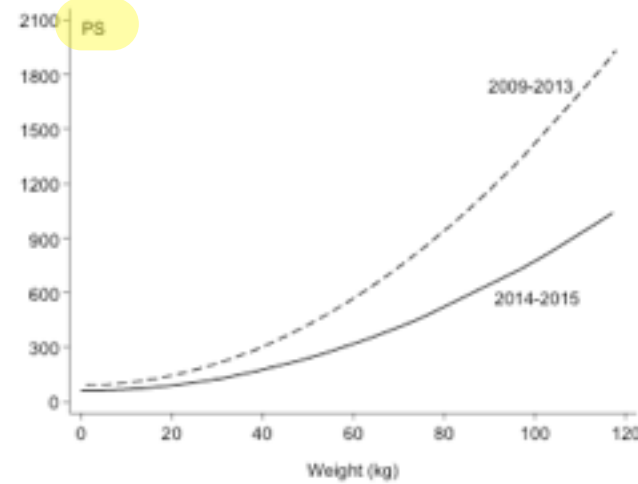
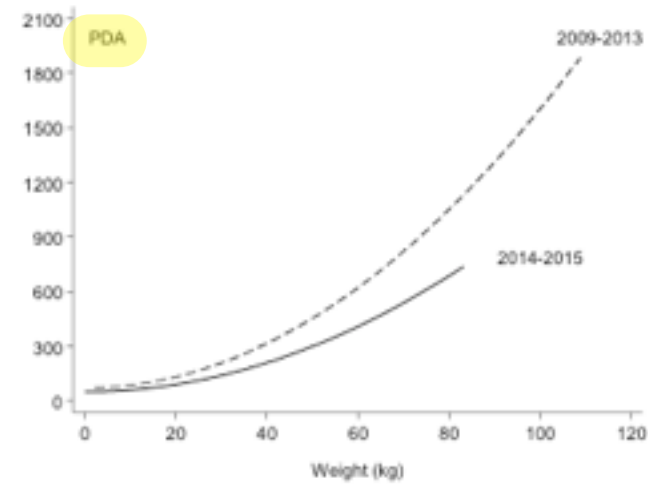
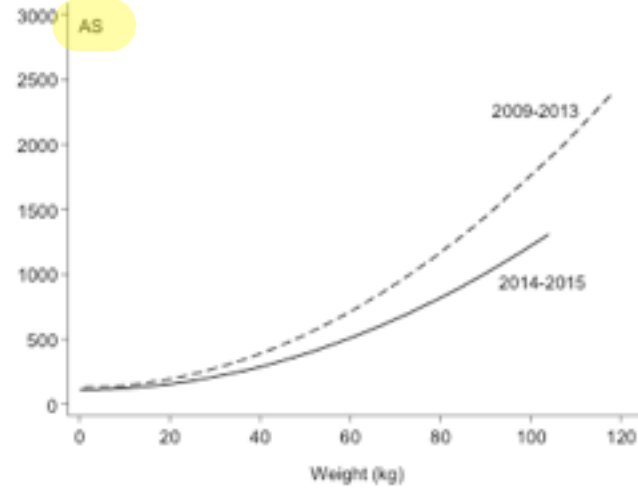
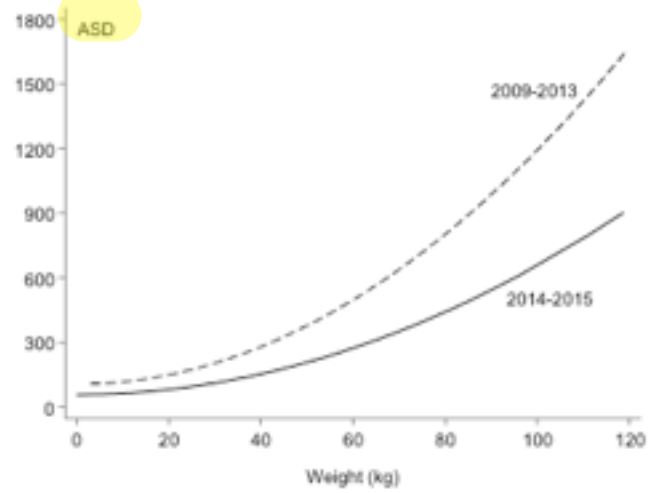
- \*Started with radiation dose benchmarks collected from retrospective experience at centers (*Ghelani et al JACC Interventions 2014*)
- \*New radiation dose benchmarks have been established based on prospective data entry in C3PO-QI between 2014 to 2015

Radiation doses compared to previous benchmarks decreased

Procedure	Total No.	Total Air Kerma, mGy				Dose Area Product, $\mu\text{Gy}\cdot\text{M}^2$				Total Fluoroscopy Time, min			
		N	Median	75 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	N	Median	75 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	N	Median	75 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile
ASD	[731, 307]	[532, 294]	-134	-321	-837	[726,296]	-1358	-4469	-19546	[726, 276]	-1	-1	+9
AV	[297, 140]	[238, 139]	-42	-172	+239	[296, 137]	-475	-2623	-3177	[296, 127]	+2	+6	+17
COA	[452, 299]	[360, 292]	-98	-344	-1586	[448, 289]	-1563	-5860	-19732	[452, 268]	+1	+1	+2
PDA	[548, 463]	[362, 444]	-36	-40	-258	[547, 445]	-338	-792	-5955	[544, 384]	+1	+3	+9
PV	[462, 267]	[362, 261]	-45	-103	-355	[461, 259]	-356	-1012	-8132	[461, 233]	-2	0	0
TPV	[223, 204]	[200, 200]	-836	-827	-184	[223, 199]	-9492	-12684	-22451	[223, 195]	-12	-14	-14

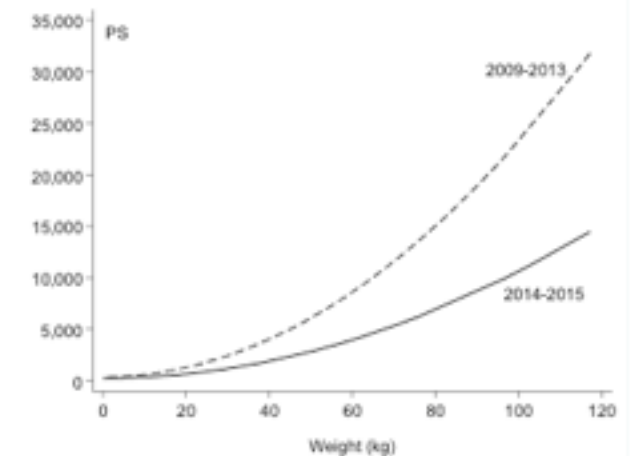
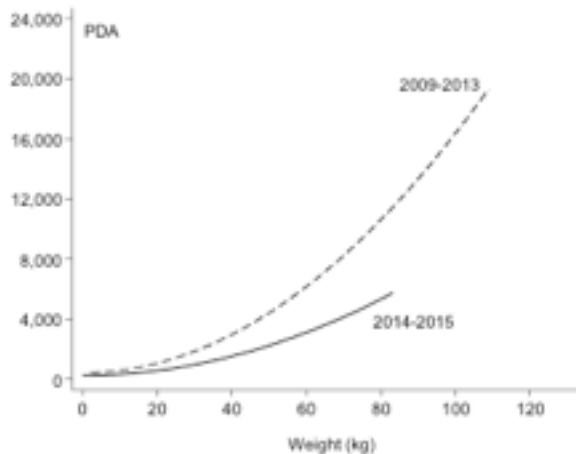
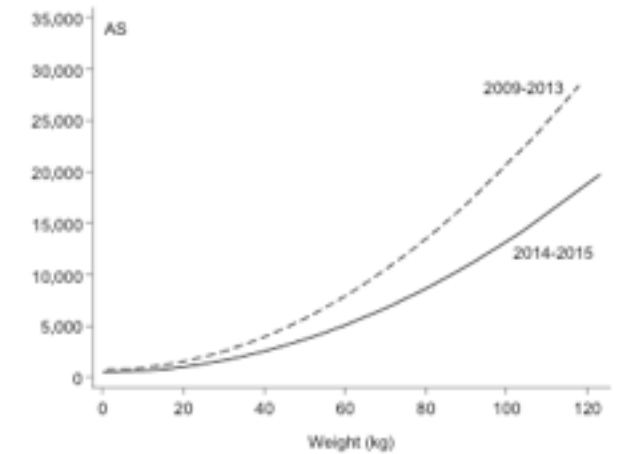
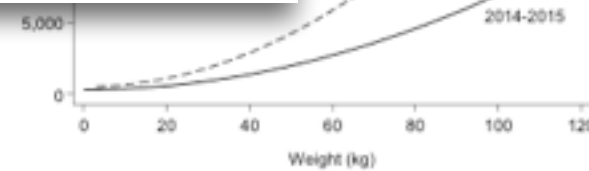


## Comparison Total Air Kerma (mGy)



## Weight-Based Percentile Curves

## Comparison DAP ( $\mu\text{Gy}\cdot\text{M}^2$ )

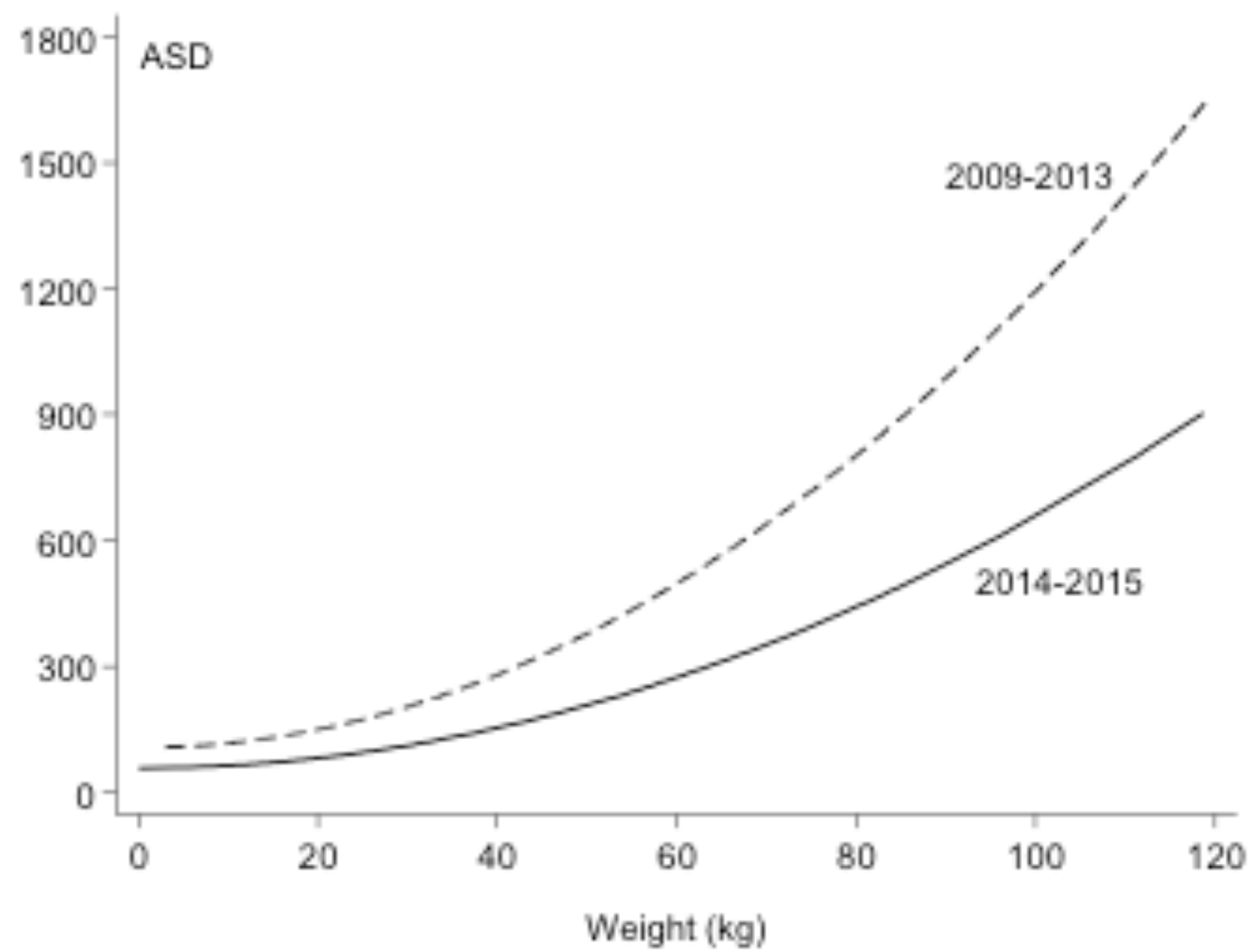


ASD

PDA

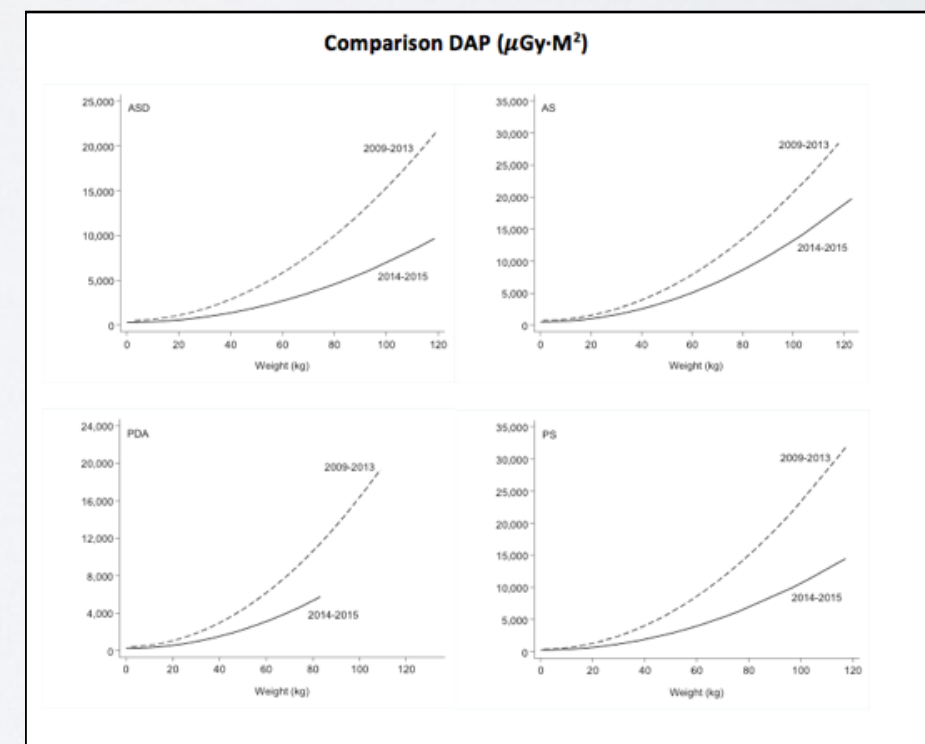
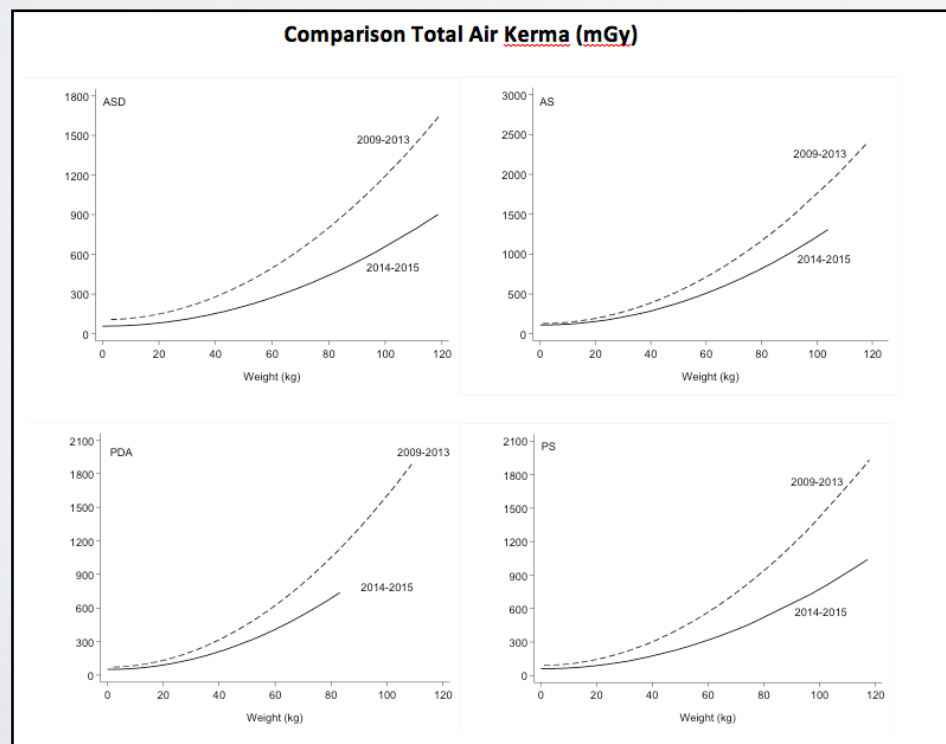
Pulmonary Valvuloplasty

Aortic Valvuloplasty



# Radiation Dose Benchmarks used for Quality Metric

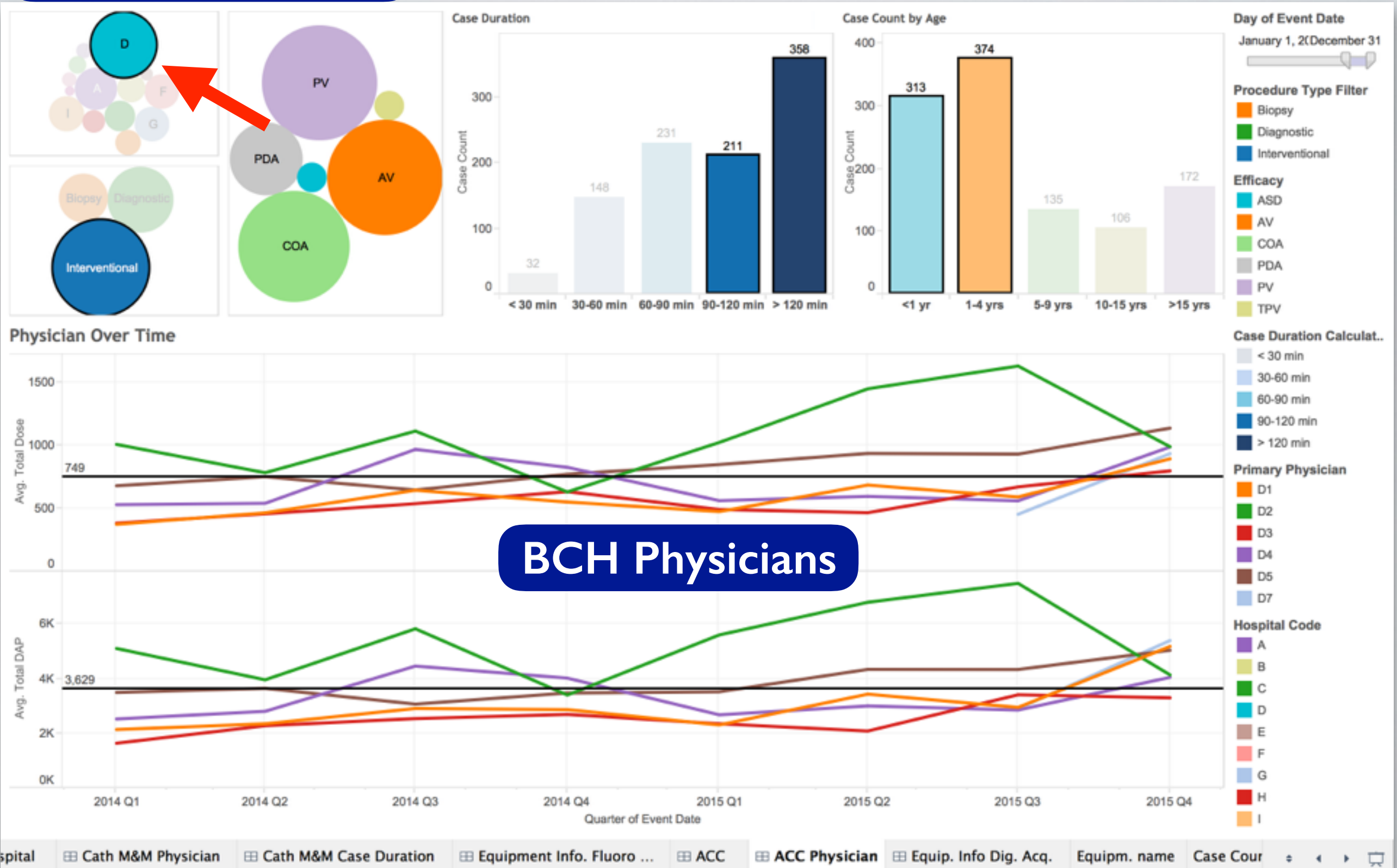
- \* New dose benchmarks established by C3PO-QI between 2014 to 2015 will be presented at the SCAI conference in May 2016
- \* The on-demand report for the procedure-specific quality metric has now as been updated using the new outcome benchmark in C3PO
- \* We will continue to move the “Bar” moving forward



# RADIATION BY PROVIDER

BOSTON CHILDREN'S HOSPITAL

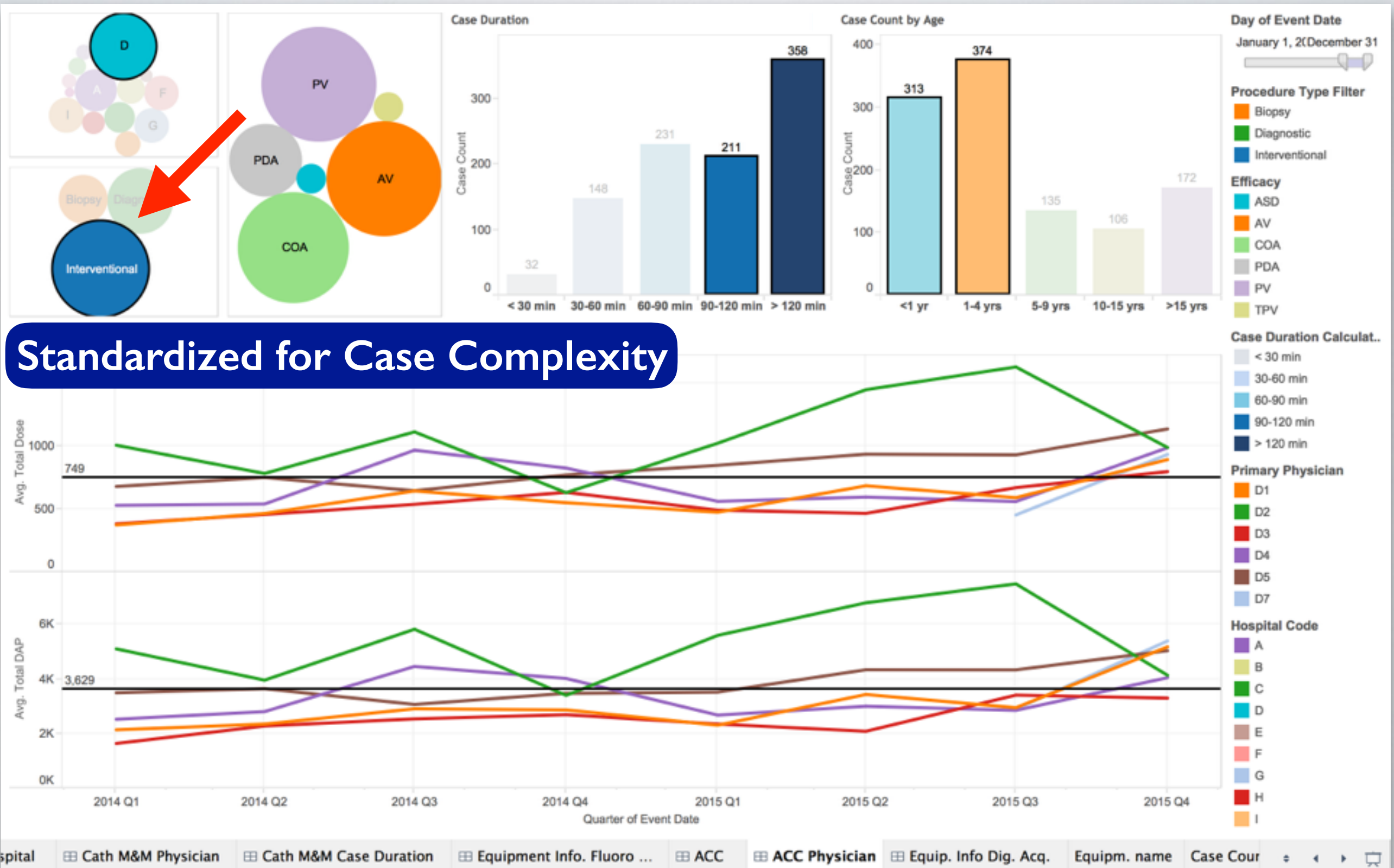
Data on Single Site





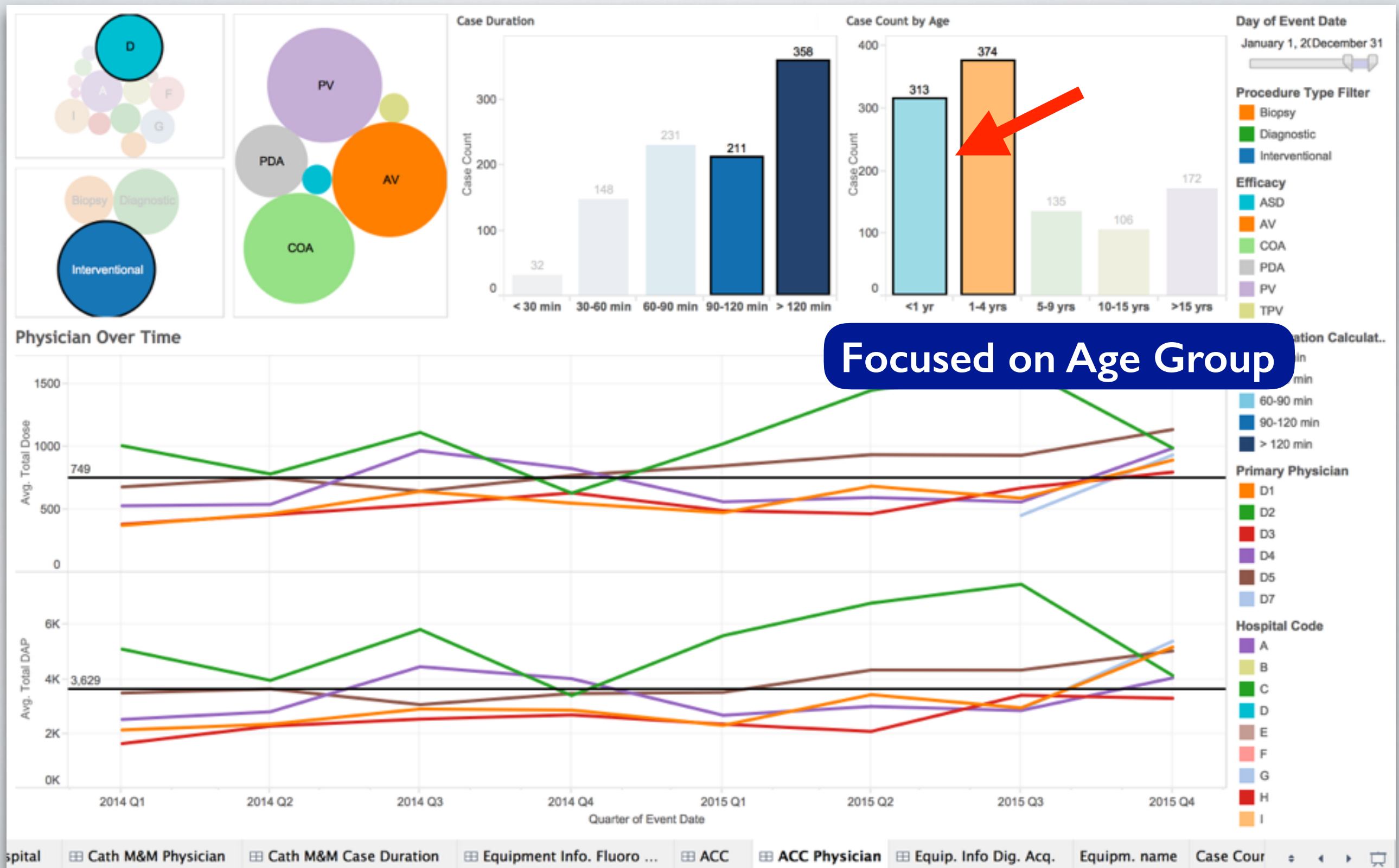
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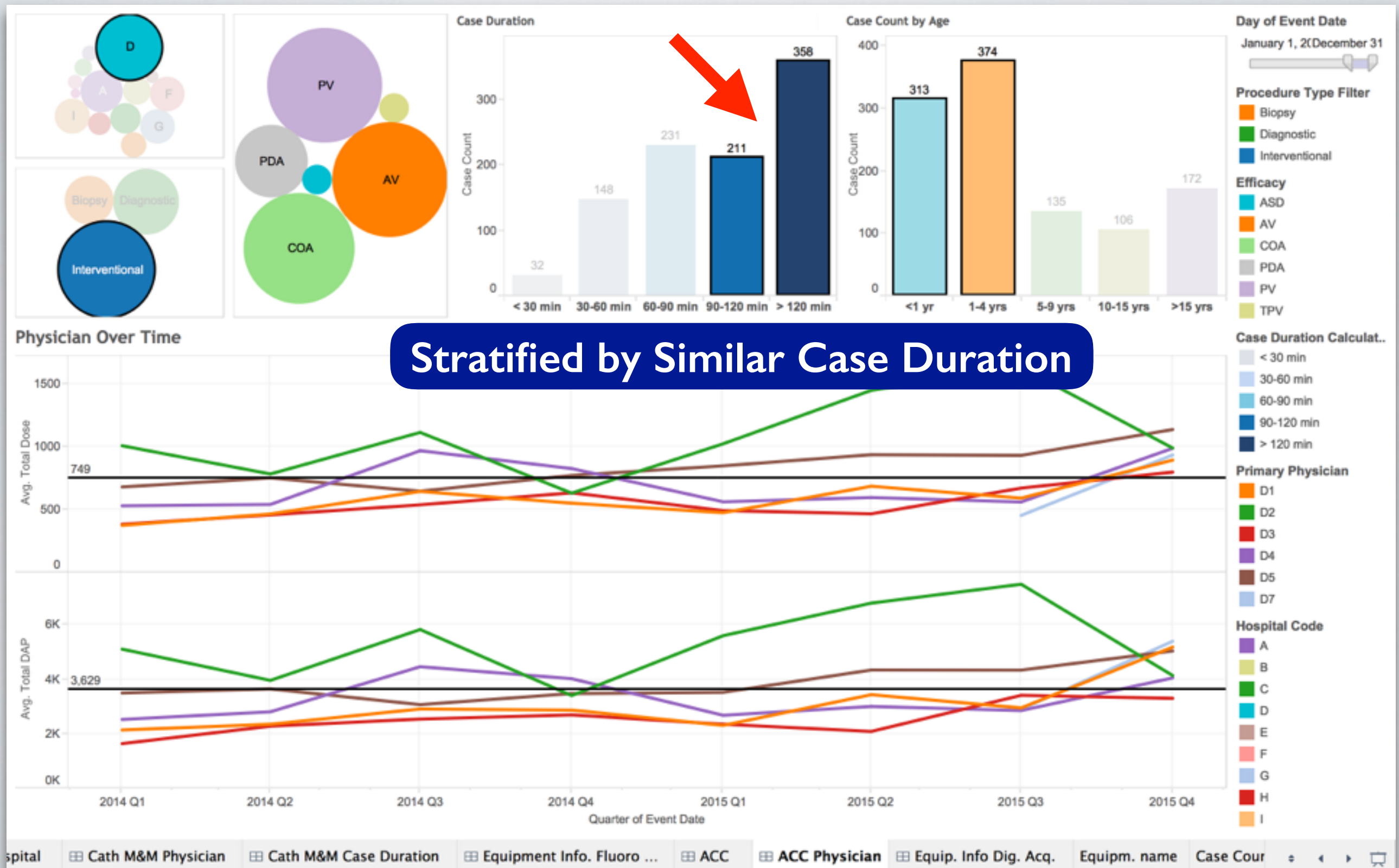
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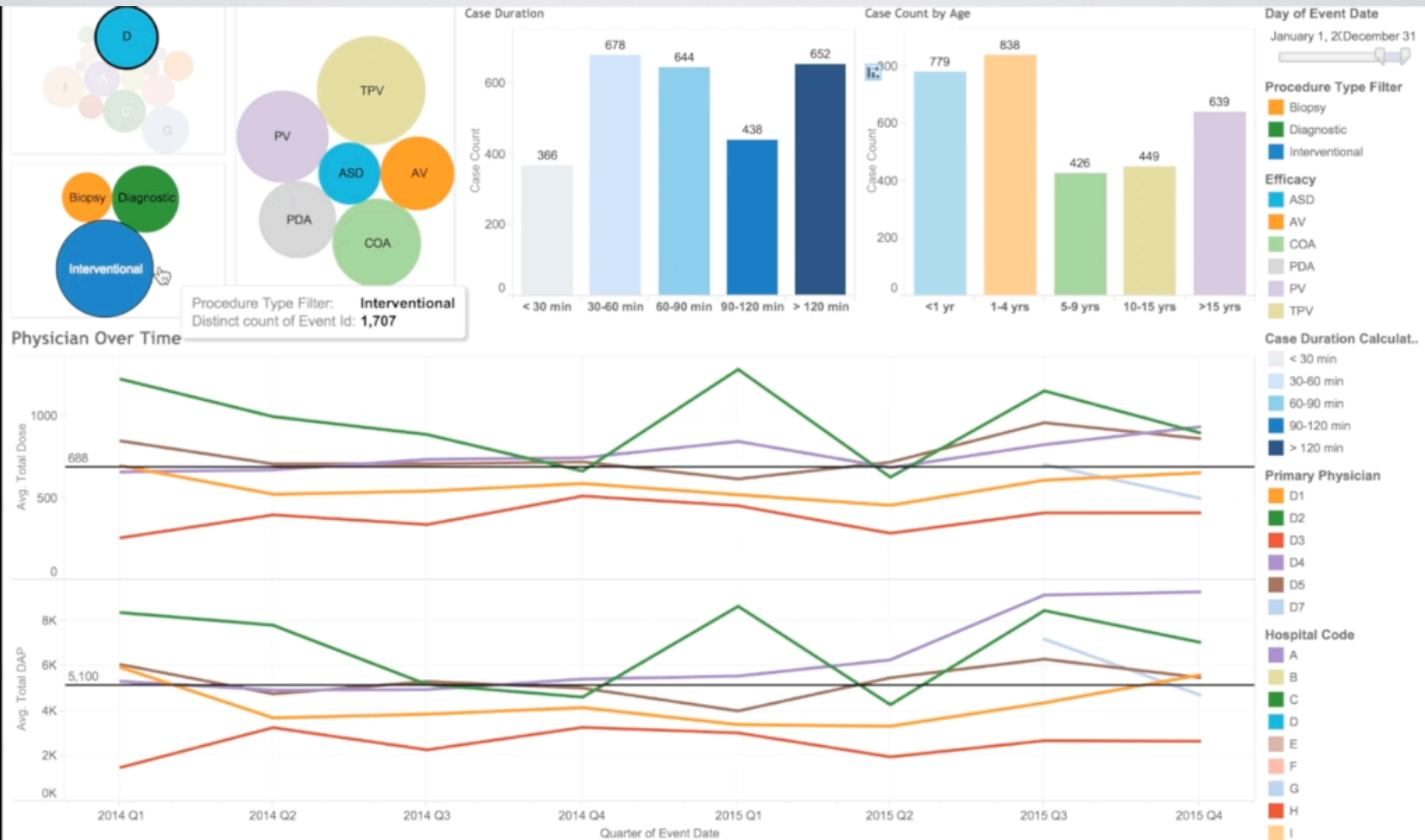
## BOSTON CHILDREN'S HOSPITAL





# RADIATION BY PROVIDER

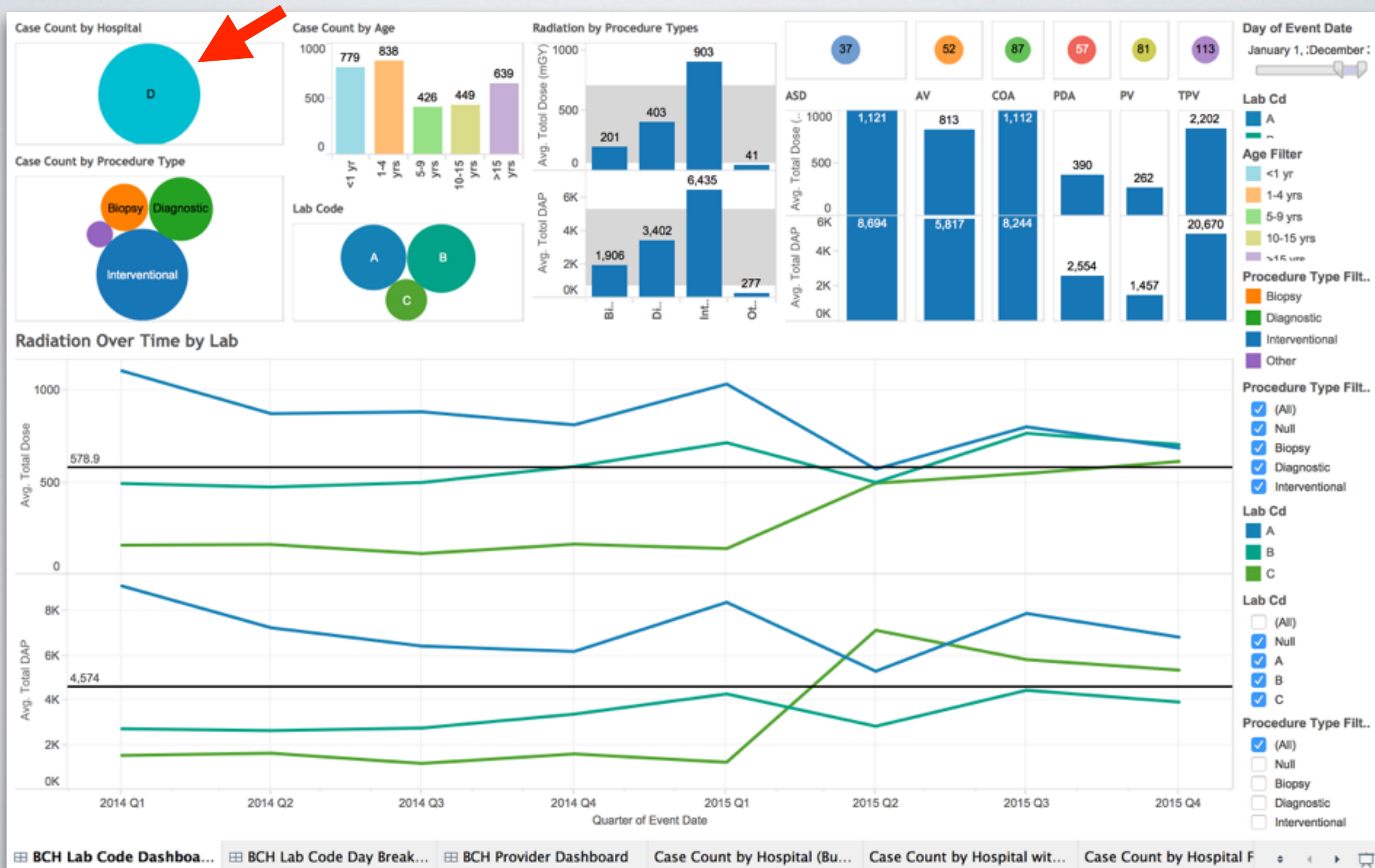
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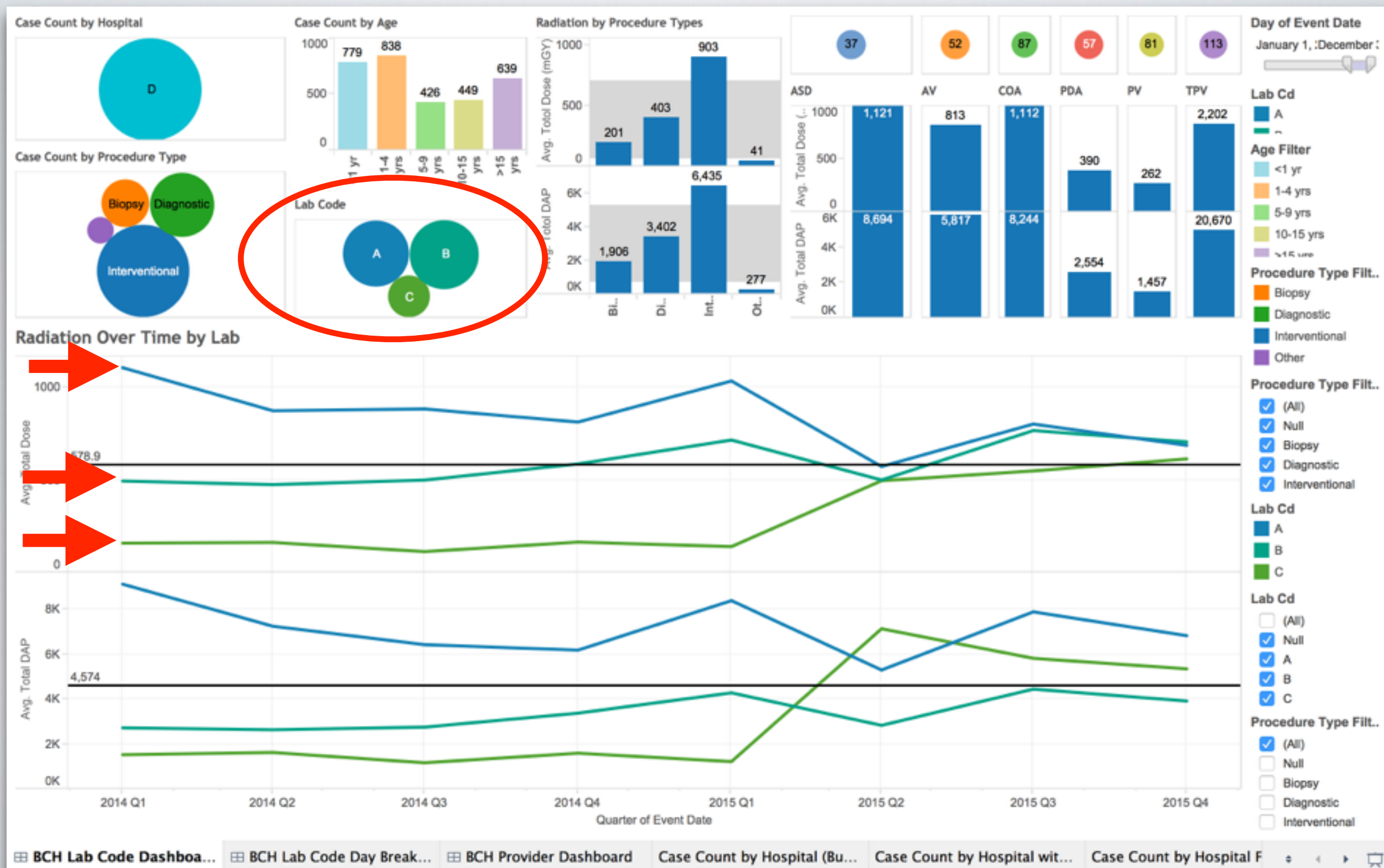
# EQUIPMENT UPGRADES

## BOSTON CHILDREN'S HOSPITAL



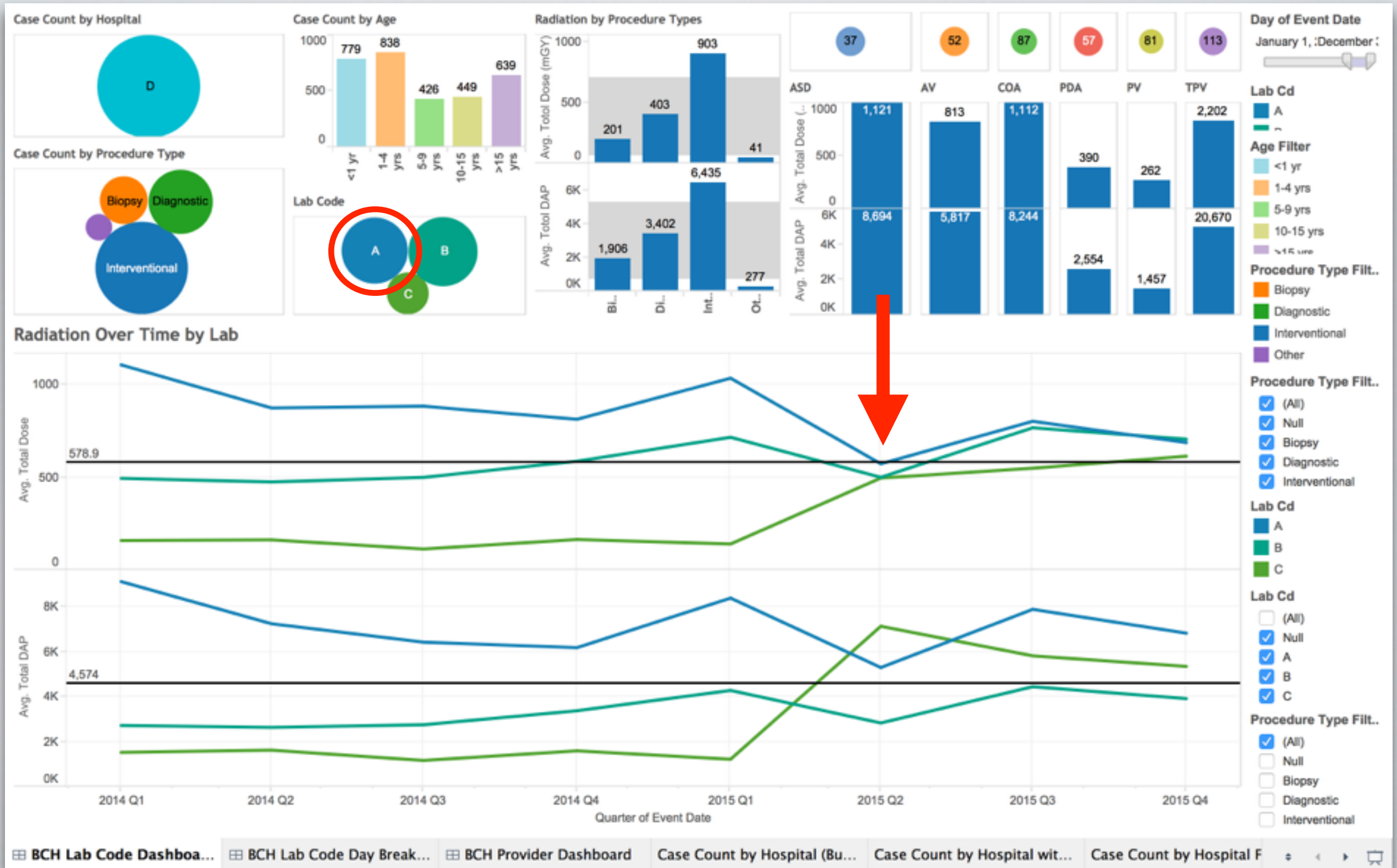
# EQUIPMENT UPGRADES

## BOSTON CHILDREN'S HOSPITAL



# EQUIPMENT UPGRADES

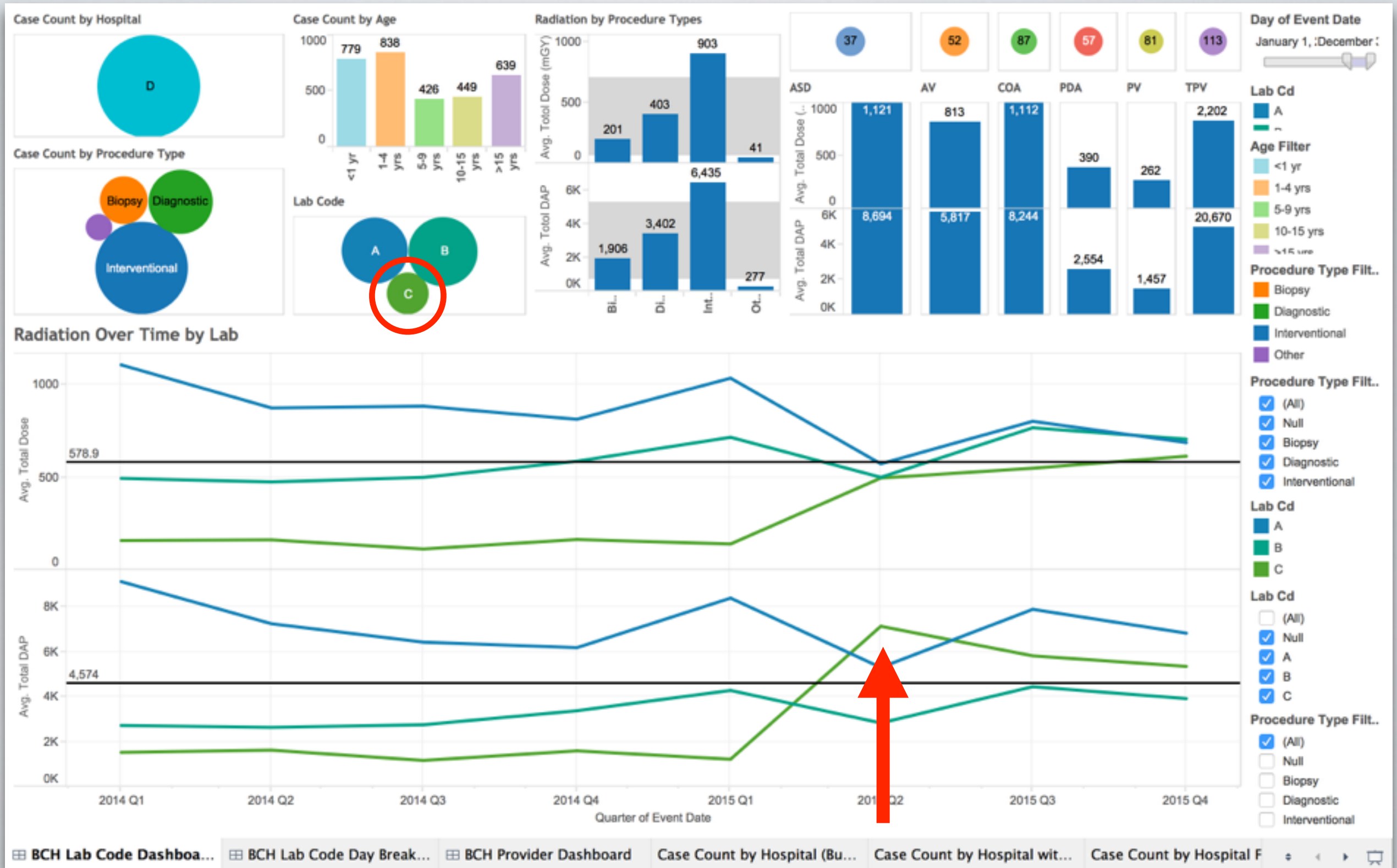
*BOSTON CHILDREN'S HOSPITAL*





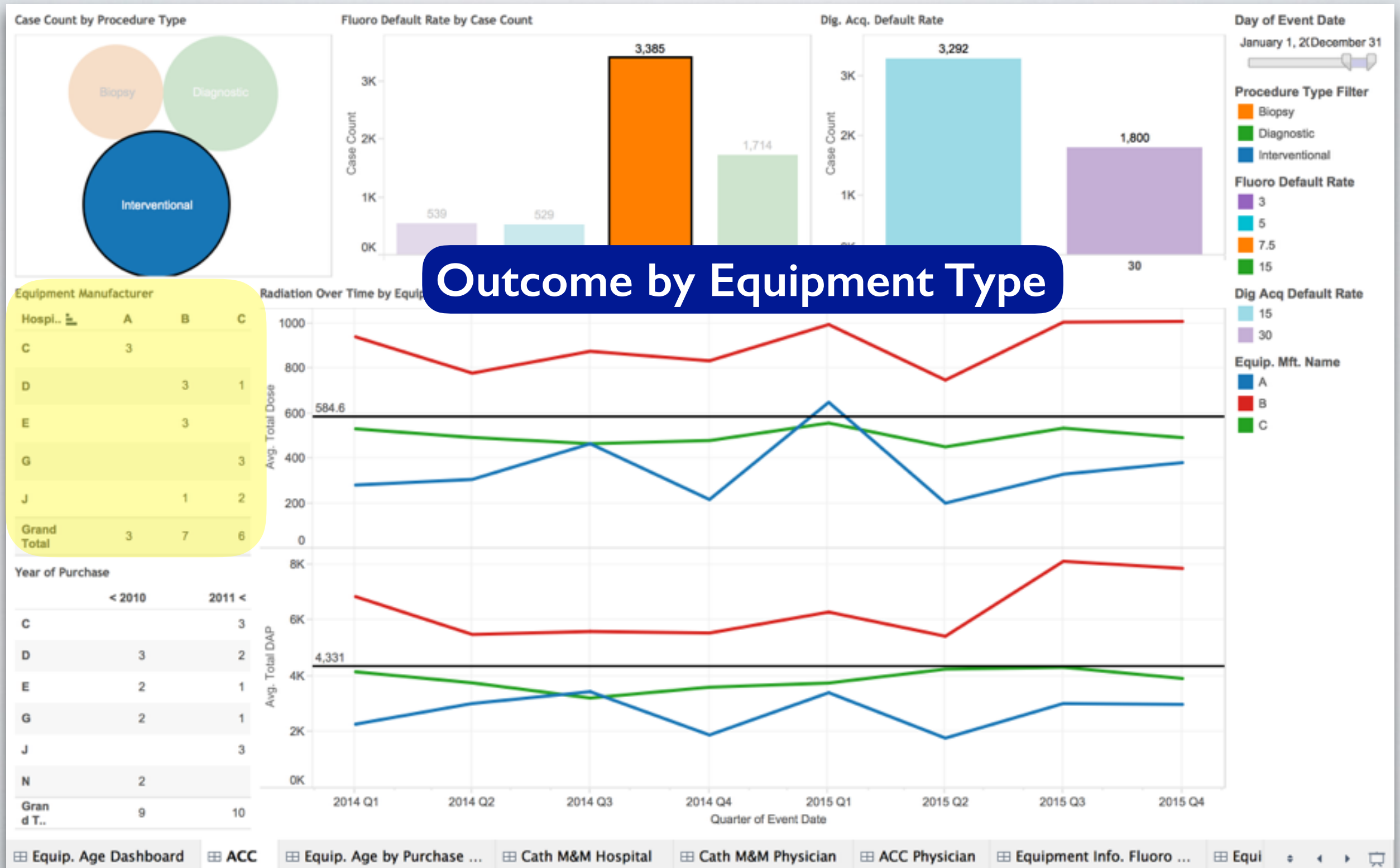
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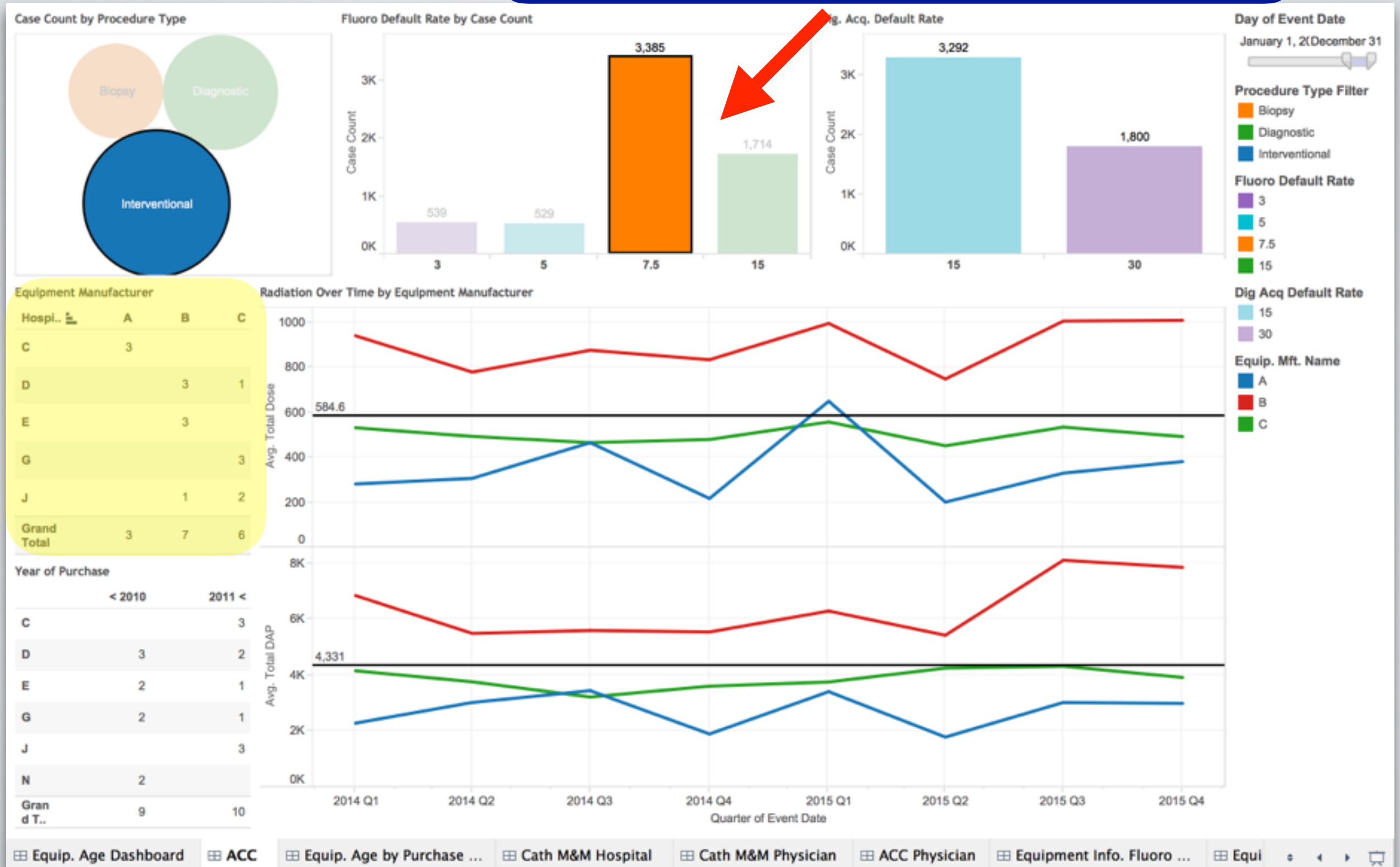


# EQUIPMENT MANUFACTURER



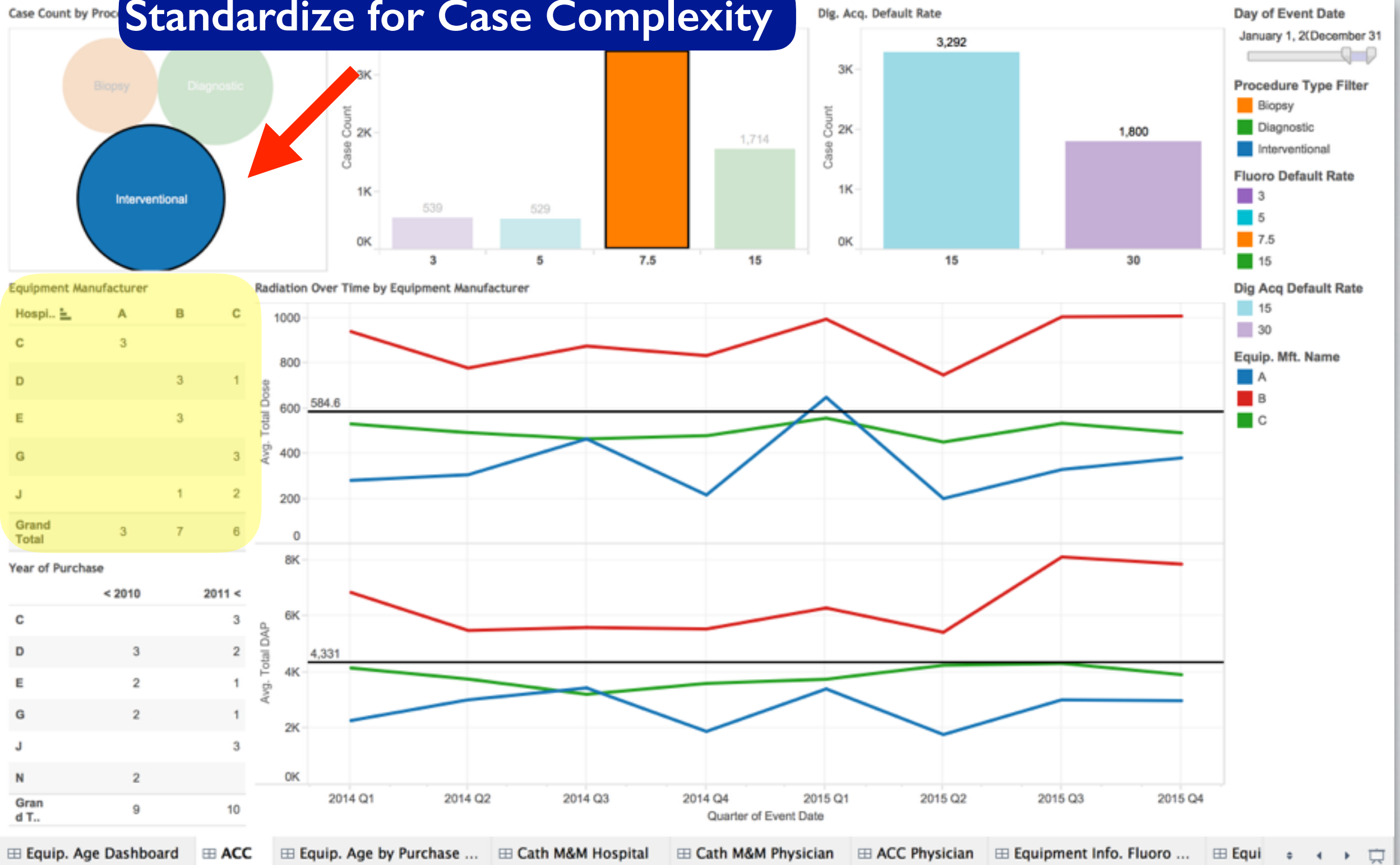
# EQUIPMENT MANUFACTURER

## Account for Differences in Site Practice



# EQUIPMENT MANUFACTURER

Standardize for Case Complexity



**Measurement**

**Metrics**

**Collaboration**

**Learning Cycles**



**Radiation  
Reduction**

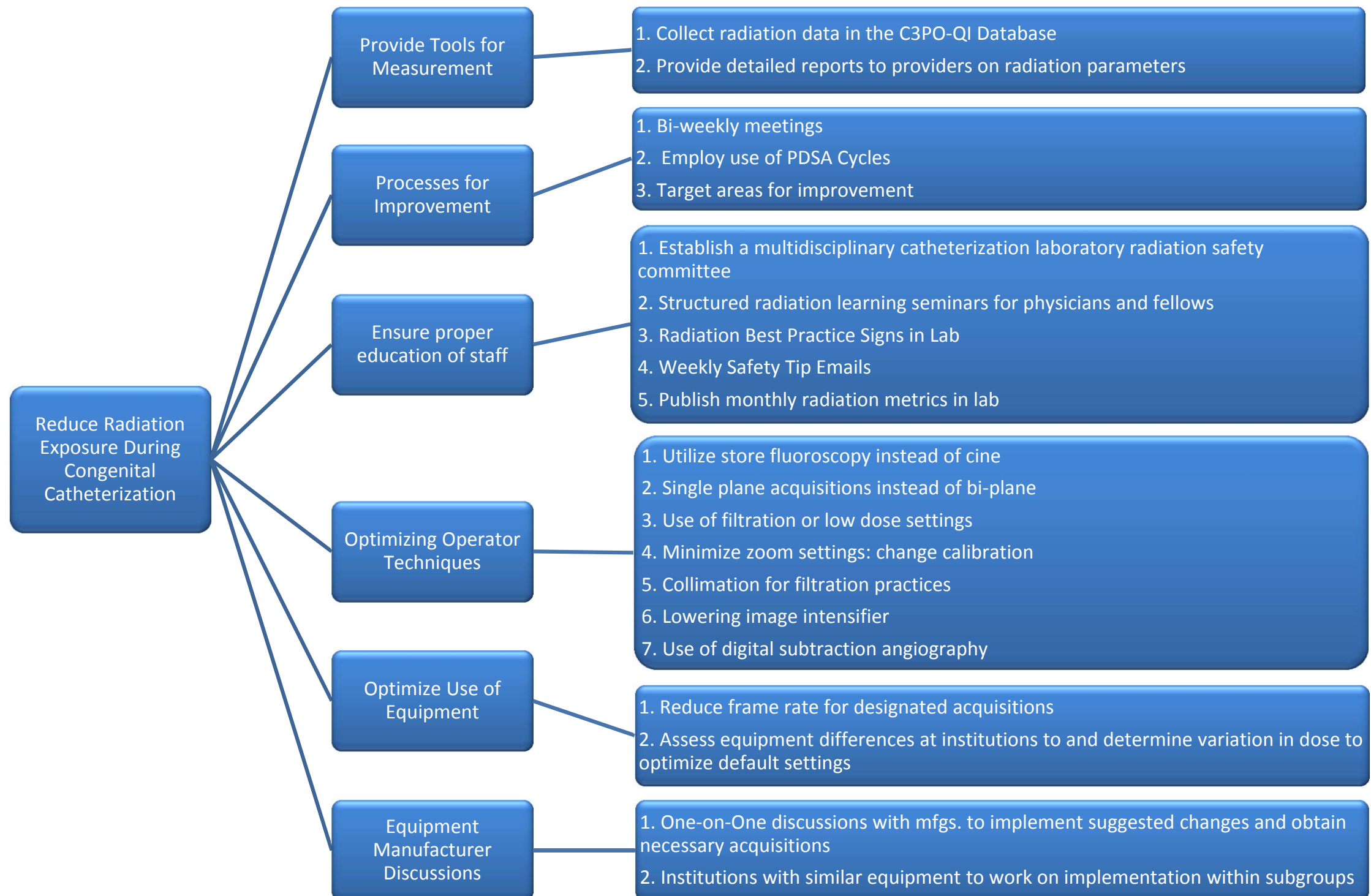
*Radiation Reduction Initiatives*



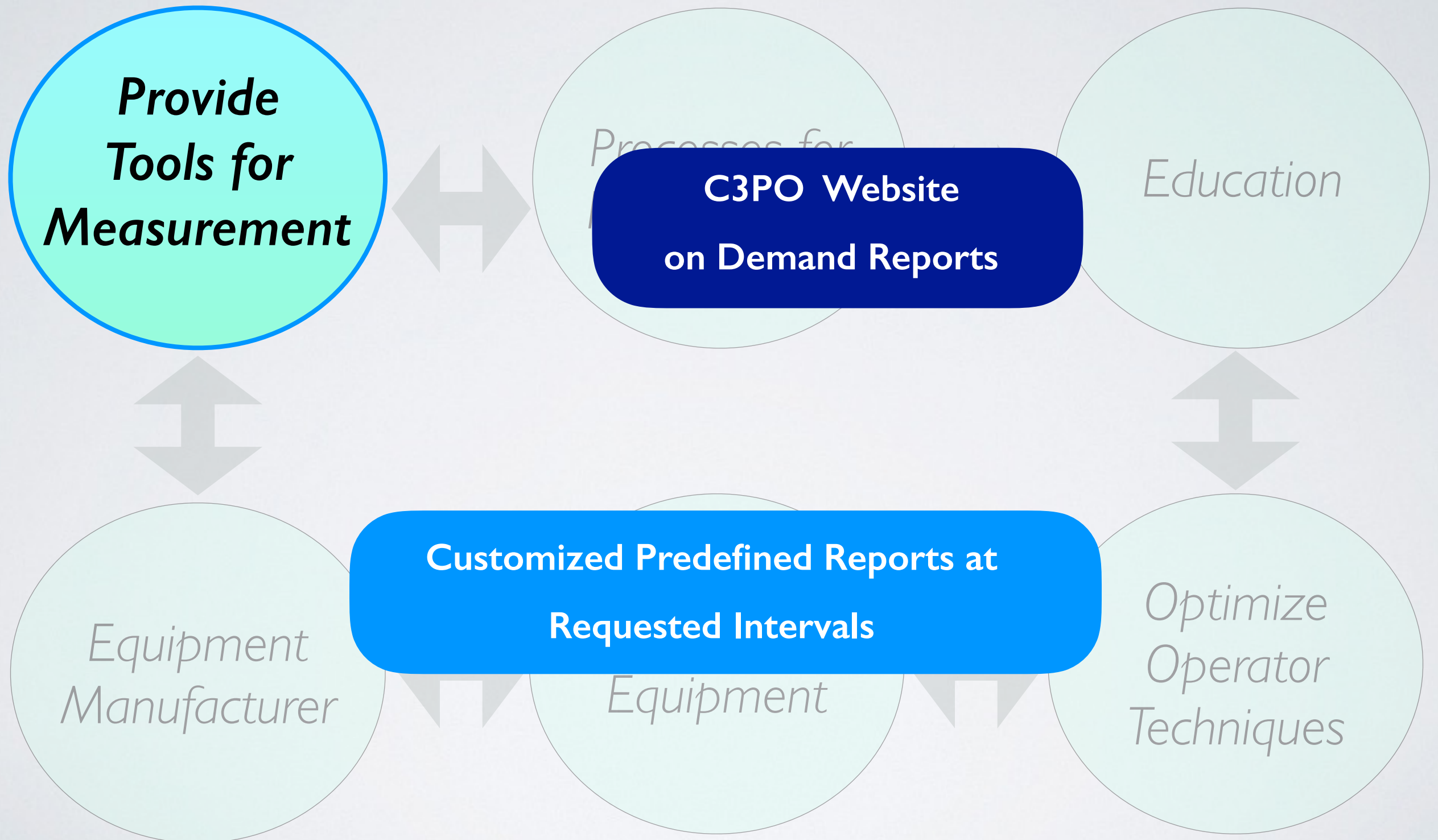


# KEY DRIVER DIAGRAM

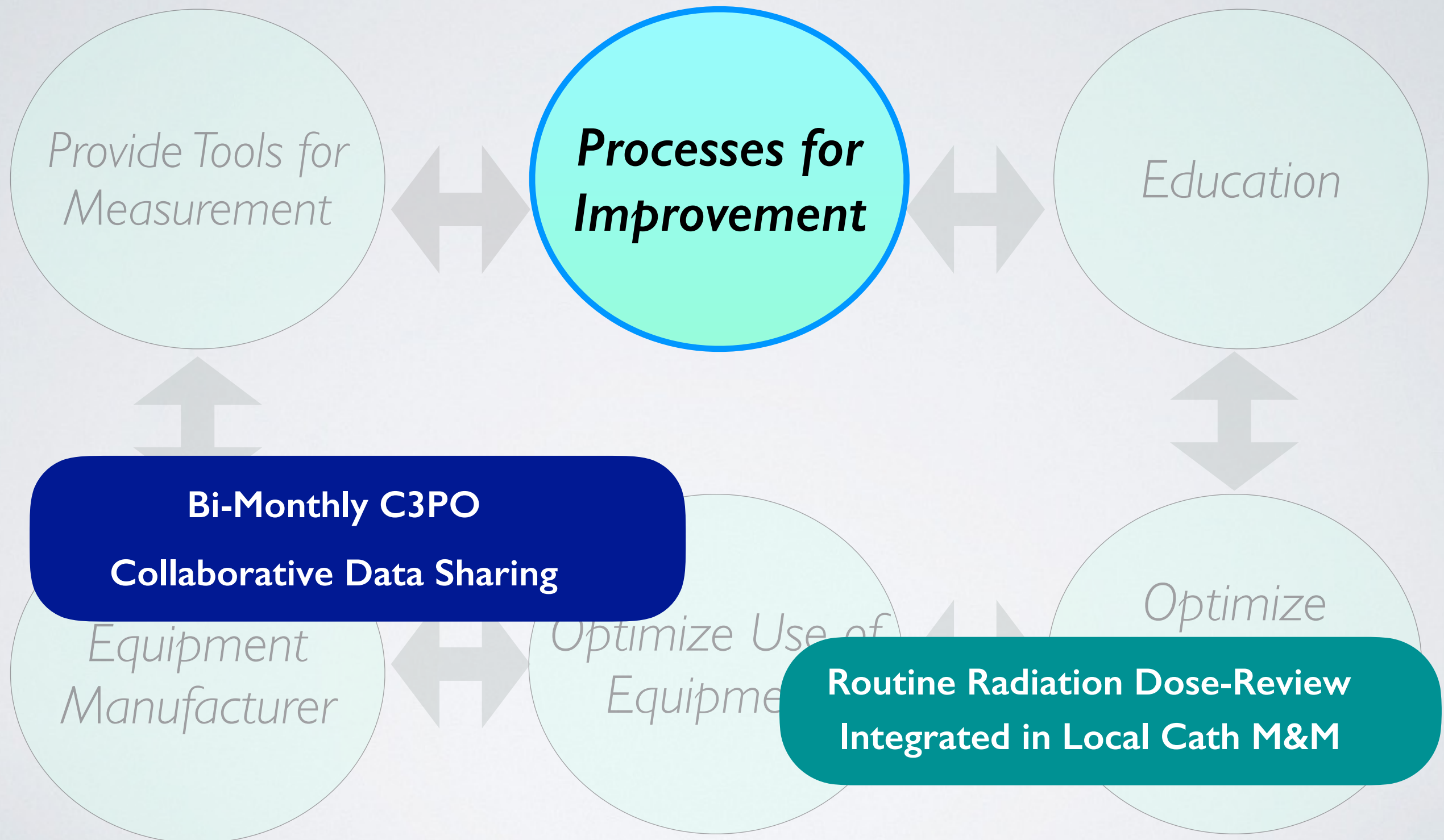
*Congenital Cardiac Catheterization Outcomes Project - Quality Improvement*



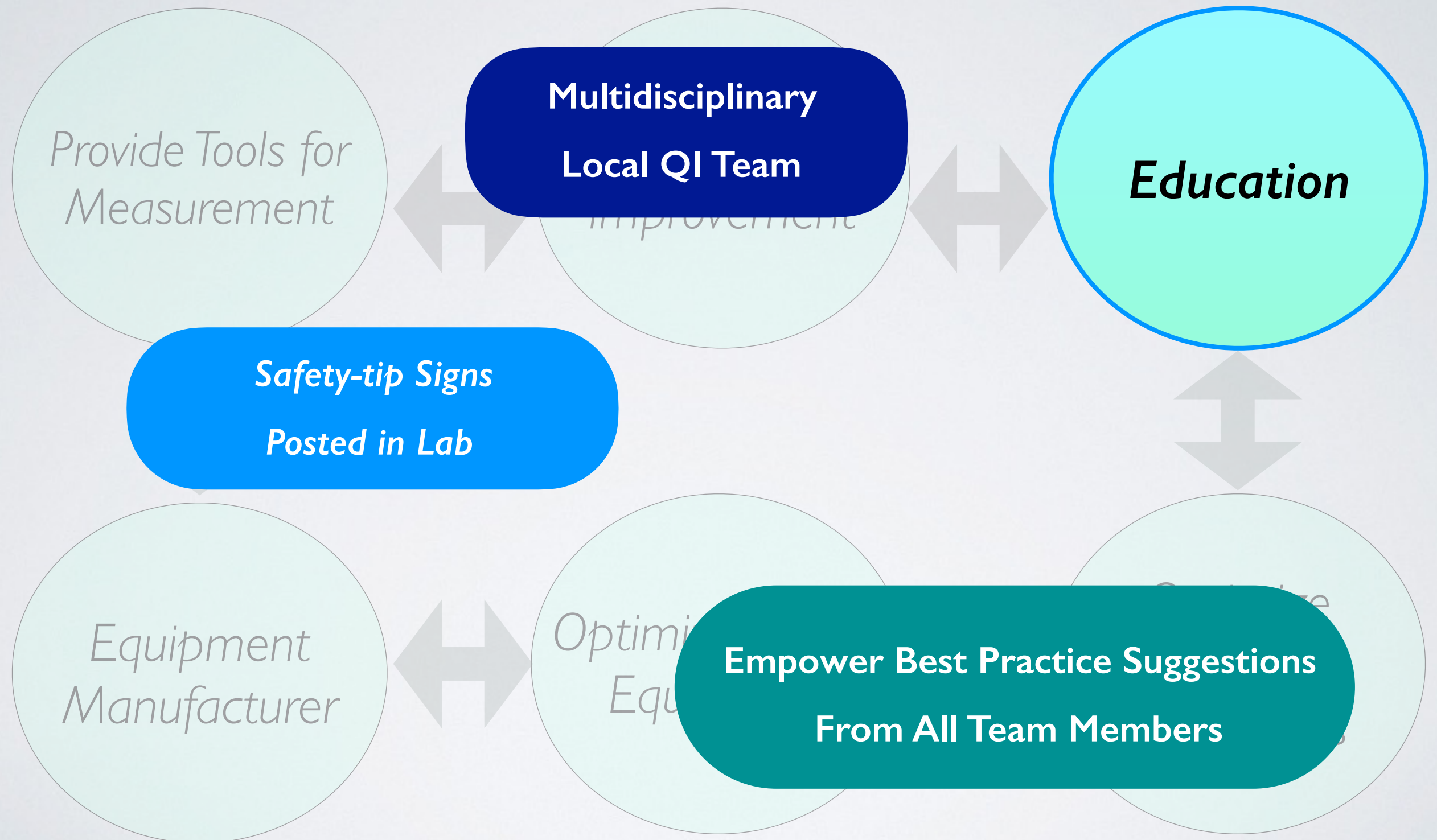
# LEARNING CYCLES



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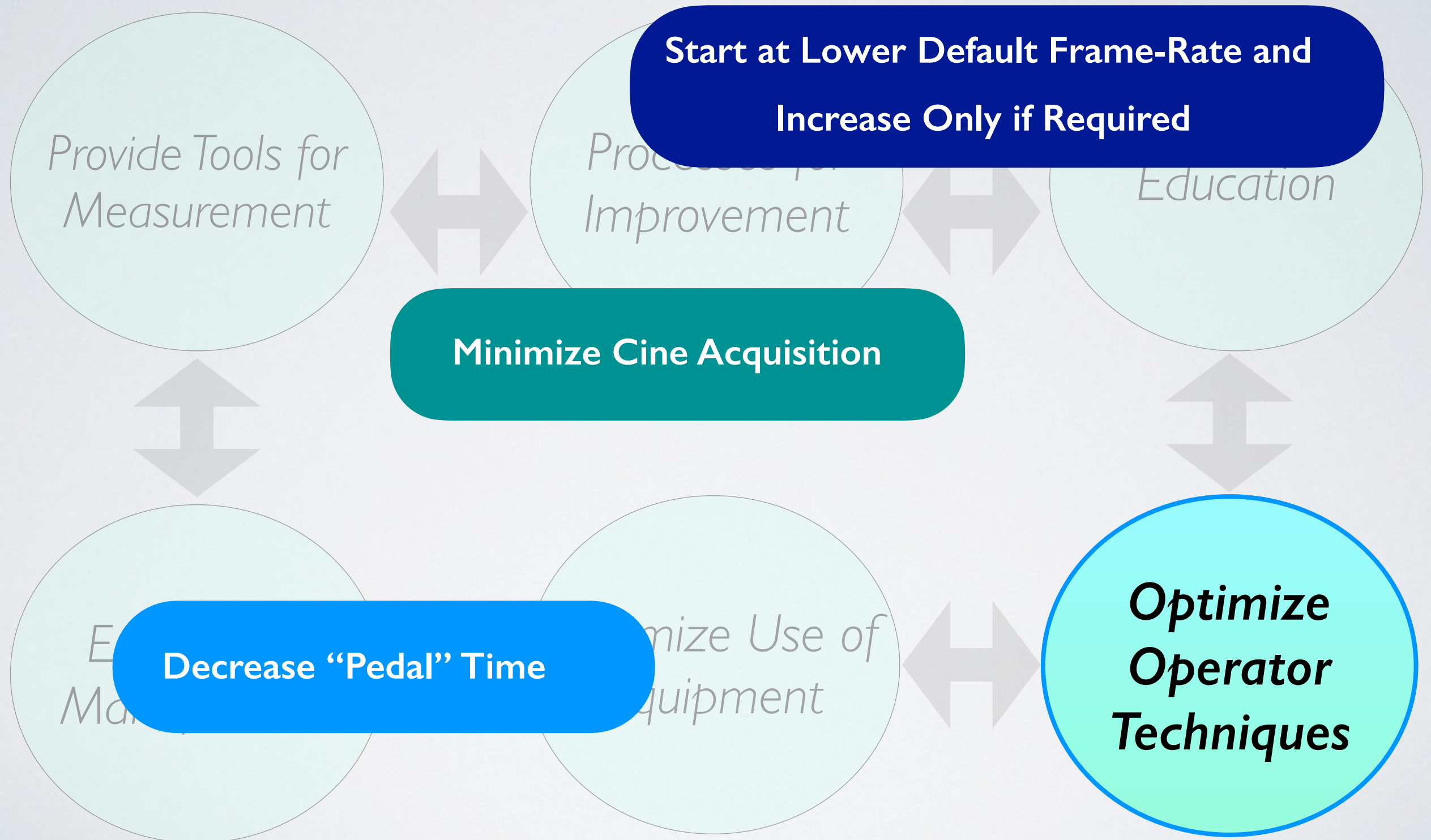


# LEARNING CYCLES

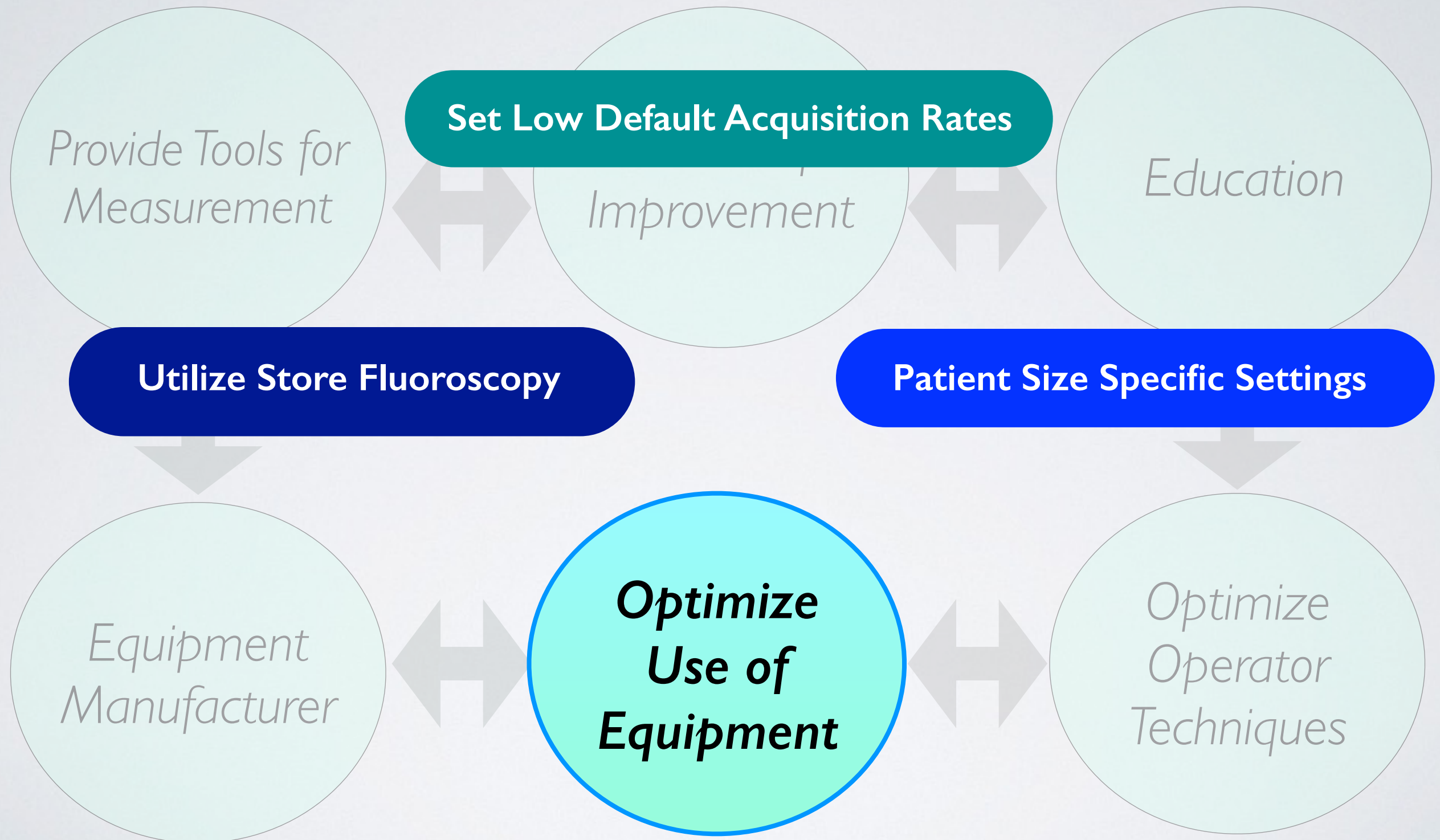




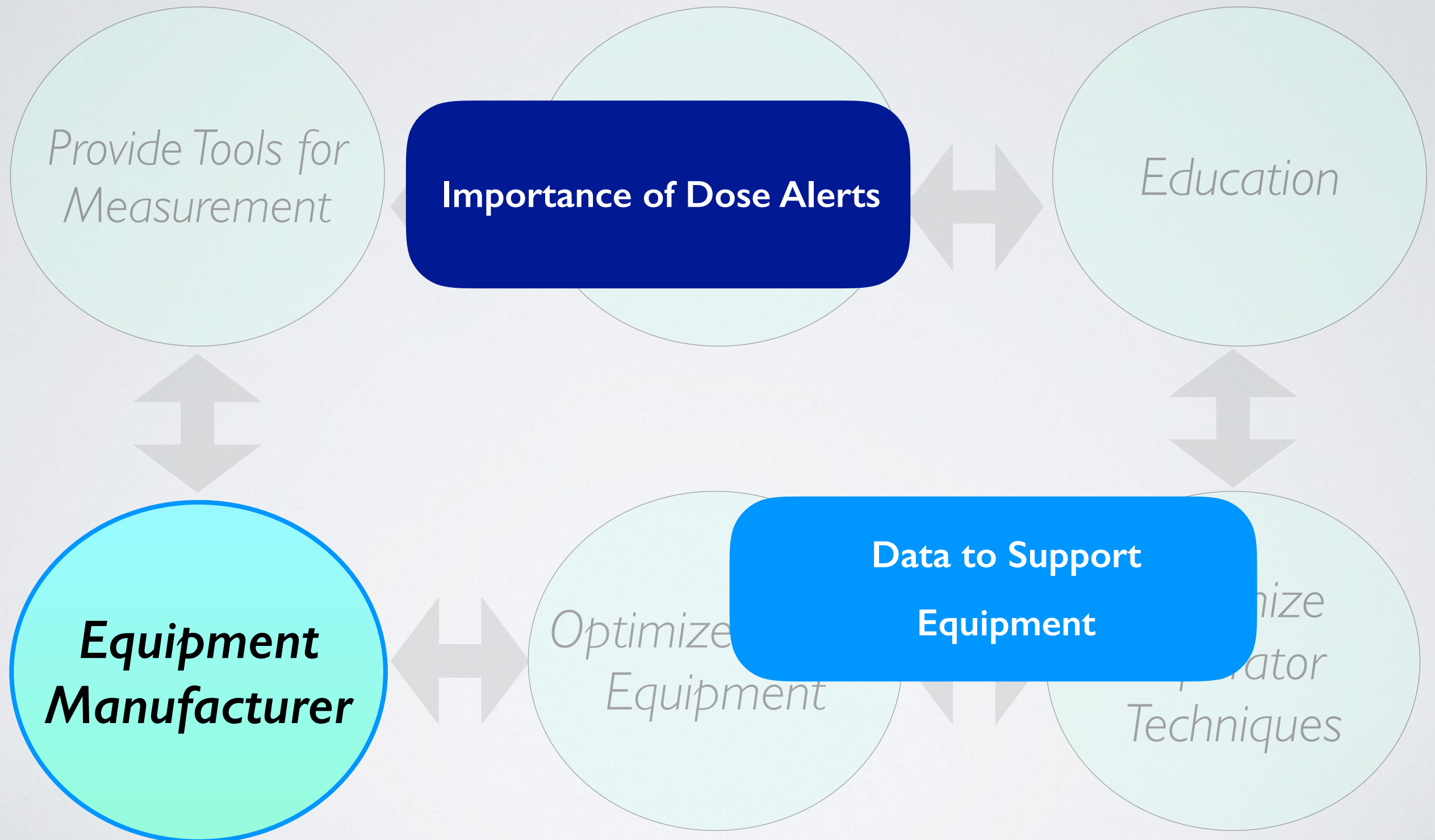
# LEARNING CYCLES



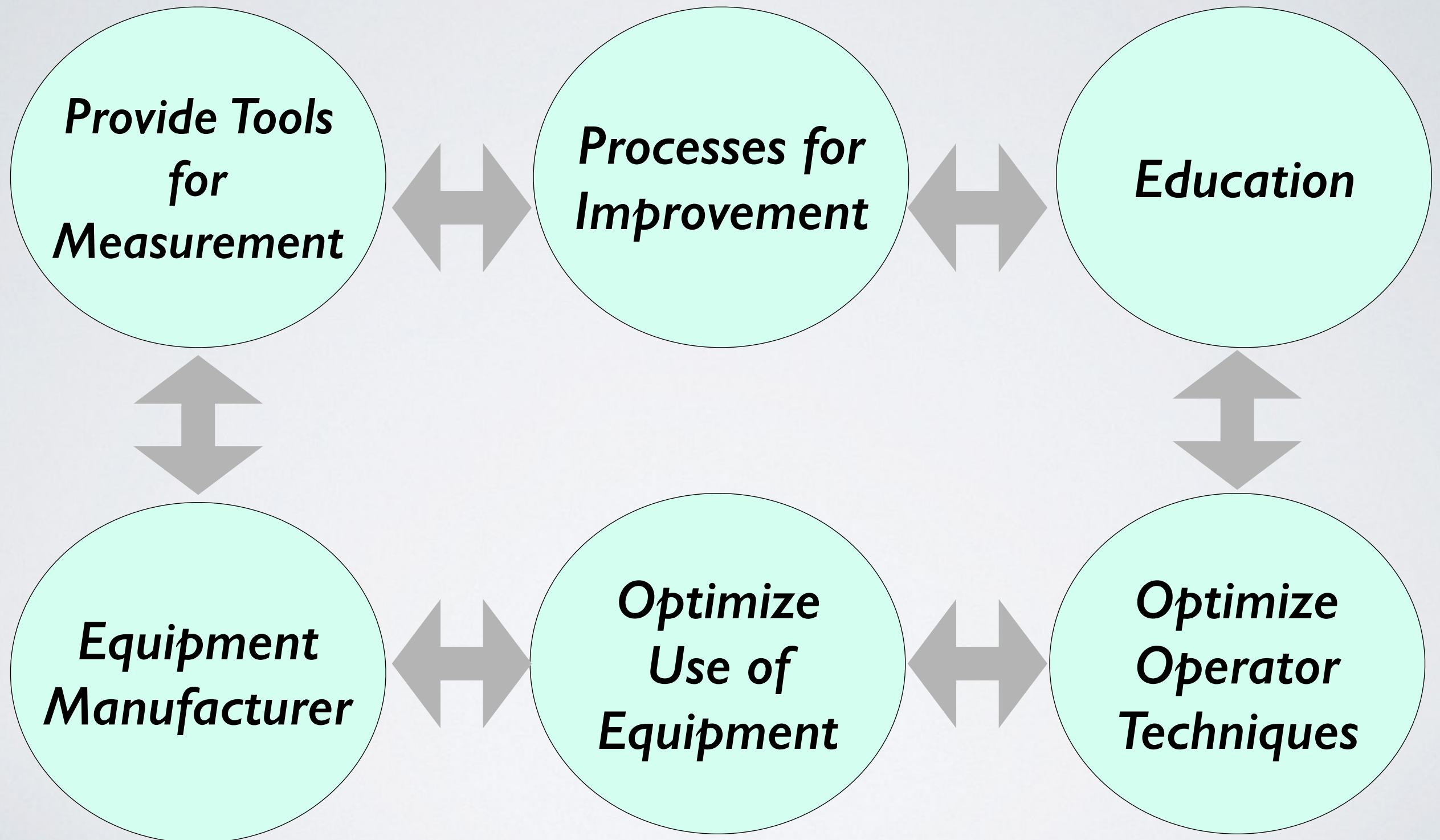
# LEARNING CYCLES



# LEARNING CYCLES



# LEARNING CYCLES





# CONCLUSIONS

Challenges Include

Data Entry Burden

Time for Data Review and Discussions

# CONCLUSIONS

The Community has an Undeniable...

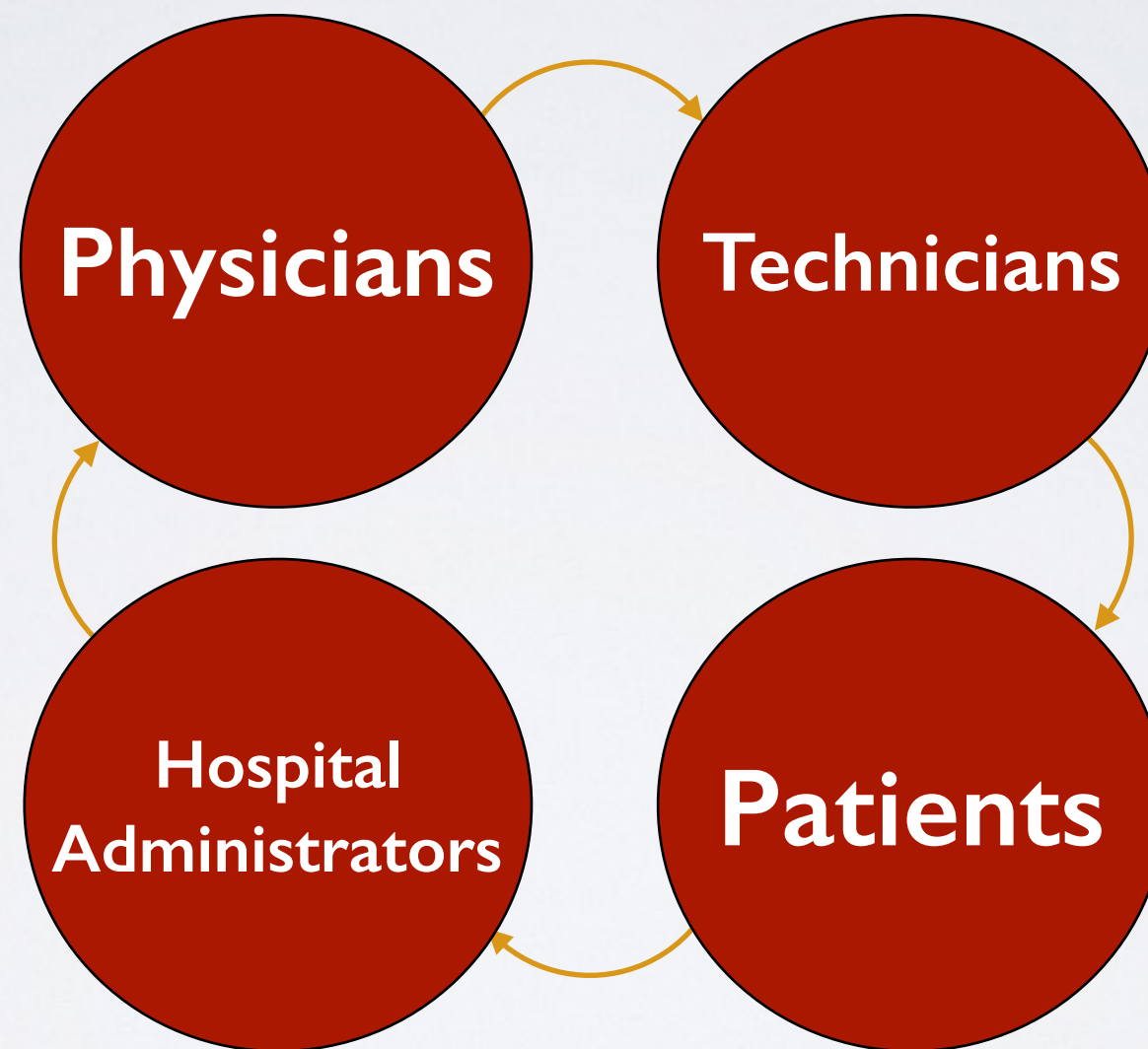
Agreement on the Critical Importance

Desire to Reduce Radiation Exposure in Patients

Commitment to Rapid Improvement

# CONCLUSIONS

Radiation safety initiatives have become a *community* conversation





*Through collaboration and learning cycles...*





***We Can Raise the Bar  
Lower Benchmarks &  
Reduce Radiation***



Boston Children's Hospital





# C3PO-QI PARTICIPATING SITES

*Congenital Cardiac Catheterization Outcomes Project - Quality Improvement*



Thank you!