

Utilization of Big Data to Assess Health System Performance

Patrice M. Weiss, M.D.

Executive Vice President and Chief Medical Officer, Carilion Clinic
Professor, Virginia Tech Carilion School of Medicine

DISCLOSURES

None



- **Integrated healthcare delivery system**
- **501 c 3 not-for-profit**
- **\$1.7 billion in annual revenue**
- **Headquartered in Roanoke**
- **12,800 employees**
- **7 hospitals**
- **Urgent care, home health agencies, retail pharmacies, wellness, patient transportation**
- **Children's Hospital**
- **Jefferson College of Health Sciences**
- **VTC School of Medicine & Research Institute**

Carilion Clinic

Integrated delivery system with multiple access points



A Word about our BIG Data...

- **BIG DATA**
 - Unstructured
 - Raw
 - Chaotic distribution
 - Un-validated
- **NOT relational databases**



CONVERGENCE

TRANSPARENCY

FINANCIAL FACTORS

PATIENT SAFETY CRISIS



DESCRIPTION	AMOUNT
DRUG ROUTINE	2.50
LABORATORY SPECIAL	87.00
ASAC	1.00
CELLANEUS CHARGES	5.415
PHYSICAL THERAPY	215.00
OCCUPATIONAL THERAPY	1,421.50
CENTRAL SERVICE	23,925.00
RESPIRATORY	25,766.75
ROOM CHARGE	110,614.88
TOTAL BILLED CHARGES	
CREDIT CARD PYMT	140.00
CREDIT CARD PYMT	400.00
DISCOUNT	2,344.00
TOTAL	22,007.00
% PAYMENTS	24.7
PAID BY ADJUTANT	
ACCOUNT NUMBERS	



CONVERGENCE

FINA
FAC



TIENT
FETY
RISIS

...RTY
...TORY S
...RACH
...LLAMED
...RICAL THE
...OCCUPATIONAL
...ENTRAL SERVING
...RSPATORY
...ROOM CHARGE
...TOTAL BILLED
...CREDIT CARD P
...REDIT CARD P
...CARE
...Y CASE
...Y PAYMEN
...E ADU
...OC



VTC | Virginia Tech Carilion
SCHOOL OF MEDICINE




CARILION CLINIC

FINANCIAL FACTORS

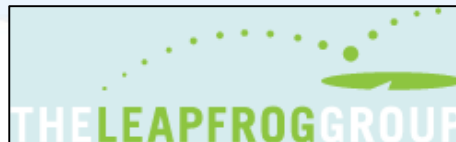
- **MACRA**
- **Value-Based Purchasing**
- **QHIP**
- **ACO**



DESCRIPTION	AMOUNT
LABORATORY ROUTINE	2,083.19
LABORATORY SPECIAL	4,521.68
PHARMACY	67,367.40
MISCELLANEOUS CHARGES	18.34
PHYSICAL THERAPY	5,419.94
OCCUPATIONAL THERAPY	210.08
CENTRAL SERVICE	1,421.18
RESPIRATORY	3,806.28
ROOM CHARGE	25,766.79
TOTAL BILLED CHARGES	110,614.88
CREDIT CARD PYMT	140.00-
CREDIT CARD PYMT	420.00-
MEDICARE	2,344.63-
MGD CARE	22,074.00-
TOTAL PAYMENTS	24,978.63-
MEDICARE ADJ	69,561.49-
PATIENT DISCOUNT	5,626.16-
TOTAL ADJUSTMENTS	75,187.65-

TRANSPARENCY

- Leap-frog
- Hospital Compare
- Healthgrades



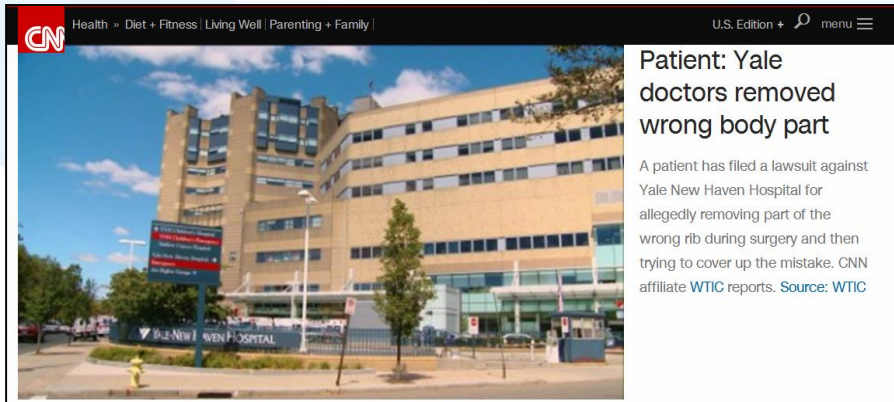
Comparative Data are Difficult to Understand!



CAUTION!!!
Mortality O/E for this
coaster is 9.7

PATIENT SAFETY

- 1999 IOM Report
- 2015 NPSF Update



This is **CONFUSING!!!**

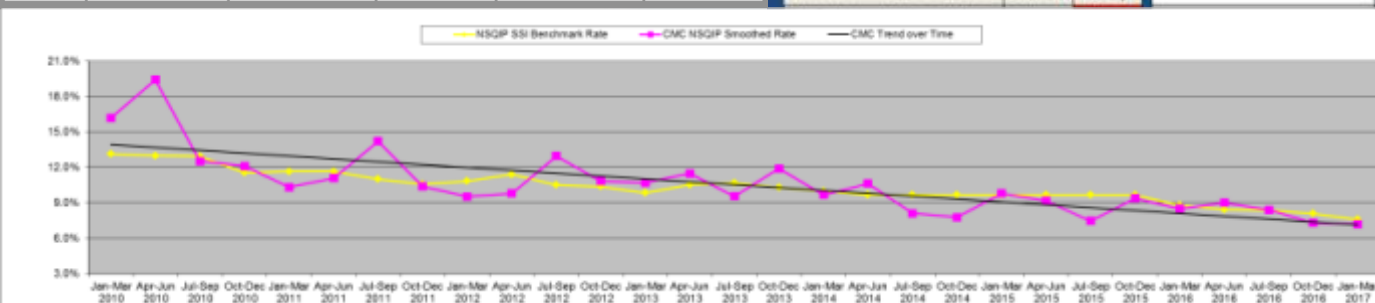
2016	18	Down	9.48	August 15 - July 16	7.3
		Down	1.04	July 15 - June 16	0.9
2017	14	Up	73.79%	FY16 (Oct. - Sept.)	72.3
		Down	11.56	FY16 (Oct. - Sept.)	4.4



Year	No. of Infections	Predicted: 2008 Risk Model	SIR: 2008 Risk Model	Predicted: 2017 Risk Model	SIR: 2017 Risk Model
2015	33	92.4	✓ 0.4	51.4	✓ 0.6
2016	27	87.5	✓ 0.3	48.7	✓ 0.6
2017	13			36.9	✓ 0.4

Measure Name	PTD Performance	"Estimate" Penalty	Measure
Hospital-Acquired Condition (HAC) Reduction Program			
AHRQ Modified PSI 95 Composite	0.78		Communication with
CLABSIRate	0.71		Communication with
CAUTI SRIrate	1.62		Responsiveness of H
SSI Colon	1.13	Unable to Calculate National Avg	Communications abo
SSI Hysterectomy	1.63		Cleanliness and Quar
HFSA	0.69		Discharge Informatio
C. Diffile	1.18		Care Transitions
Hospital Readmission Reduction Program			
Overall Rating of Hospital			
30-Day Mortality, AM "Survival Rate" OE			
Measure Name	PTD Performance	"Estimate" Penalty	Measure

Facility:	Carilion Medical Center		
Patient Safety Grade	2017	AHRQ Average (BM)	Gap - BM
A = Excellent	35%	34%	1%
B = Very Good	41%	42%	-1%
C = Acceptable	19%	19%	0%
D = Poor	4%	4%	0%
E = Failing	1%	1%	0%



49.54%	Unable to calculate at this time
73.22%	
1.00	
1.00	
0.99	
0.59%	
0.60	
0.00	
0.67	

Reference points for each program:

1. HAC Reduction: We cannot be certain of program performance because we do not know how others are performing in this competitive program.
2. Readmission Reduction Program: The performance period ended in June, 2017. We cannot minimize the CMS algorithm so we monitor our observed to expected ratio compared to the Premier 50th percentile.
3. Value-Based Purchasing Program: We cannot accurately reproduce CMC's 30 day mortality measures, thus inpatient mortality Q/E is utilized to trend performance. In addition, there is no reliable method to replicate the Hip/knee complications and Medicare Spend Per Beneficiary measures.

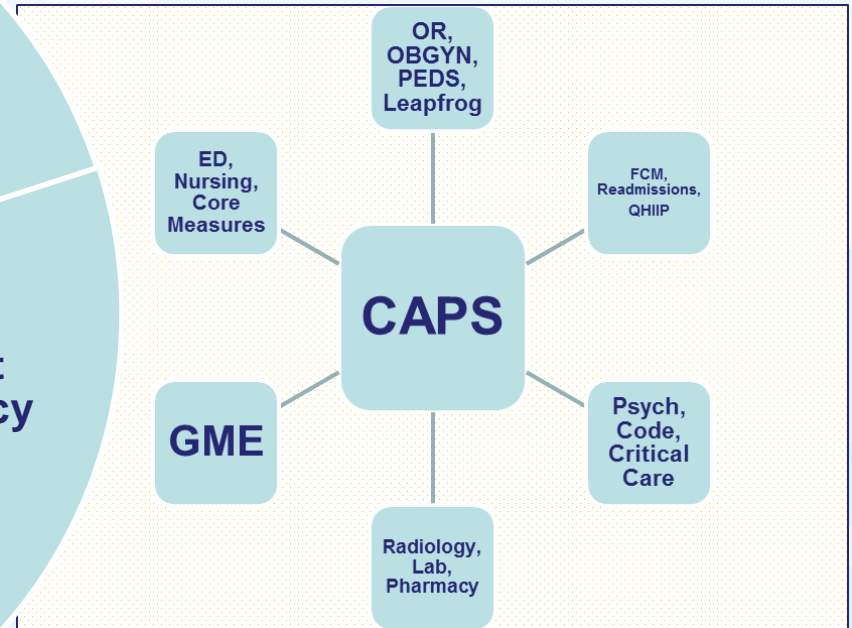
A long-exposure photograph of a night sky filled with blue and white star trails, creating a spiral pattern. The foreground shows a green field, a wooden fence, and a town with lights in the distance under a dark sky.

CARILION CLINIC PERSPECTIVE



We have the opportunity to utilize BIG DATA to redesign care in order to provide greater VALUE to our patients. We should do this well.

Clinical Advancement & Patient Safety



Clinical Advancement Program



Clinical Advancement Program



Facility KPIs
(Quality Plan)



Department KPIs



Unit KPIs



Practice KPIs

Clinical Advancement Program

**MEANINGFUL
IMPROVEMENT**



Converting Data into Intelligence

Intelligence

Collective application
of knowledge in action

Knowledge

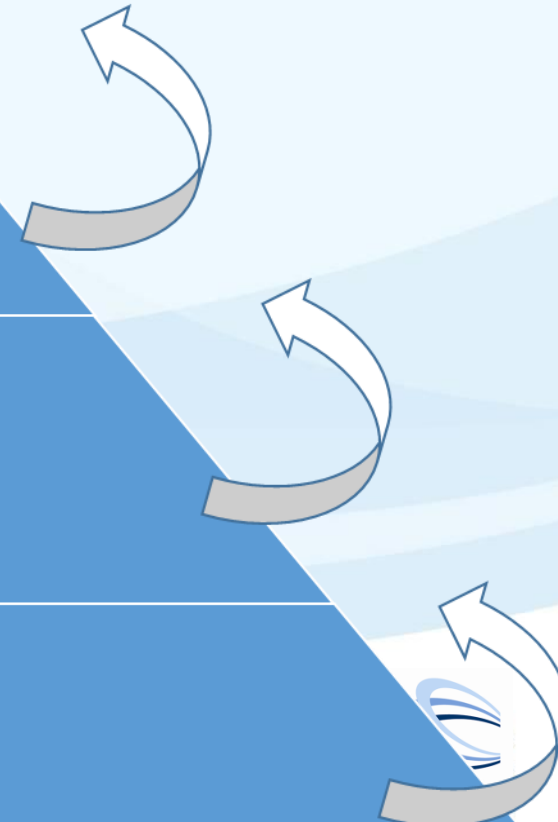
Organized Information

Information

Captured Data

Data

Facts of the World

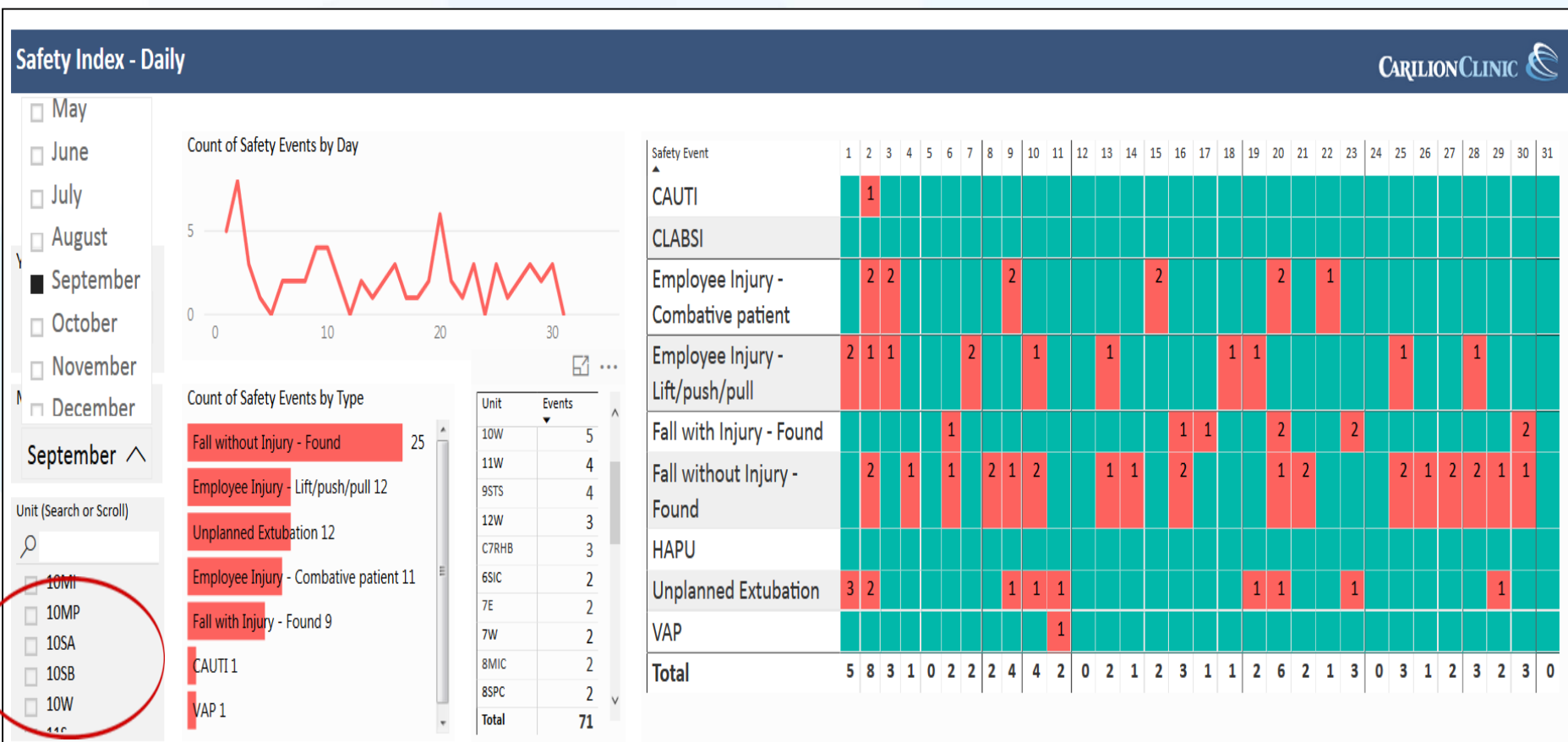


When sharing data... ...be kind!



Safety Index:

Occurrences facilitates **improvement**



2018 CMC Quality Plan

QUALITY PLAN: FY18

Carilion Medical Center

Report as of:07/11/2018

Reported Quarterly to Board of Trustees

Current Performance

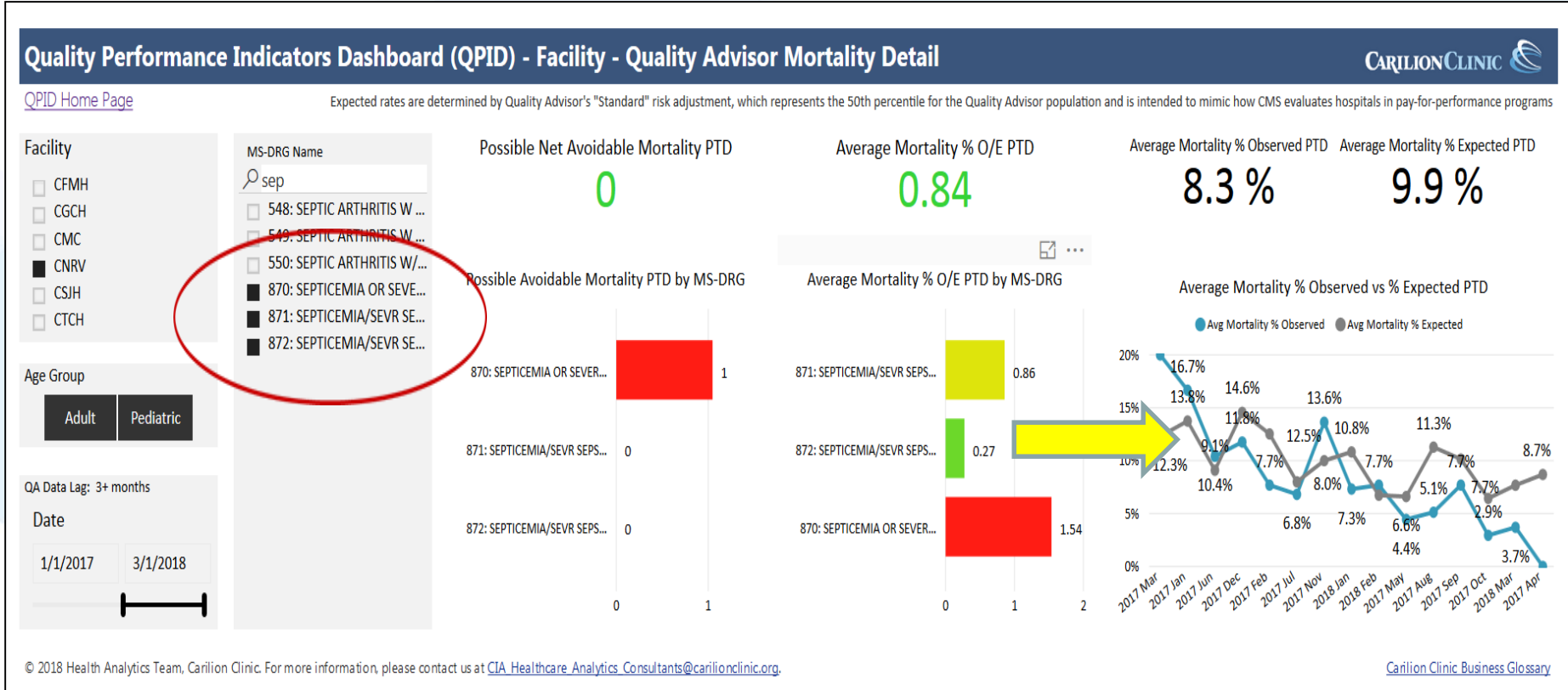
Meeting

Progress

Not Meeting

Improvement Opportunity / Project	Key Metrics	Champion	Desired Direction	Baseline Performance		Current Performance	Goal	
				Value	Time Pd	PTD Value	Target	By When
Quality, Patient Safety and Experience								
CAUTI	Occurrence	Dr. Baffoe-Bonnie	Down	79.00	FY16 (Oct. - Sept.)	35 (8 months)	70 (6/month)	Sep. 30, 2018
C. Diff	Occurrence	Dr. Kerkering	Down	172	August 15 - July 16	63 (6 months)	155 (13/month)	
30 Day Medicare Readmission (7 Dx)	Observed/Expected	Donna Littlepage	Down	1.02	July 16 - June 17	0.94	1	
Inpatient Mortality	Observed/Expected	Dr. Jon Gleason	Down	0.9	July 16 - June 17	1.01	1	
HCAHPS - Would recommend (hospital-system)	HCAHPS	Tim Auwarter	Up	84.28	FY16 (Oct. - Sept.)	84.58	85.3	
Provider Communication (hospital-system)	HCAHPS	Tim Auwarter	Up	76.9	FY16 (Oct. - Sept.)	78.4	77.9	

Quality Performance Indicators Dashboard



AHRQ Patient Safety Indicators

Quality Performance Indicators Dashboard (QPID) - Facility - Quality Advisor PSI



[QPID Home Page](#)

Facility

- CFMH
- CGCH
- CMC
- CNRV
- CSJH
- CTCH

Age Group

- Adult
- Pediatric

QA Data Lag: 3+ months

Date

10/1/2015 3/1/2018

PSI Total Count PTD

26

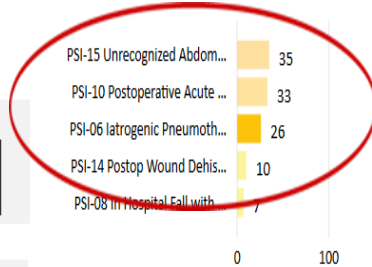
PSI 90 Grouping

Non-PSI 90
PSI 90

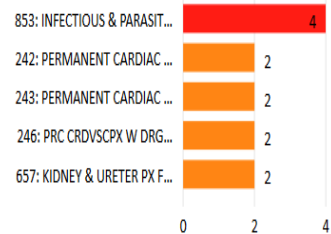
MS-DRG Name

- 0: Outpatient
- 1: HEART TRNSPLT/IMPLT ...
- 2: HEART TRNSPLT/IMPLT ...
- 3: ECMO/TRCHWMV>96H...
- 4: TRCH WMV >96HR/PDX...
- 5: LIVER TRNSPLNT WMC...
- 6: LIVER TRANSPLANT W/...

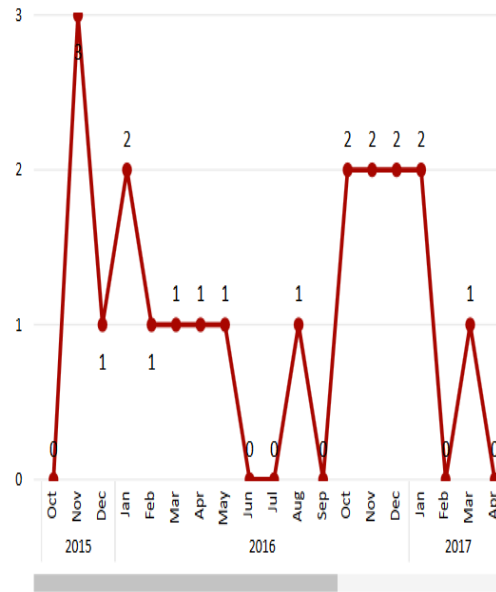
Overall PSI Counts by PSI PTD



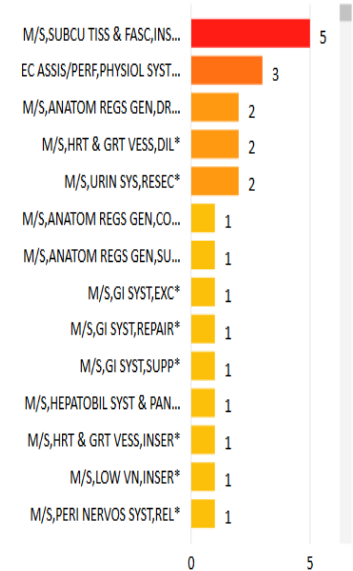
Overall PSI Counts by MS-DRG PTD



PSI Count by Year and Month



PSI Count by ICD-10 Principal Procedure PTD



© 2018 Health Analytics Team, Carilion Clinic. For more information, please contact us at CIA_Healthcare_Analytics_Consultants@carilionclinic.org.

[Carilion Clinic Business Glossary](#)

Quality Performance Indicators Dashboard

Quality Performance Indicators Dashboard (QPID) - Facility - KPI
CARILION CLINIC

[QPID Home Page](#)

Facility

CMC ▼

Fiscal year

2018 ▼

Department

- Anesthesia
- ECM
- Medicine
- OB/GYN
- Orthopedics
- Pediatrics
- Psychiatry
- Surgery

Metric	As of Date	PTD Average	Current Value	Target	Limit	Current Status	Trend
CAHPS overall rating (%)	May 2018	76.44	79.50	85.80	70.00	▲	
THA & TKA Complications (%)	Mar 2018	1.69	0.00	1.10	1.20	✓	
THA & TKA Readmissions (Ratio)	Feb 2018	0.59	0.60		0.76	✓	

© 2018 Health Analytics Team, Carilion Clinic. For more information, please contact us at CIA_Healthcare_Analytics_Consultants@carilionclinic.org. [Carilion Clinic Business Glossary](#)

Descriptive to Prescriptive



BARRIERS...

- **COST: \$8 Billion in 2016 → \$24 Billion, 2021**
- **DATA BREACH - \$17 Billion at Risk**
- **Privacy**
- **Data Integrity**
- **Data is not the core competency of a health system, or healthcare provider.**

QUESTIONS???

