



Data Visualization Best Practices

IAP Data Analytics Webinar

January 25, 2017, 3:00pm EST



Today's Speakers

- Jessie Parker, GTL and Analyst on Medicaid IAP Data Analytic Team, Data and Systems Group, CMCS
- Katherine Rowell, Co-Founder and Principal HealthDataViz





Agenda for Today's Call

- Overview of Medicaid Innovation Accelerator Program
- Presentation Overview
- Data Visualization Research and Best Practices
- Questions and Answers



Medicaid Innovation Accelerator Program (IAP)

- (Four year commitment by CMS to build state capacity and support ongoing innovation in Medicaid through targeted technical assistance
- (A Center for Medicare & Medicaid Innovation (CMMI) funded program that is led by and lives in Center for Medicaid and CHIP Services (CMCS)
- (Supports states' and HHS delivery system reform efforts
 - The end goal for IAP is to increase the number of states moving towards delivery system reform across program priorities



Medicaid Delivery System Reform

Р	RO	GR	AM	AR	EAS

Improving Care for Medicaid Beneficiaries with Complex Care Needs and High Costs Promoting Community Integration Through Long-Term Services and Supports

Supporting Physical and Mental Health Integration Reducing Substance Use Disorders

Functional Areas

- Data Analytics
- Quality Measurement
- Performance Improvement
- Value-Based Payment and Financial Simulations



IAP Data Analytics Support State Medicaid Agencies

Overarching Goal:

Assist states in using data to improve programmatic decisionmaking across a variety of analytic areas.

This Webinar:

Review techniques to improve states' data visualization capabilities.



Presentation Overview

- 1. What do we need to know to create great visual displays? (
- 2. The importance of understanding your data's lineage.
- 3. Basic statistics are required.
- 4. Lessons learned from visual and cognitive research.
- 5. When to use a table.
- 6. When to use a graph.
- 7. Dashboards defined.
- 8. How to create a great dashboard.
- 9. What's an infographic anyway?
- 10. Technology alone is not the solution.



Visual Intelligence Data Visualization Research & Best Practices





1. What do we need to know to create great visual displays?





Health, Healthcare & Basic Statistics

Data Visualization & Visual Intelligence

Technology





Health, Healthcare & Basic Statistics





IAP Medicaid Innovation Accelerator Program

2. The importance of understanding your data's lineage.





1982 Universal Billing (Administrative Data)







Clinical Data Registries



Home

About STS Membership Education & Meetings

STS National Database Database Participants Database Managers Quality, Research & Patient Safety Advocacy Resources & Publications

For Patients

Membership Join Now Benefits Renew



STS National Database

The STS National Database was established in 1989 as an initiative for quality improvement and patient safety among cardiothoracic surgeons. There are three components to the STS National Database, each focusing on a different area of cardiothoracic surgery—Adult Cardiac, General Thoracic, and Congenital Heart Surgery, with the availability of Anesthesiology participation within the Congenital Heart Surgery Database. The Database has grown exponentially over the years, both in terms of participation and stature.

Quality Improvement

The component Databases provide opportunities for quality improvement to their participants. The Society has developed quality performance measures in all three sub-specialties of surgery, and these measures have either been endorsed or are in the process of being considered for endorsement by the National Quality Forum. By collecting outcomes data for submission to the STS National Database, surgeons are committing to improving the quality of care that their cardiothoracic surgery patients receive.

Clinical Research

The Database has the corollary potential to be a powerful tool for clinical research. Since its inception, more than 100 publications have been derived from Database outcomes. These studies have been published in a variety of professional journals and textbooks and have significantly advanced knowledge in cardiothoracic surgery.

New Initiatives

The Database continues to expand with new initiatives. Launched in January 2011, STS Public Reporting Online enables Database participants to voluntarily report to the public their heart bypass surgery performance. Overall composite star ratings as well as their component ratings are listed on sts.org for more than 250 Database participants. The Adult Cardiac Surgery Database, now containing more than 4.5 million surgical records, represents an estimated 94 percent of all adult cardiac surgery centers across the U.S. With the success of participation nationally, STS launched in 2011 an initiative to accommodate Database participation worldwide by including international participants in the Adult Cardiac Surgery Database.



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Home > Medicaid > Quality of Care > Performance Measurement > Nationwide Adult CAHPS

Performance Measurement	
Child Core Set	
Adult Quality Grants	
Adult Core Set	
Nationwide Adult CAHPS	
CAHPS® Home and Community Based Services Survey	

Nationwide Adult Medicaid CAHPS

In the Fall of 2014, CMCS conducted a Nationwide Adult Medicaid (NAM) CAHPS survey of Medicaid enrollees to attain national and state-by-state measures of access, barriers to care, and experiences with care across delivery systems and major population subgroups. The survey interviewed a representative sample of adults ages 18 and older enrolled in Medicaid during October 2013 through December 2013. This first-of-its kind survey provides baseline information on the experiences of low-income adults prior to a state's expansion of coverage to the new adult group that took effect on January 1, 2014. These data will be used to inform CMS and state efforts to improve health care delivery for Medicaid enrollees. Additional information is available in a CMCS Informational Bulletin D.

Additional Resources

NORC's Medicaid CAHPS Project Page

Handout for the Nationwide Adult Medicaid CAHPS

Questions or requests for technical assistance related to the Nationwide Adult Medicaid CAHPS survey can be directed to: <u>MedicaidCAHPS@norc.org</u>.



Quality of Data

Importance of Understanding the Quality and Timeliness of Your Data

- Is the data well defined and documented?
- Is it timely?
- Is it complete (missingness)?
- Is it ever audited?



Understanding why and for what purpose data is being captured, along with the quality of the data is essential to understanding what insights it can and cannot deliver.





3. Basic statistics are required.





Mean or Median

Which statistic would you use to describe this group's annual income?







Mean vs. Median

Medical Patients' Average Length of Stay (ALOS)		Medical Patients' Median Length of STAY		
Α	3	С	1	
В	2	В	2	
С	1	Ι	2	
D	5	А	3	
E	8	G	3	
F	9	D	5	
G	3	Н	5	
н	5	E	8	
1	2	F	9	
ALOS	4.2	Median	3.0	







Decreased reoperative complications results in a better patient experience as well as a better use of hospital resources, as shown in the decreased length of stay for both colon resections and gastric bypass. Image 4 of 5

CLOSE X



AP Medicaid Innovation Accelerator Program

SCOAP Example - Details





Compared with what?





Values with No Comparisons

What do these values tell us? 10,000 Cancer Deaths 25,000 Surgeries 1,000 Live Births 500 Beneficiaries 200 Immunizations



Examples of Possible Comparison Values

We always need a comparison

- Budget
- Target
- Expected
- Similar Programs
- Previous Year
- Competitor
- Benchmark



If the viewers of your dashboards, reports or infographics can't answer SO WHAT you need to go back to the drawing board.





Data Visualization & Visual Intelligence





IAP Medicaid Innovation Accelerator Program

4. Lessons learned from visual and cognitive research.





I See, I Understand

70% of the way we take in all data and information is through our eyes.





Gestalt Principles of Visual Perception (Pattern Seeking)

Principle	Description
Proximity	Objects that are close together are perceived as a group.
Similarity	Objects that share similar attributes are perceived as being part of a group.
Enclosure	Objects collected within a boundary-like structure are perceived as a group.
Closure	Open structures are perceived as closed, complete, and regular whenever there is a way that they can be reasonably interpreted that way.
Continuity	Objects that are aligned together or appear to be a continuation of one another are perceived as a group.
Connection	Objects that are connected are perceived as a group.



Proximity

Objects that are close together are perceived as a group.







Continuity

Objects that are aligned together or appear to be a continuation of one another are perceived as a group.











Decreased reoperative complications results in a better patient experience as well as a better use of hospital resources, as shown in the decreased length of stay for both colon resections and gastric bypass. Image 4 of 6

CLOSE X



Pre-Attentive Processing is the ability of the low-level human visual system to rapidly identify certain basic visual properties.





Count the Fives





See the Fives


Data-Ink Ratio

Good graphics should include only data-ink. Non-data-ink is to be deleted everywhere else possible.

Above all else show the data Tufte, 1983





		CY10			
Priority Area	Accountability	Q1	Q2	Q3	Q4
Falls					
Patient Falls with Injury		0.46	0.45	0.41	
Serious Reportable Events		1	0	1	6
Medical Records					
MD Notes Composite		72%	66%	65%	67%
H&P Compliance		100%	96%	94%	95%
H&P Updated per Policy		41%	21%	80%	45%
Medication Management-Inpatient					_
Medications Secured Properly		88%	83%	78%	
Expired Meds (Doses)		435	277		
Patients' Own Meds-Labelling		38%	86%	60%	
Recording/Reporting Fridge Temp		40%	70%	53%	
Patient Education on AntiCoag		80%			
Med Rec-Admission	_	89%	92%	89%	87%
Med Rec-Discharge	_	98%	98%	98%	97%
Medication Management-Outpatient					
Sites-MESAC Approval of Samples		100%	100%	100%	
Sites-Correct Use of SIMS for	_				
Approved Samples		86%	86%	86%	
Pain Management					
Pain Assessment/Reassessment		NA	97%	98%	98%
Severe Pain Management	_	NA	84%	95%	97%
Patient Identifiers					
Mislabeled Specimens		1058	1110	1177	1143
Blood Transfusion RN Verification	_		Data	TBD	
Safety Reporting Proxy	_	0	0	0	0
Patient Rights					
Grievance Responded (per Hospital					
policy)		NA	79%	82%	76%
Restraints					
Restraint Prevalence		NA	NA	6.1%	3.2%
MD/NP/PA Daily Assessment		NA	NA	NA	33%
Ordered per Policy		NA	90%	89%	89%
Utilization Matches Order		NA	88%	80%	37%
RN Assessment & Interventions		NA	92%	82%	85%
Skin Integrity					
Pressure Ulcer Prevalence		NA	NA	2.9%	2.1%
CNS Consults (>Stage 2)	-	NA	95%	87%	
Wound Measured Weekly	-	NA	86%	80%	
Serious Reportable Events	-	3	2	1	4
Universal Protocol			_		
LIP Compliance (Procedural Areas)		0.6%	00%	9.4%	020/
UP Compliance (Ambulatory Areas)	_	7 1 %	01%	64%	96.04
Wrong Site Procedures SPE	-	0	2	0470	- 00 70
Other NDSCe		0	2	0	
Critical Value Callbacko		NIA	NIA	0.00/	0.0.04
		NA	NA	9070	98%
later patients without Orders			Det	TOD	
Interventions without Orders			Data	TDD	
Intection Control			Data	TBD	
Internal Handoffs			Data	IBD	



Show the Data

_	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Group 1	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,500	3,750
Group 2	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
Group 3	2,000	2,250	2,500	2,750	3,000	3,250	3,500	3,750	4,000	4,250	4,500	4,750
Group 4	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000
Group 5	3,000	2,900	2,800	2,700	2,600	2,500	2,400	2,300	2,200	2,100	2,000	1,900
Group 6	3,500	3,300	3,100	2,900	2,700	2,500	2,300	2,100	1,900	1,700	1,500	1,300
Group 7	4,000	4,200	4,400	4,600	4,800	5,000	5,200	5,400	5,600	5,800	6,000	6,200
Group 8	4,500	4,100	3,700	3,300	2,900	2,500	2,100	1,700	1,300	900	500	100
Group 9	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500	9,000	9,500	10,000	10,500
Group 10	5,500	5,200	4,900	4,600	4,300	4,000	3,700	3,400	3,100	2,800	2,500	2,200



Color used well can enhance and clarify a presentation. Color used poorly will obscure, muddle, confuse.





Inappropriate Use of Color

What are the colors conveying?





Medicaid and CHIP

Color

Use color to show differences and highlight important information.





Fill in the blank: Approximately 10% of all males and 1% of all females are





Color Normal



	CY	10	
Q1	Q2	Q3	Q4
0.46	0.45	0.41	
1	0	1	6
72%	66%	65%	67%
100%	96%	94%	95%
41%	21%	80%	45%
88%	83%	78%	
435	277		
38%	86%	60%	
40%	70%	53%	
80%			
89%	92%	89%	87%
98%	98%	98%	97%
1000			
100%	100%	100%	
86%	86%	86%	
NA	97%	98%	98%
NA	84%	95%	97%
4.050		4 4 7 7	
1058	1110	11//	1143
0	Data	IBD	0
0	Data 0	0	0
0	Data 0	0	0
0	Data 0	0	0
0 NA	Data 0 79%	82%	0 76%
NA	0 79%	82%	0
NA NA	0 79%	82%	0 76% 3.2%
NA NA NA	Data 0 79% NA NA 90%	82%	0 76% 3.2% 33%
NA NA NA NA NA	Data 0 79% NA NA 90% 88%	82% 6.1% NA 89% 80%	0 76% 3.2% 33% 89% 37%
NA NA NA NA NA NA	Data 0 79% NA NA 90% 88% 92%	82% 6.1% NA 89% 80% 82%	0 76% 3.2% 33% 89% 37% 85%
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NA NA NA NA NA NA	Data 0 79% NA NA 90% 88% 92% NA 95%	82% 6.1% NA 89% 80% 82% 2.9% 87%	0 76% 3.2% 33% 89% 37% 85% 2.1%
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CY10						
Q1	Q2	Q3	Q4			
0.46	0.45	0.41				
1	0	1	6			
72%	66%	65%	67%			
100%	96%	94%	95%			
41%	21%	80%	45%			
88%	83%	78%	83%			
38%	86%	60%	86%			
40%	70%	53%	83%			
80%	80%	80%	80%			
89%	92%	89%	87%			
98%	98%	98%	97%			
100%	100%	100%				
86%	86%	86%				
NA	97%	98%	98%			
NA	84%	95%	97%			
1058	1110	1177	1143			
	Data	TBD				
0	0	0	0			
NA	79%	82%	76%			
NA	NA	6.1%	3.2%			
NA	NA	NA	33%			
NA	90%	89%	89%			
NA	88%	80%	37%			
NA	92%	82%	85%			
NA	NA	2.9%	2.1%			
NA	95%	87%				
NA	86%	80%				
3	2	1	4			
96%	99%	94%	92%			
71%	91%	64%	86%			
0	2	0	1			
0						
NA	NA	98%	98%			
11/5	107	0078	0078			
	Data	TRD				
Data TBD						
	Data	IBD				
Data IBD						

Dichromatic





Questions so far?





5. When to use a table.





Tables

Use a TABLE to:

- Look up individual values
- Compare individual values
- Display precise values
- Communicate more than one unit of measure



Table "Before" Example

Annual Monitoring for Patients on Persistent Medications - ACE Inhibitors or ARBs	80%	84%	81%	80%
Annual Monitoring for Patients on Persistent Medications - ACE Inhibitors or ARBs	85%	84%	81%	80%
Annual Monitoring for Patients on Persistent Medications - ACE Inhibitors or ARBs	85%	84%	81%	80%
Annual Monitoring for Patients on Persistent Medications - ACE Inhibitors or ARBs	84%	84%	81%	86%
Annual Monitoring for Patients on Persistent Medications - ACE Inhibitors or ARBs	84%	84%	81%	80%
Annual Monitoring for Patients on Persistent Medications - ACE Inhibitors or ARBs	01%	04%	01%	00%
	5%			
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	73%	69%	62%	71%
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	70%	69%	62%	71%
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	70%	00%	62%	71%
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	0876	09%	02%	71%
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	08%	09%	62%	71%
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	00%	09%	02%	71%
	6%			
Annual Monitoring for Patients on Persistent Medications - Diuretics	85%	84%	80%	80%
Annual Monitoring for Patients on Persistent Medications - Diuretics	84%	84%	80%	80%
Annual Monitoring for Patients on Persistent Medications - Diuretios	84%	84%	80%	80%

Annual Monitoring for Patients on Persistent				
Medications - Diuretics	83%	84%	80%	86%
Annual Monitoring for Patients on Remistent				
Medications - Diuretics	83%	84%	80%	80%
Annual Manifestra des Batients de Bassistent				
Annual Monitoring for Patients on Persistent	0.156	0.4%	8084	0.004
Neoroalions - Diareous	01%	04.96	0076	00%
Annual Manitorian for Patients on Parcistant	4%			
Medications - Total rate	05%	02%	80%	05%
Annual Monitoring for Patients on Persistent	00 %	0074		00.0
Medications - Total rate	84%	83%	80%	85%
Annual Monitoring for Patients on Persistent				
Medications - Total rate	84%	83%	80%	85%
Annual Monitoring for Patients on Persistent				
Medications - Total rate	82%	83%	80%	85%
Medications - Total rate	83%	83%	80%	85%
Annual Monitoring for Patients on Persistent		0074		
Medications - Total rate	01%	83%	80%	05%
	4%			
Antidepressant Medication Management - Effective				
Acute Phase Treatment	71%	68%	63%	72%
Antidenressant Medication Management - Effective				
Acute Phase Treatment	09%	68%	63%	72%
Antidepressant Medication Management - Effective				704
Acute Phase Treatment	08%	08%	03%	7.296
Antidepressant Medication Management - Effective				
Acute Phase Treatment	08%	68%	63%	72%
Antidepressant Medication Management - Effective	0.035	0004	6256	7294
Acuse Phase Treatment	00%	00%	0376	1270
Antidepressant Medication Management - Effective				
Acute Phase Treatment	64%	68%	63%	72%
	6%			
Antidepressant Medication Management - Effective				
Continuation Phase Treatment	04%	62%	40%	00%
Antidepressant Medication Management - Effective				
Continuation Phase Treatment	04%	52%	40%	55%
Antidepressant Medication Management - Effective	6334	6264		
CONTRACTOR OF THE REAL PROPERTY OF THE REAL PROPERT		0.478	40%	001

Antidepressant Medication Management - Effective Continuation Phase Treatment	52%	52%	40%	50%
Antidepressant Medication Management - Effective Continuation Phase Treatment	50%	52%	40%	55%
Antidepressant Medication Management - Effective Continuation Phase Treatment	41%	52%	475	55%
	7%			
Appropriate Testing for Children with Pharyngitis	63%	90%	77%	80%
Appropriate Testing for Children with Pharyngitis	92%	90%	77%	89%
Appropriate Testing for Children with Pharyngitis	92%	-	77%	ION
Appropriate Testing for Children with Pharyngitis	50%	90%	77%	80%
Appropriate Testing for Children with Pharyngitis	60%	90%	77%	ED.N.
Appropriate Testing for Children with Pharyngitis	63%	90%	77%	89%
	10%			
Appropriate Treatment for Children with Upper Respiratory Infection (URI)	97%	-	84%	92%
Appropriate Treatment for Children with Upper Respiratory Infection (URI)	90%	94%	84%	93%
Appropriate Treatment for Children with Upper Respiratory Infection (URI)	90%	94%	84%	83%
Appropriate Treatment for Children with Upper Respiratory Infection (URI)	95%	94%	84%	93%
Appropriate Treatment for Children with Upper Respiratory Infection (URI)	93%	94%	84%	93%
Appropriate Treatment for Children with Upper Respiratory Infection (UR)	63%	94%	84%	93%
	3%			
Austidance of Antibiotic Treatment in Adults with Acute Bronchilds	30%	22%	24%	21%

Measure Name	Regional Rate	MA Rate	NCQA Nat Ave	NCGA 90th Percentile
Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis	20%	22%	24%	319
Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis	21%	22%	24%	319
Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis	21%	22%	24%	319
Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis	21%	22%	24%	319
Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis	20%	22%	24%	319
	10%			
Breast Cancer Screening	84%	83%	71%	80%
Breast Cancer Screening	84%	83%	71%	809
Breast Cancer Screening	83%	83%	71%	80%
Breast Cancer Screening	82%	83%	71%	80%
Breast Canoer Screening	82%	83%	71%	80%
Breast Cancer Screening	82%	83%	71%	80%
	2%			
Cervical Cancer Screening	80%	87%	77%	835
Centical Cancer Screening	87%	87%	77%	835
Cervical Cancer Screening	87%	87%	77%	835
Cervical Cancer Screening	88%	87%	77%	839
Cervical Cancer Screening	87%	87%	77%	83%
Cervical Cancer Screening	83%	87%	77%	835
	2%			
Chlamydia Screening in Women Ages 15 to 20	05%	57%	41%	529
Chlamydia Screening in Women Ages 15 to 20	58%	57%	41%	529
Chlamydia Screening in Women Ages 15 to 20	58%	67%	4196	629
Chlamydia Screening in Women Ages 15 to 20	50%	67%	41%	529
Chlamydia Screening in Women Ages 15 to 20	53%	57%	41%	529
Chlamydia Screening in Women Ages 15 to 20	50%	67%	4196	529
	14%			
Chlamydia Screening in Women Ages 21 to 24	00%	62%	45%	599
Chlamydia Screening in Women Ages 21 to 24	04%	62%	45%	599
Chlamydia Screening in Women Ages 21 to 24	03%	02%	45%	599
Chlamydia Screening in Women Ages 21 to 24	59%	62%	45%	593

Chiamydia Screening in Women Ages 21 to 24	59%	62%	45%	50%
Chlamydia Screening in Women Ages 21 to 24	58%	62%	45%	59%
	8%			
Cholesterol Management for Patients with Cardiovascular Conditions-LDL-C Screening	93%	92%	88%	93%
Cholesterol Management for Patients with Cardiovascular Conditions-LDL-C Screening	93%	92%	88%	93%
Cholesterol Management for Patients with Cardiovascular Conditions-LDL-C Screening	93%	92%	80%	93%
Cholesterol Management for Patients with Cardiovascular Conditions-LDL-C Screening	93%	92%	80%	93%
Cholesterol Management for Patients with Cardiovascular Conditions-LDL-C Screening	92%	92%	88%	93%
Cholesterol Management for Patients with Cardiovascular Conditions-LDL-C Screening	88%	92%	88%	93%
	6%			
Colorectal Cancer Screening	82%	77%	61%	72%
Colorectal Cancer Screening	78%	77%	01%	72%
Colorectal Cancer Screening	78%	77%	01%	72%
Colorectal Cancer Screening	78%	77%	61%	72%
Colorectal Cancer Screening	75%	77%	61%	72%
Colorectal Cancer Screening	71%	77%	61%	72%
	11%			
Comprehensive Diabetes Care - HbA1c Testing	95%	94%	89%	94%
Comprehensive Diabetes Care - HbA1c Testing	94%	94%	89%	94%
Comprehensive Diabetes Care - HbA1c Testing	94%	94%	89%	94%
Comprehensive Diabetes Care - HbA1c Testing	94%	94%	89%	94%
Comprehensive Diabetes Care - HbA1o Testing	93%	94%	89%	04%
Comprehensive Diabetes Care - HbA1c Testing	93%	94%	89%	94%
	3%			
Comprehensive Diabetes Care - LDL-C Screening	92%	01%	85%	01%
Comprehensive Diabetes Care - LDL-C Screening	92%	91%	05%	91%
Contraction Distance of the Contraction				

Comprehensive Diabetes Care - LDL-C Screening	90%	91%	85%	91%
Comprehensive Diabetes Care - LDL-C Screening	80%	91%	85%	91%
Comprehensive Diabetes Care - LDL-C Screening	87%	91%	85%	91%
Comprehensive Diabetes Care - Medical Attention for Nephropathy	91%	80%	83%	90%
Comprehensive Diabetes Care - Medical Attention for Nephropathy	90%	80%	83%	90%
Comprehensive Diabetes Care - Medical Attention for Nephropathy	90%	80%	83%	90%
Comprehensive Diabetes Care - Medical Attention for Nephropathy	89%	89%	83%	90%
Comprehensive Diabetes Care - Medical Attention for Nephropathy	80%	80%	83%	90%
Comprehensive Diabetes Care - Medical Attention for Nephropathy	80%	89%	83%	90%
	5%			
Follow-up of Care of Children Presoribed ADHD Medications - Initiation Phase	50%	45%	37%	45%
Follow-up of Care of Children Presoribed ADHD Medications - Initiation Phase	40%	45%	37%	45%
Follow-up of Care of Children Prescribed ADHD Medications - Initiation Phase	45%	45%	37%	45%
Follow-up of Care of Children Presoribed ADHD Medications - Initiation Phase	47%	45%	37%	45%
Follow-up of Care of Children Presoribed ADHD Medications - Initiation Phase	41%	40%	37%	45%
Follow-up of Care of Children Presoribed ADHD Medications - Initiation Phase	40%	45%	37%	45%
	9%			
Use of Appropriate Medications for People with Asthma: Children Ages 5 to 11	00%	97%	97%	00%



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Table "After"

NCQA National Process Measures Example State Compliance Rates vs. National Compliance Rates @ 90th Percentile

Areas for Improvement			
Process Measures	Example State_ Rate	National Rate @ 90th Percentile	Variance
Avoidance of Antibiotic Treatment in Adult with Acute Bronchitis	22%	31%	-9%
Use of Spirometry Testing in the Assessment and Diagnosis of COPD	44%	50%	-6%
Antidepressant Medication Management: Effective Continuation Phase Treatment	52%	55%	-3%
Chlamydia Screening in Women: Ages 15 to 20	57%	72%	-15%
Antidepressant Medication Management: Effective Acute Phase Treatment	68%	72%	-4%
Annual Monitoring for Patients on Persistent Medications: Anticonvulsants	69%	71%	-2%
Annutal Monitoring for Patients on Persistent Medications: Total Rate	83%	85%	-2%
Annual Monitoring for Patients on Persistent Medications: ACE Inhibitors or ARBs	84%	86%	-2%
Annual Monitoring for Patients on Persistent Medications: Diuretics	84%	86%	-2%
Comprehensive Diabetes Care: Medical Attention for Nephropathy	89%	90%	-1%
Use of Appropriate Medications for People with Asthma: People Ages 12 to 50	90%	95%	-5%
Use of Appropriate Medications for People with Asthma: Children Ages 5 to 11	97%	99%	-2%
Meets or Exceeds 90th Percentile of National			
Comprehensive Diabetes Care: HbA1c Testing	94%	94%	0%
Well Child Visits: First 15 Months of Life	93%	87%	6%
Well Child Visits: Ages 3 to 6	92%	85%	7%
Comprehensive Diabetes Care: LDL-C-Screening	91%	91%	0%
Use of Imaging Studies for Low Back Pain	89%	81%	8%
Cervical Cancer Screening	87%	83%	4%
Breast Cancer Screening	83%	80%	3%
Colorectal Cancer Screening	77%	72%	5%
Well Child Visits: for Adolescents Ages 12 to 21	74%	61%	13%
Chlamydia Screening in Women: Ages 21 to 24	62%	59%	3%
Follow-up of Care of Children Prescribed ADHD Medications: Initiation Phase	45%	45%	0%





Table "After" Version 2

NCQA National Process Measures

Example State Compliance Rates vs. National Compliance Rates @ 90th Percentile By Region

.

Region	Measure	Example State Rate	National Rate @ 90th Percentile	Variance
East	Appropriate Testing for Children with Pharyngitis	83%	90%	-7%
	Well Child Visits: Adolescents Ages 12 to 21	68%	74%	-6%
	Antidepressant Medication Mgmt: Acute Phase	64%	68%	-4%
	Antidepressant Medication Mgmt: Continuation Phase	48%	52%	-4%
	Followup Children Prescribed ADHD Medication: Initiation Phase	41%	45%	-4%
	Comprehensive Diabetes Care: Medical Neuropathy	86%	89%	-3%
West	Cholesterol Screening of Patients with Cardiovascular LDL	88%	92%	-4%
	Comprehensive Diabetes Care: LD Screening	87%	91%	-4%
	Cervical Cancer Screening	83%	87%	-4%
	Monitoring Patients on ACE or ARB	81%	84%	-3%
	Monitoring Patients on Diuretics	81%	84%	-3%
South	Chlamydia Screening Women: Ages 21 to 24	59%	62%	-3%
	Followup Children Prescribed ADHD Medication: Initiation Phase	40%	45%	-5%
Metro	Chlamydia Screening Women: Ages 21 to 24	58%	62%	-4%
	Monitoring Patients on Anticonvulsants	66%	69%	-3%
North	Chlamydia Screening Women: Ages 21 to 24	58%	62%	-4%
	Well-Child Visits: Adolescents Ages 12 to 21	66%	69%	-3%



Table Arrangement – Consider how you might arrange and organize data in a table to make it easy for the viewer to understand any important information you wish to convey.









Chartjunk is a term coined by Edward Tufte.

Chartjunk does not achieve the goals of its propagators. The overwhelming fact of data graphics is that they stand or fall on their content, gracefully displayed.

Tufte The Visual Display of Quantitative Data





Chartjunk Perfected





6. When to use a graph.





Graphs

Use a **GRAPH** to:

- Show Patterns
- Show Trends
- Show Exceptions
- Reveal relationships between multiple values



Methods of Encoding Data on a Graph





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Shape and Color









Graph Examples and Summary Best Practices





World Health Organization (WHO) Bar Chart Example







World Health Organization (WHO) Example 2







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Medicaid and CHIP





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Bar graphs always start at **0** because they are displaying the size of the underlying values.

The exception is when you're working with a dataset with a wide range of values, then you can use a broken axis (as one option) to display the data.





		CY10			
Priority Area	A ccounta bility	Q1	Q2	Q3	Q4
Falls				<u>.</u>	
Patient Falls with Injury		0.46	0.45	0.41	
Serious Reportable Events		1	0	1	6
Medical Records					
MD Notes Composite		72%	66%	65%	67%
H&P Compliance		100%	96%	94%	95%
H&P Updated per Policy		41%	21%	80%	45%
Medication Management-Inpatient					
Medications Secured Properly		88%	83%	78%	
Expired Meds (Doses)		435	277		
Patients' Own Meds-Labelling		38%	86%	60%	
Recording/Reporting Fridge Temp		40%	70%	53%	
Patient Education on AntiCoag		80%			
Med Rec-Admission		89%	92%	89%	87%
Med Rec-Discharge		98%	98%	98%	97%
Medication Management-Outpatient	t				
Sites-MESAC Approval of Samples		100%	100%	100%	
Sites-Correct Use of SIMS for					
Approved Samples		86%	86%	86%	
Pain Management					
Pain Assessment/Reassessment		NA	97%	98%	98%
Severe Pain Management		NA	84%	95%	97%
Patient Identifiers					
Mislabeled Specimens		1058	1110	1177	1143
Blood Transfusion RN Verification			Data	TBD	
Safety Reporting Proxy		0	0	0	0
Patient Rights					
Grievance Responded (per Hospital					
policy)		NA	79%	82%	76%
Restraints					
Restraint Prevalence		NA	NA	6.1%	3.2%
MD/NP/PA Daily Assessment		NA	NA	NA	33%
Ordered per Policy		NA	90%	89%	89%
Utilization Matches Order		NA	88%	80%	37%
RN Assessment & Interventions		NA	92%	82%	85%
Skin Integrity					
Pressure Ulcer Prevalence		NA	NA	2.9%	2.1%
CNS Consults (>Stage 2)		NA	95%	87%	
Wound Measured Weekly		NA	86%	80%	
Serious Reportable Events		3	2	1	4
Universal Protocol				,	
UP Compliance (Procedural Areas)		96%	99%	94%	92%
UP Compliance (Ambulatory Areas)		71%	91%	64%	86%
Wrong Site Procedures-SRF	_	0	2	0	1
Other NPSGs			-		
Critical Value Callbacks		NΔ	NΔ	98%	98.04
Worry Box		11/1		0070	00.00
Interventions without Orders			Data	TRD	
Infection Control			Data	TRD	
Internal Handoffs			Data	TRD	



Medication Management



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Medicaid and CHIP

Scale and Arrangement - 1









Avg Charges





Scale and Arrangement - 2

Pay close attention to scale and arrangement (and remember the Gestalt Principles).







Incidence of Tobacco-Related Cancers* by Idaho Health District (2011)

Small

Cancer	PHD 1	PHD 2	PHD 3	PHD 4	PHD 5	PHD 6	PHD 7	All of Idaho
Acute Myeloid Leukemia	5	2	7	23	5	6	11	59
Bladder	60	37	53	103	44	25	28	350
Cervix	8	2	14	13	6	6	4	53
Colorectal	118	51	105	138	83	74	70	639
Corpus Uteri	45	13	39	53	19	21	21	211
Esophagus	12	2	14	19	6	7	9	69
Kidney & Renal Pelvis	44	17	48	78	22	23	26	258
Larynx	6	6	5	13	4	1	3	38
Lung & Bronchus	168	82	154	205	92	76	61	838
Oral Cavity & Pharynx	39	16	26	65	33	16	15	210
Ovary	14	8	13	27	5	11	13	91
Pancreas	32	10	37	42	17	27	21	186
Stomach	21	5	8	22	3	8	8	75
Total by HD	572	251	523	801	339	301	290	3077

*Population attributable fractions for tobacco vary by cancer site

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Small Multiples

Incidence of Tobacco-Related Cancer Rates by 7 Idaho Public Health District (2011)





Pie Charts

Quantify the size of the slices.







The Pie vs. The Bar

Don't Do This



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Try This Instead

Target: 25%



Measure Compliance

Measure Compliance
Measure Compliance







Bar charts are always superior to pie charts (and donut graphs and bubble charts).

Always.









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Using 3-D

3-D or Not 3-D – that is the question (and we have the answer).

Location Details for Floor Location Detai Volume for Location - C4 % Compliance for All Measures For Week-1 - C4100 66 3,66 50 - no Compliance (%) 2 and a contract of the contract of the contract of the ant 04 5 Core Measure Week %Compliance of the Core Measure Total Volume for Floor #Patients (#Patients could overlap with other % Compliance for the Week measures) Discharged Clinician Clinician's Name(s) Unit Number Missed Element Floor

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Medicaid and CHIP

3-D and Bad Data

Studies suggest that people use 3-D graphics to obfuscate bad data.







7. Dashboards defined.





Data Dashboards Defined

Visually identify and monitor at a glance

on a

single computer screen or report page

the

most important information

needed to

think and reason

and make informed decisions.





8. How to create a great dashboard.





Data Dashboards

Data dashboards are NOT comprehensive. Rather, like a car dashboard they only provide summary information and warnings.





AP Medicaid Innovation Accelerator Program If a warning light comes on



there is a manual to look up more information about the warning.



And sometimes additional In-depth analysis is required.





We can use this same construct when we consider the creation of our dashboards and supporting reports, detail lists and analytic tools.





Summary Overview Dashboard



Analytic Tools





But how do we determine what viewers need to have displayed on each of these?





Books vs. E-reader

Think about how you read a book and how that was translated to the Kindle.







Mental Model

Mental Model – how do the viewers of the dashboards and reports you will create think about and use data in the context of their:

- Scope extent of the viewer's responsibility, e.g. Organization, Department, Project
- Role the function or part the viewer plays, e.g. Director, Manager, Support Staff
- Decisions/Need and based on scope and role what decisions do the viewers have to make or what do they need to have?





Features of Great Dashboard Design

- Well organized
- Details rolled up into summaries
- Exceptions and unfavorable trends are highlighted
- Concise and clear displays
- Context, context, context



Example CEO Dashboard



Hospital CEO



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Prototype State Public Dashboard





9. What's an infographic anyway?





An Infographic (information graphic) is a tool for rational understanding, an instrument to discuss relevant ideas and phenomena



Medicaid and CHIP

Uninsured Infographic

Percentage Uninsured, by County, 2013 to 2015

10% 12% 14% 16% uninsured



In **2013**, there were only 10 states where the percentage of residents who lacked health insurance was lower than 9 percent.

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In **2014**, the Affordable Care Act was rolled out, reducing the number of Americans without health insurance. States that expanded Medicaid, outlined in black, saw the biggest changes.



In **2015**, Pennsylvania and Indiana also expanded their Medicaid programs. Now states with the highest rates of uninsured residents are in the South and Southwest.

Created by: By QUOCTRUNG BUI and MARGOT SANGER-KATZ OCT. 30, 2015



10. Technology alone is NOT the solution.





It is NOT About the Tool

Software Applications Do Not On Their Own Result in Great Results



Just because you have this:

Doesn't mean you'll write this:





Health, Healthcare & Basic Statistics

Data Visualization & Visual Intelligence

Technology





For more information & resources please contact: <u>MedicaidIAP@cms.hhs.gov</u>





Additional Information

Thank you for joining today's webinar!

A summary of best practices and a resource library of links to data visualization educational topics will be posted on the <u>IAP Data Analytics website</u>.

You will receive an email with the link when these educational materials are posted.



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Questions or Comments?





