IAP Medicaid Innovation Accelerator Program

MACBIS Medicaid and CHIP Business Information Solutions

Data Visualization Best Practices

IAP Data Analytics Webinar

January 25, 2017, 3:00pm EST

Today's Speakers

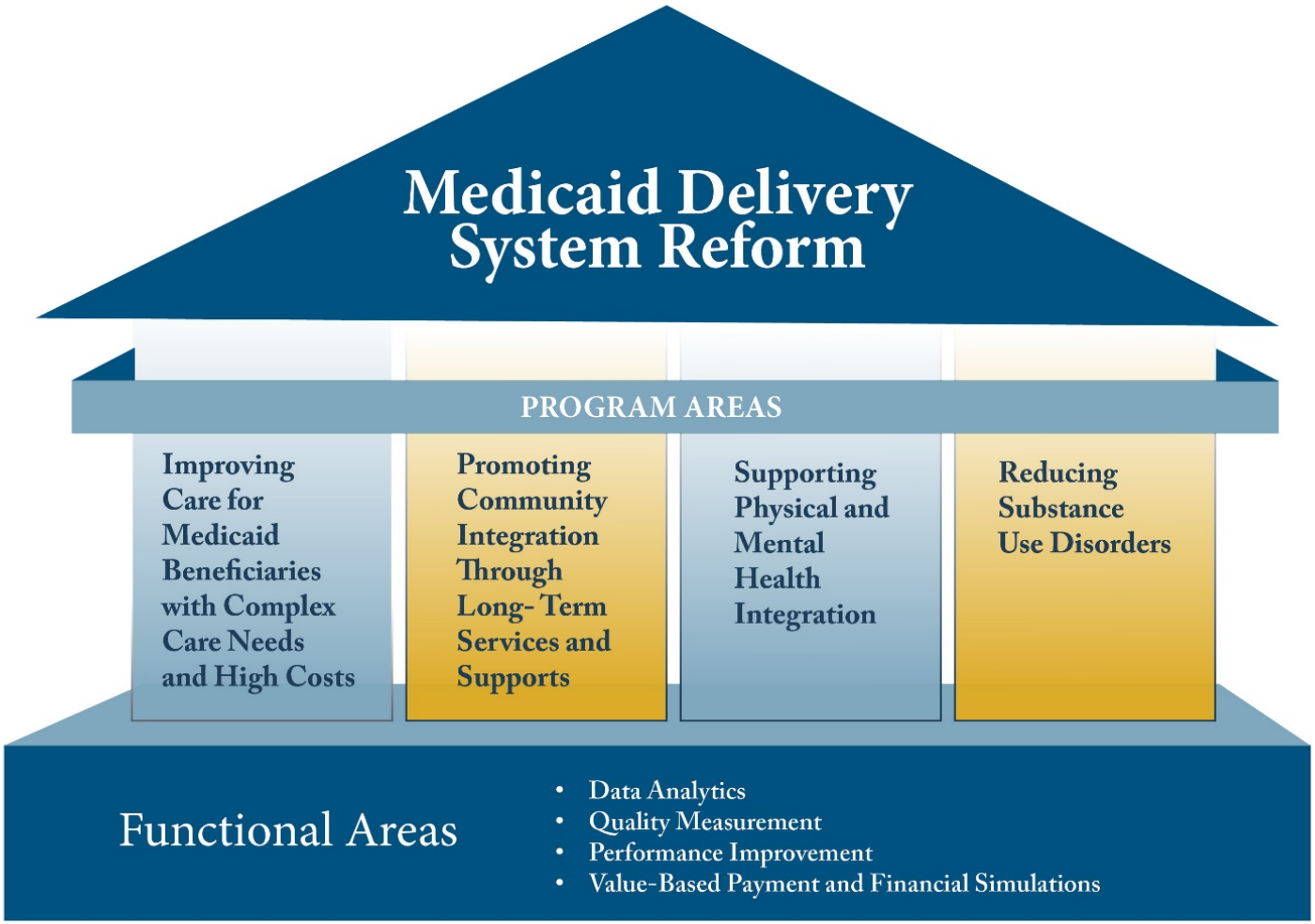
- Jessie Parker, GTL and Analyst on Medicaid IAP Data Analytic Team, Data and Systems Group, CMCS
- Katherine Rowell, Co-Founder and Principal HealthDataViz

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
PROGRAM AREAS
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 decision-making 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

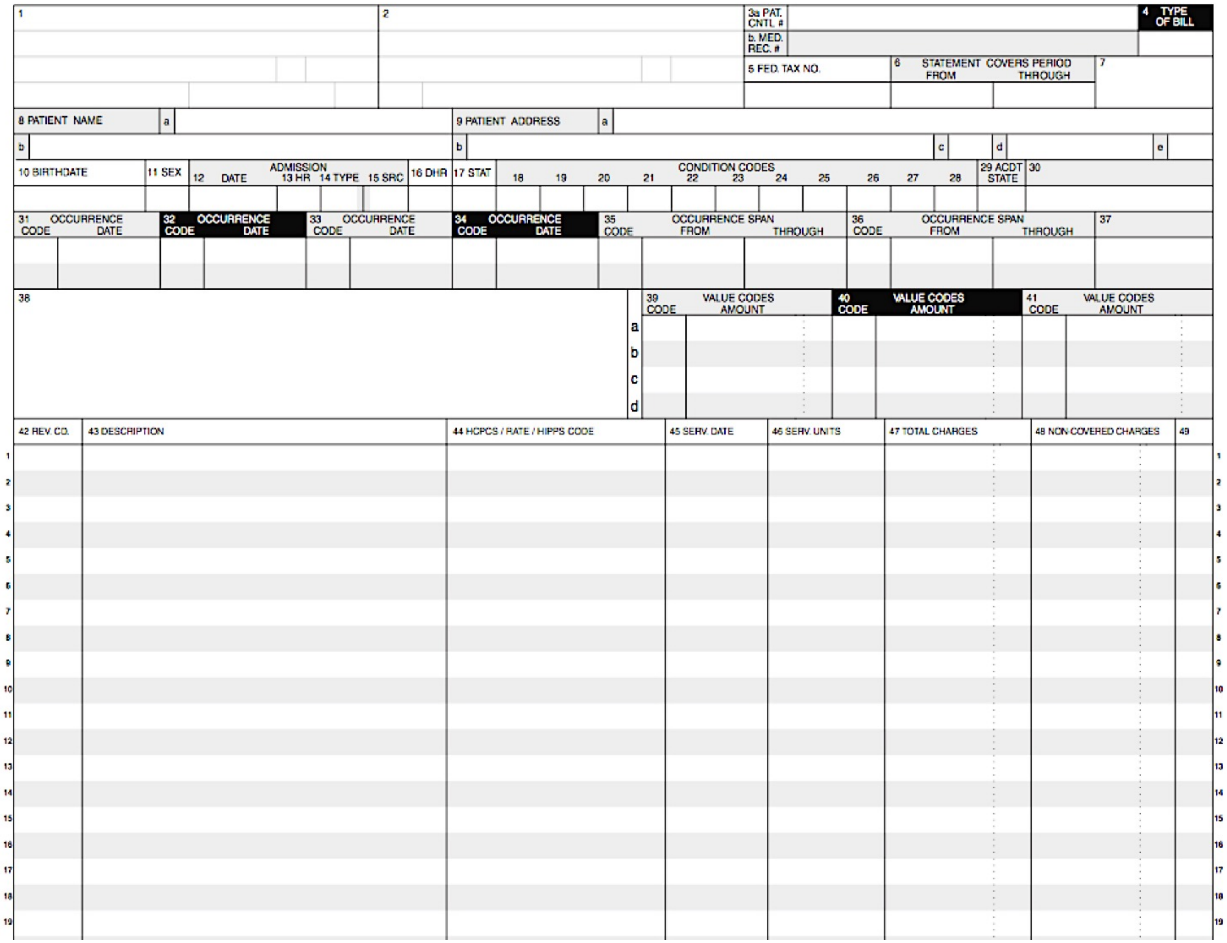
Data Visualization & Visual Intelligence

Technology

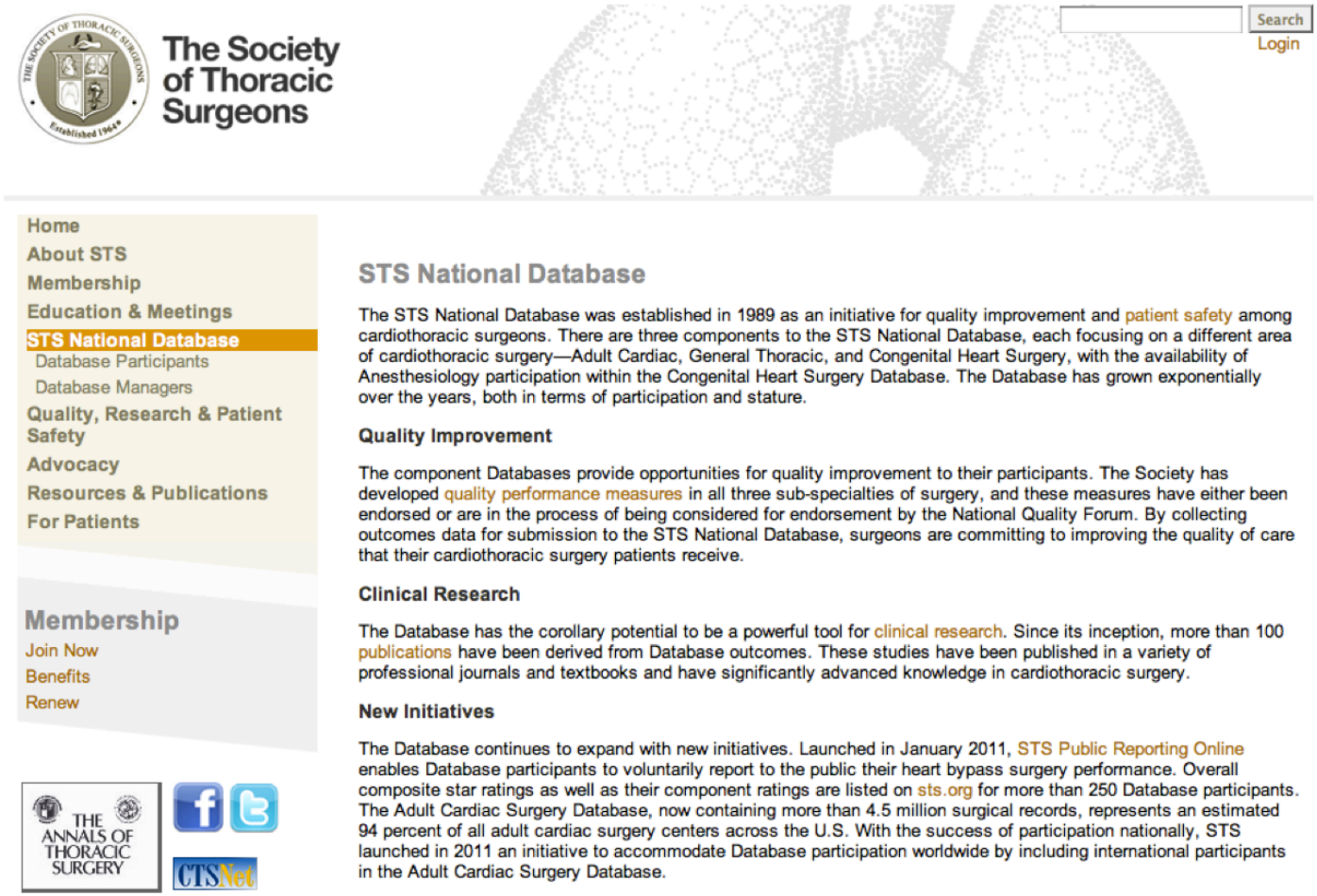
Health, Healthcare & Basic Statistics

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

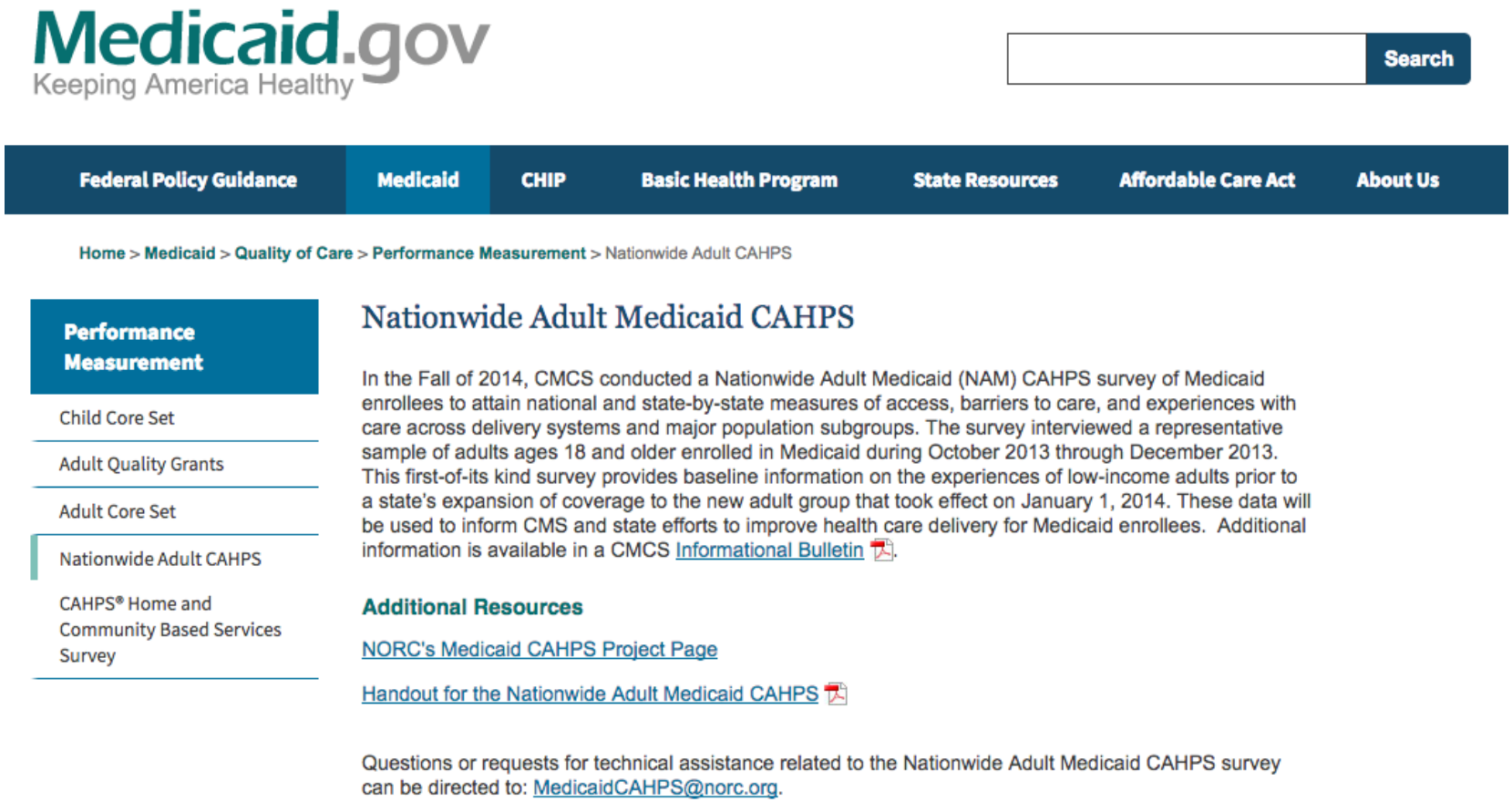
1982 Universal Billing (Administrative Data)



Clinical Data Registries



Medicaid.gov
Survey of Medicaid Enrollees



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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.

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: MedicaidCAHPS@norc.org.

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

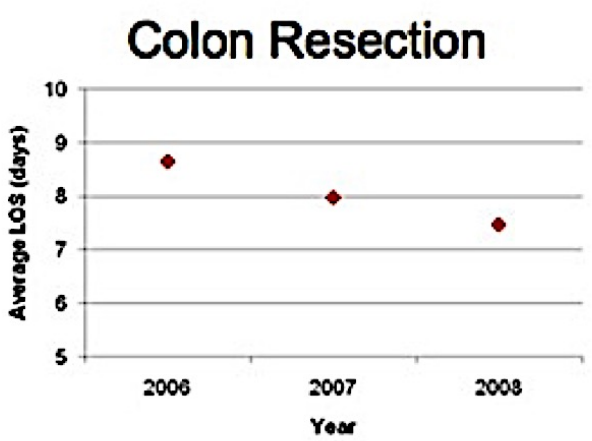
Medical Patients' Average Length of Stay (ALOS)	
Patient	Days in Hospital
A	3
B	2
C	1
D	5
E	8
F	9
G	3
H	5
I	2
ALOS	4.2

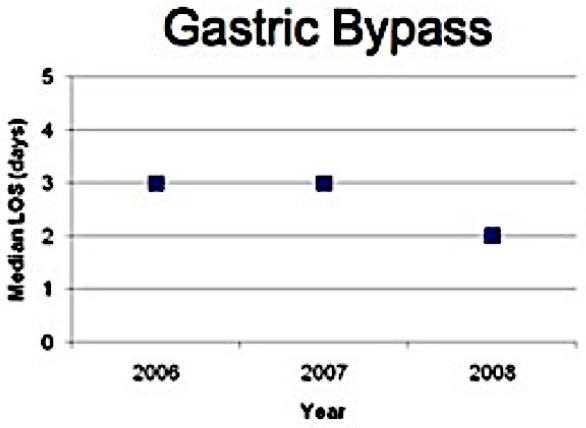
Medical Patients' Median Length of STAY	
Patient	Days in Hospital
C	1
B	2
I	2
A	3
G	3
D	5
H	5
E	8
F	9
Median	3.0

SCOAP

Impact on Length of Stay

NEXT





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.

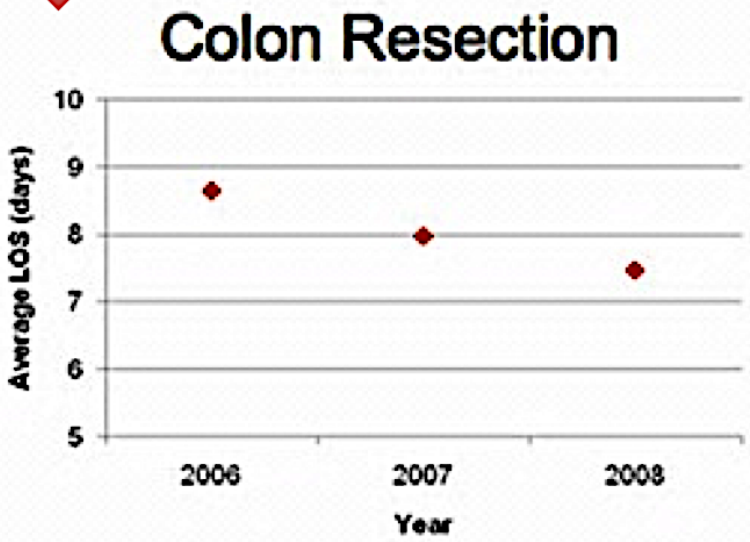
Image 4 of 5

CLOSE ✕

SCOAP Example - Details

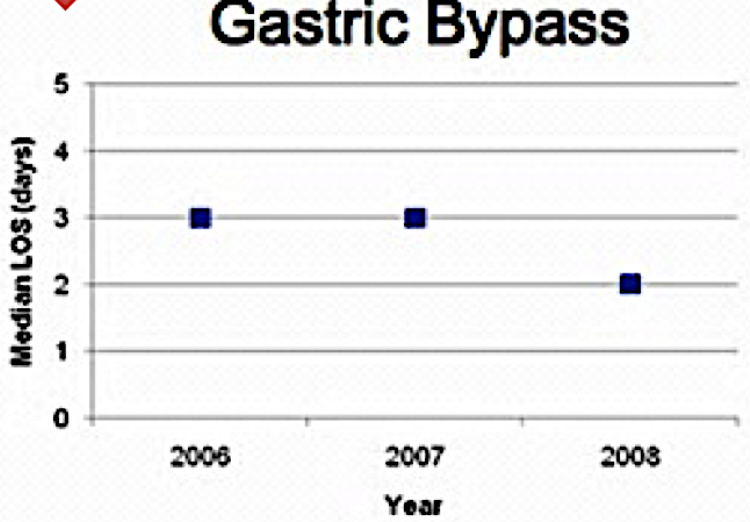
Average Length of Stay

Y Axis Begins at **5**



Median Length of Stay

Y Axis Begins at **0**



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

4. Lessons learned from visual and cognitive research.

I See, I Understand

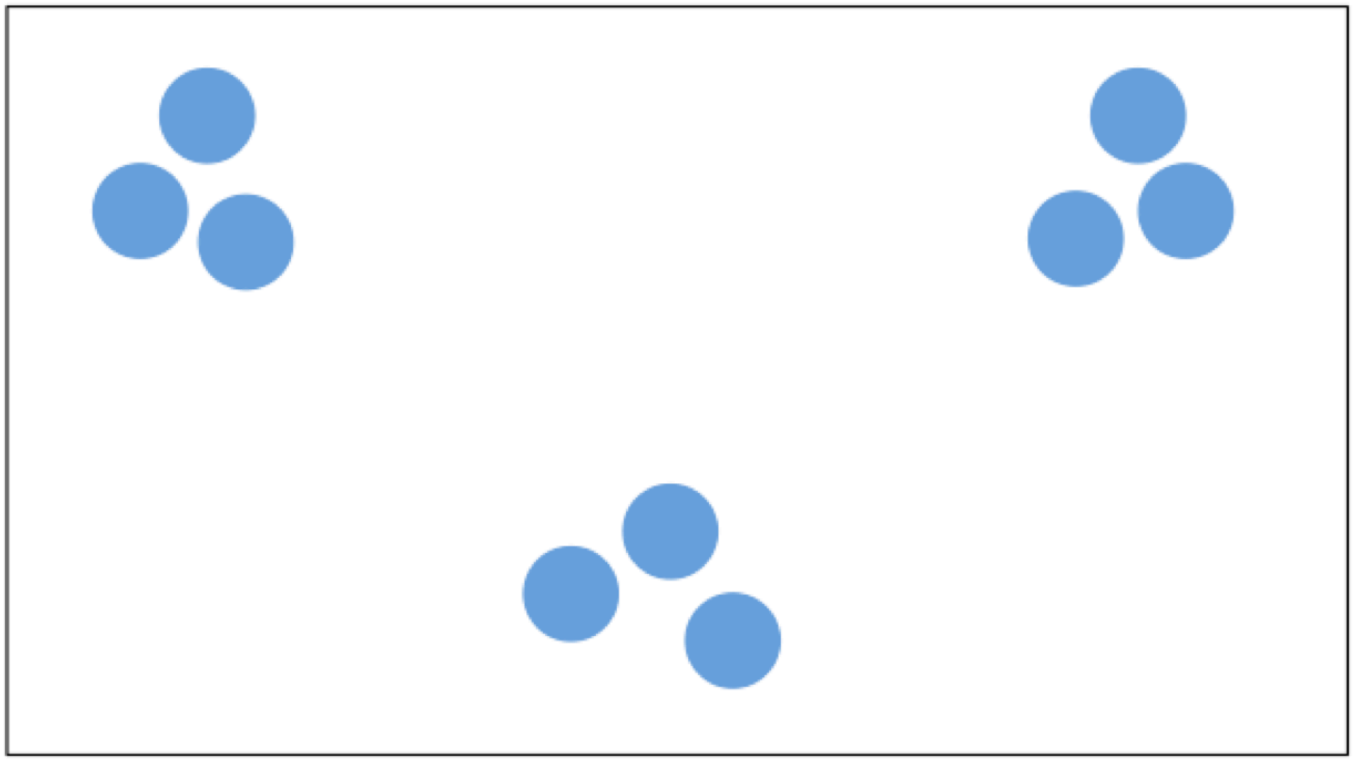
70% of the way we take in all data and information is through our eyes.

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.

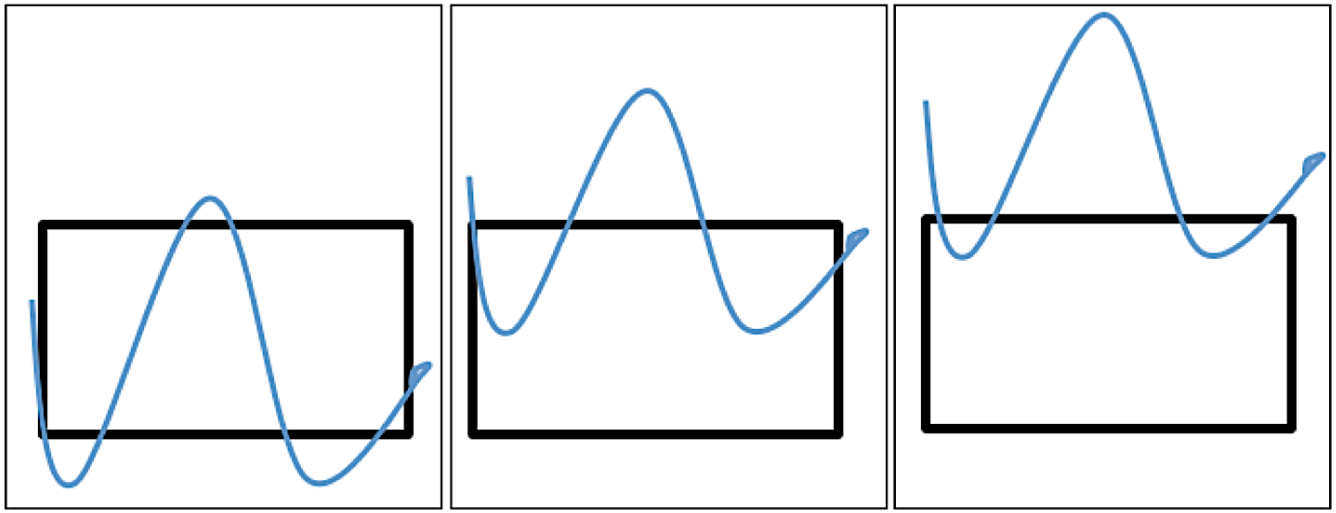
Proximity

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.



Impact on Length of Stay

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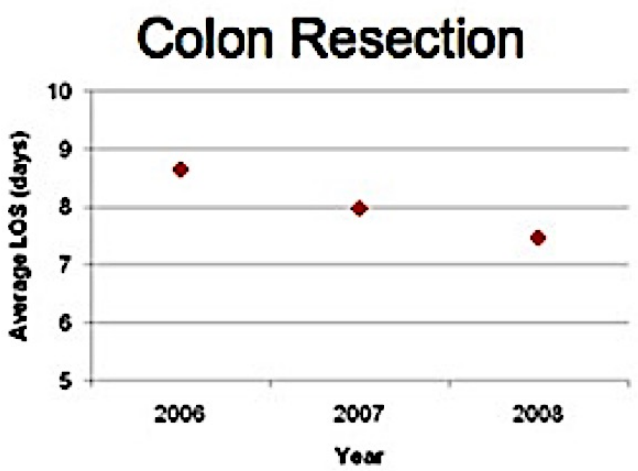
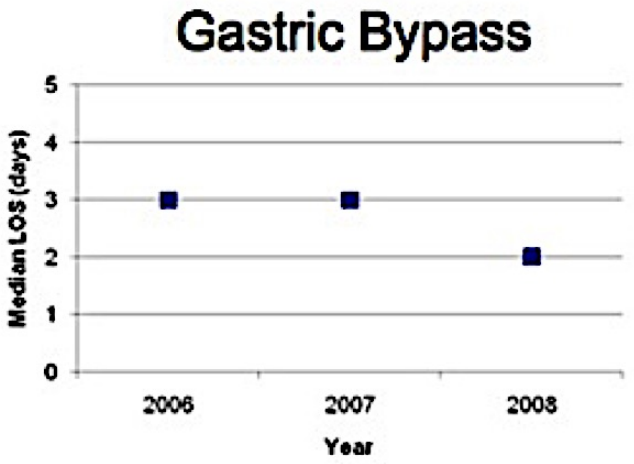




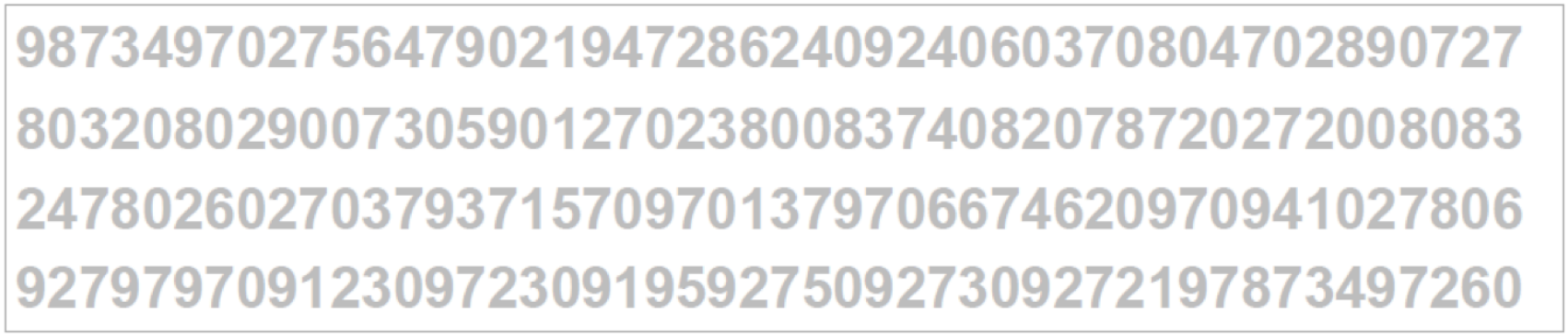
Decreased reoperative complications results in a better patient experience as well as a better use of hospital resources, as shown in the decreased length of stay for both colon resections and gastric bypass.

Image 4 of 5

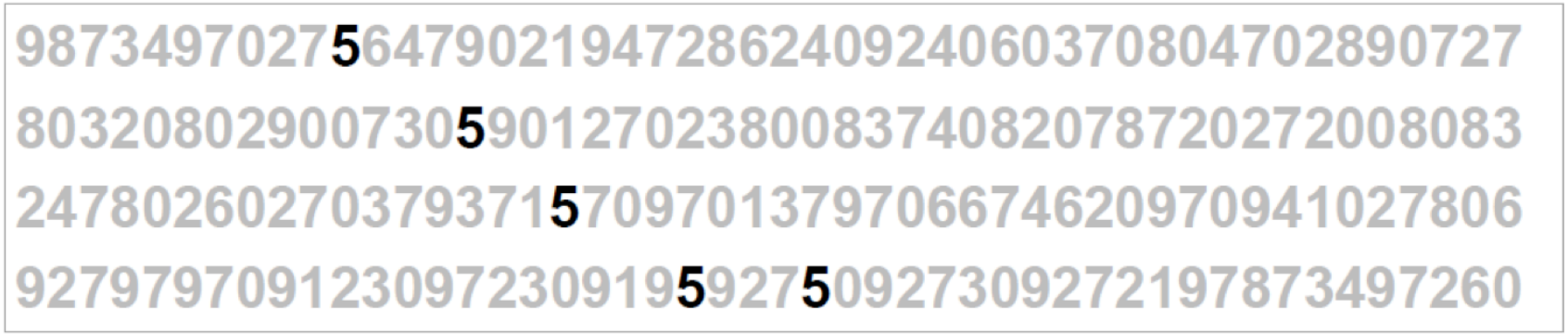
CLOSE ✕

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

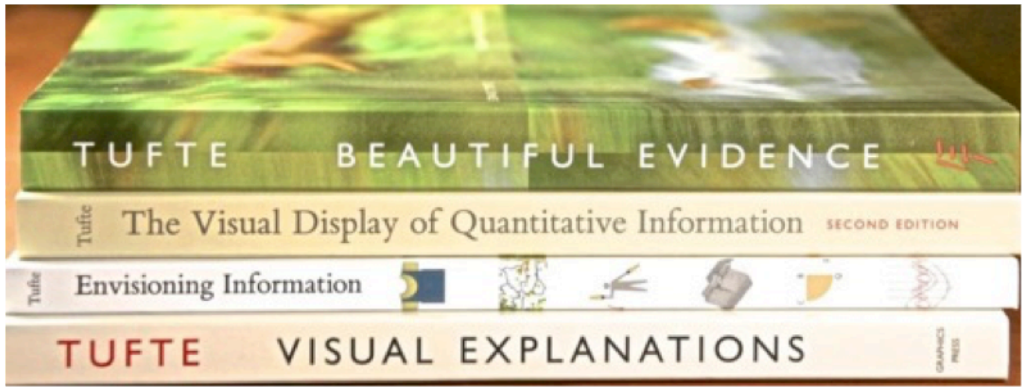


Data-Ink Ratio

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



Priority Area	Accountability	CY10 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					
UP Compliance (Procedural Areas)		96%	99%	94%	92%
UP Compliance (Ambulatory Areas)		71%	91%	64%	86%
Wrong Site Procedures-SRE		0	2	0	1
Other NPSGs					
Critical Value Callbacks		NA	NA	98%	98%
Worry Box					
Interventions without Orders		Data TBD			
Infection Control		Data TBD			
Internal Handoffs		Data TBD			

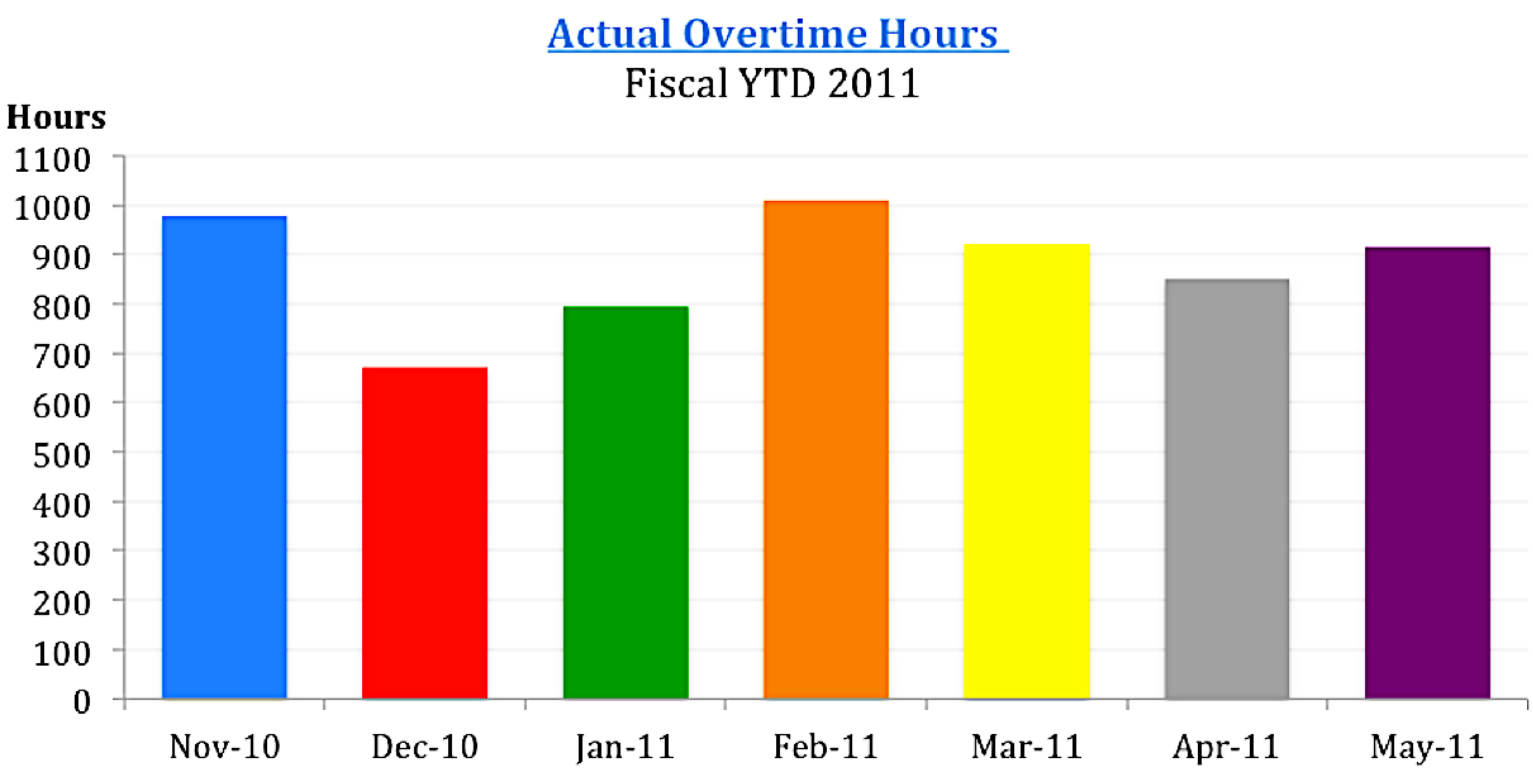
Show the Data

	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.

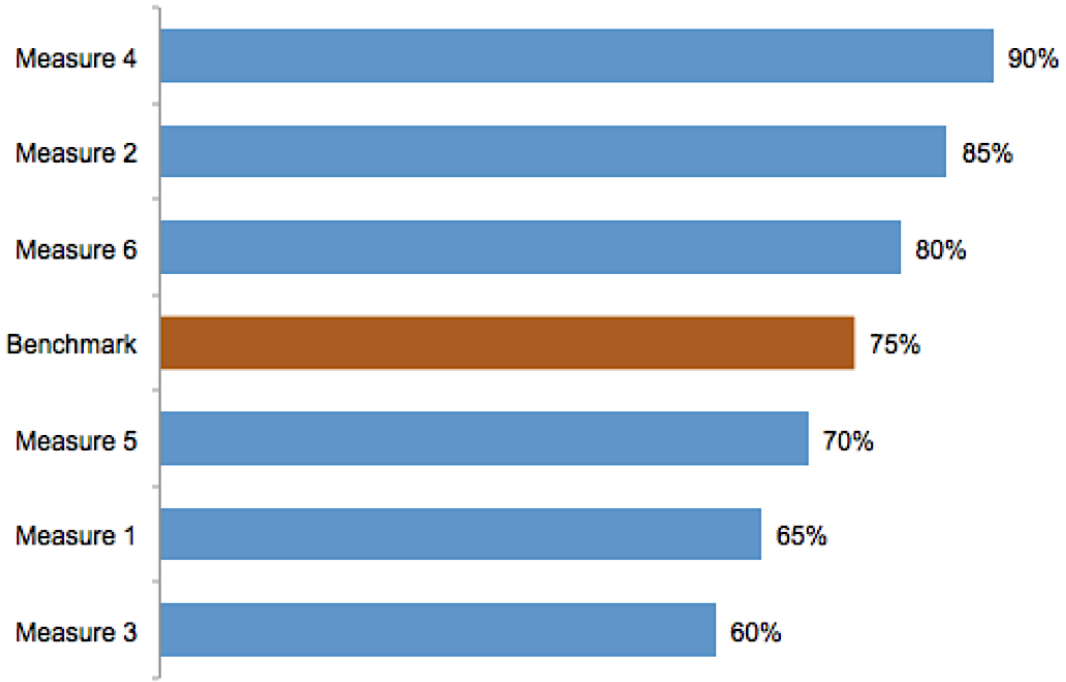
Inappropriate Use of Color

What are the colors conveying?



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

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%	
435	277		
38%	86%	60%	
40%	70%	53%	
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
NA	NA	98%	98%
Data TBD			
Data TBD			
Data TBD			

Dichromatic

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
NA	NA	98%	98%
Data TBD			
Data TBD			
Data TBD			

Questions so far?

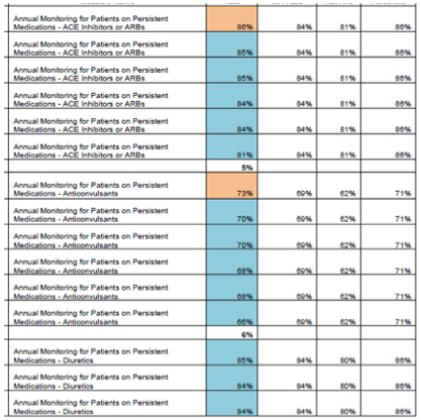
5. When to use a table.

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	86%	84%	81%	86%
Annual Monitoring for Patients on Persistent Medications - ACE Inhibitors or ARBs	85%	84%	81%	86%
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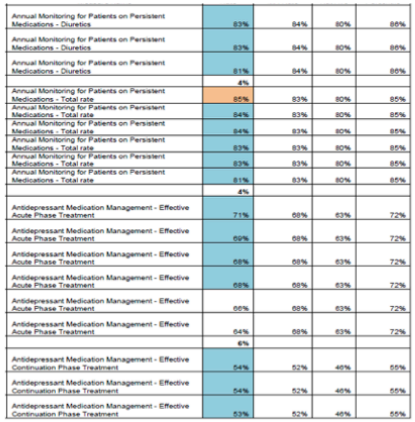
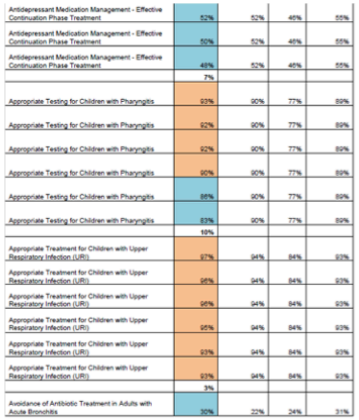
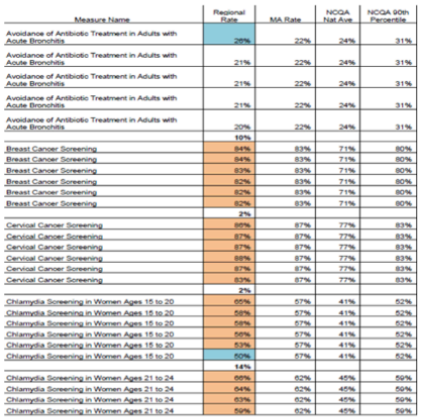
Annual Monitoring for Patients on Persistent Medications - ACE Inhibitors or ARBs	84%	84%	81%	86%
Annual Monitoring for Patients on Persistent Medications - ACE Inhibitors or ARBs	81%	84%	81%	86%
	5%			
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	73%	69%	62%	71%
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	70%	69%	62%	71%
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	70%	69%	62%	71%
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	68%	69%	62%	71%
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	68%	69%	62%	71%
Annual Monitoring for Patients on Persistent Medications - Anticonvulsants	66%	69%	62%	71%
	6%			
Annual Monitoring for Patients on Persistent Medications - Diuretics	85%	84%	80%	86%
Annual Monitoring for Patients on Persistent Medications - Diuretics	84%	84%	80%	86%
Annual Monitoring for Patients on Persistent Medications - Diuretics	84%	84%	80%	86%



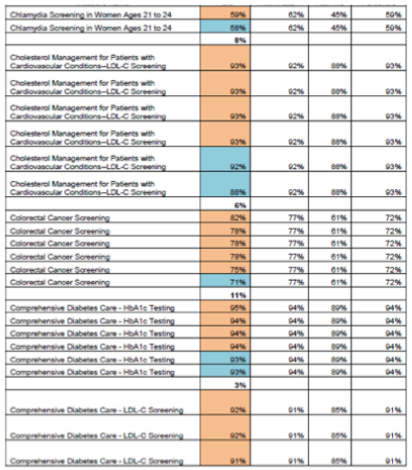
Annual Monitoring for Patients on Persistent Medications - Diuretics	83%	84%	80%	86%
Annual Monitoring for Patients on Persistent Medications - Diuretics	83%	84%	80%	86%
Annual Monitoring for Patients on Persistent Medications - Diuretics	81%	84%	80%	86%
	4%			
Annual Monitoring for Patients on Persistent Medications - Total rate	85%	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	84%	83%	80%	85%
Annual Monitoring for Patients on Persistent Medications - Total rate	83%	83%	80%	85%
Annual Monitoring for Patients on Persistent Medications - Total rate	83%	83%	80%	85%
Annual Monitoring for Patients on Persistent Medications - Total rate	81%	83%	80%	85%
	4%			
Antidepressant Medication Management - Effective Acute Phase Treatment	71%	68%	63%	72%
Antidepressant Medication Management - Effective Acute Phase Treatment	69%	68%	63%	72%
Antidepressant Medication Management - Effective Acute Phase Treatment	68%	68%	63%	72%
Antidepressant Medication Management - Effective Acute Phase Treatment	68%	68%	63%	72%
Antidepressant Medication Management - Effective Acute Phase Treatment	66%	68%	63%	72%
Antidepressant Medication Management - Effective Acute Phase Treatment	64%	68%	63%	72%
	6%			
Antidepressant Medication Management - Effective Continuation Phase Treatment	54%	52%	46%	55%
Antidepressant Medication Management - Effective Continuation Phase Treatment	54%	52%	46%	55%
Antidepressant Medication Management - Effective Continuation Phase Treatment	53%	52%	46%	55%



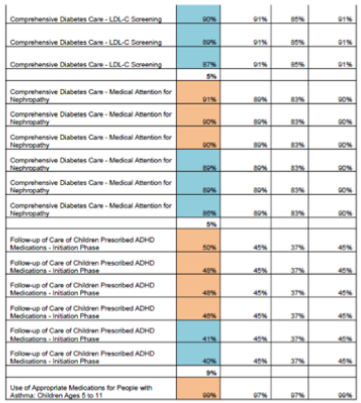
Antidepressant Medication Management - Effective Continuation Phase Treatment	52%	52%	46%	55%
Antidepressant Medication Management - Effective Continuation Phase Treatment	50%	52%	46%	55%
Antidepressant Medication Management - Effective Continuation Phase Treatment	48%	52%	46%	55%
	7%			
Appropriate Testing for Children with Pharyngitis	93%	90%	77%	89%
Appropriate Testing for Children with Pharyngitis	92%	90%	77%	89%
Appropriate Testing for Children with Pharyngitis	92%	90%	77%	89%
Appropriate Testing for Children with Pharyngitis	90%	90%	77%	89%
Appropriate Testing for Children with Pharyngitis	86%	90%	77%	89%
Appropriate Testing for Children with Pharyngitis	83%	90%	77%	89%
	10%			
Appropriate Treatment for Children with Upper Respiratory Infection (URI)	97%	94%	84%	93%
Appropriate Treatment for Children with Upper Respiratory Infection (URI)	96%	94%	84%	93%
Appropriate Treatment for Children with Upper Respiratory Infection (URI)	96%	94%	84%	93%
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 (URI)	93%	94%	84%	93%
	3%			
Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis	30%	22%	24%	31%



Measure Name	Regional Rate	MA Rate	NCQA Nat Ave	NCQA 90th Percentile
Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis	26%	22%	24%	31%
Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis	21%	22%	24%	31%
Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis	21%	22%	24%	31%
Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis	21%	22%	24%	31%
Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis	20%	22%	24%	31%
	10%			
Breast Cancer Screening	84%	83%	71%	80%
Breast Cancer Screening	84%	83%	71%	80%
Breast Cancer Screening	83%	83%	71%	80%
Breast Cancer Screening	82%	83%	71%	80%
Breast Cancer Screening	82%	83%	71%	80%
Breast Cancer Screening	82%	83%	71%	80%
	2%			
Cervical Cancer Screening	86%	87%	77%	83%
Cervical Cancer Screening	87%	87%	77%	83%
Cervical Cancer Screening	87%	87%	77%	83%
Cervical Cancer Screening	88%	87%	77%	83%
Cervical Cancer Screening	87%	87%	77%	83%
Cervical Cancer Screening	83%	87%	77%	83%
	2%			
Chlamydia Screening in Women Ages 15 to 20	65%	57%	41%	52%
Chlamydia Screening in Women Ages 15 to 20	58%	57%	41%	52%
Chlamydia Screening in Women Ages 15 to 20	58%	57%	41%	52%
Chlamydia Screening in Women Ages 15 to 20	56%	57%	41%	52%
Chlamydia Screening in Women Ages 15 to 20	53%	57%	41%	52%
Chlamydia Screening in Women Ages 15 to 20	50%	57%	41%	52%
	14%			
Chlamydia Screening in Women Ages 21 to 24	66%	62%	45%	59%
Chlamydia Screening in Women Ages 21 to 24	64%	62%	45%	59%
Chlamydia Screening in Women Ages 21 to 24	63%	62%	45%	59%
Chlamydia Screening in Women Ages 21 to 24	59%	62%	45%	59%



Chlamydia Screening in Women Ages 21 to 24	59%	62%	45%	59%
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%	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	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%	61%	72%
Colorectal Cancer Screening	78%	77%	61%	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 - HbA1c Testing	93%	94%	89%	94%
Comprehensive Diabetes Care - HbA1c Testing	93%	94%	89%	94%
	3%			
Comprehensive Diabetes Care - LDL-C Screening	92%	91%	85%	91%
Comprehensive Diabetes Care - LDL-C Screening	92%	91%	85%	91%
Comprehensive Diabetes Care - LDL-C Screening	91%	91%	85%	91%



Comprehensive Diabetes Care - LDL-C Screening	90%	91%	85%	91%
Comprehensive Diabetes Care - LDL-C Screening	89%	91%	85%	91%
Comprehensive Diabetes Care - LDL-C Screening	87%	91%	85%	91%
	5%			
Comprehensive Diabetes Care - Medical Attention for Nephropathy	91%	89%	83%	90%
Comprehensive Diabetes Care - Medical Attention for Nephropathy	90%	89%	83%	90%
Comprehensive Diabetes Care - Medical Attention for Nephropathy	90%	89%	83%	90%
Comprehensive Diabetes Care - Medical Attention for Nephropathy	89%	89%	83%	90%
Comprehensive Diabetes Care - Medical Attention for Nephropathy	89%	89%	83%	90%
Comprehensive Diabetes Care - Medical Attention for Nephropathy	86%	89%	83%	90%
	5%			
Follow-up of Care of Children Prescribed ADHD Medications - Initiation Phase	50%	45%	37%	45%
Follow-up of Care of Children Prescribed ADHD Medications - Initiation Phase	49%	45%	37%	45%
Follow-up of Care of Children Prescribed ADHD Medications - Initiation Phase	48%	45%	37%	45%
Follow-up of Care of Children Prescribed ADHD Medications - Initiation Phase	46%	45%	37%	45%
Follow-up of Care of Children Prescribed ADHD Medications - Initiation Phase	41%	45%	37%	45%
Follow-up of Care of Children Prescribed ADHD Medications - Initiation Phase	40%	45%	37%	45%
	9%			
Use of Appropriate Medications for People with Asthma: Children Ages 5 to 11	99%	97%	97%	99%

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.

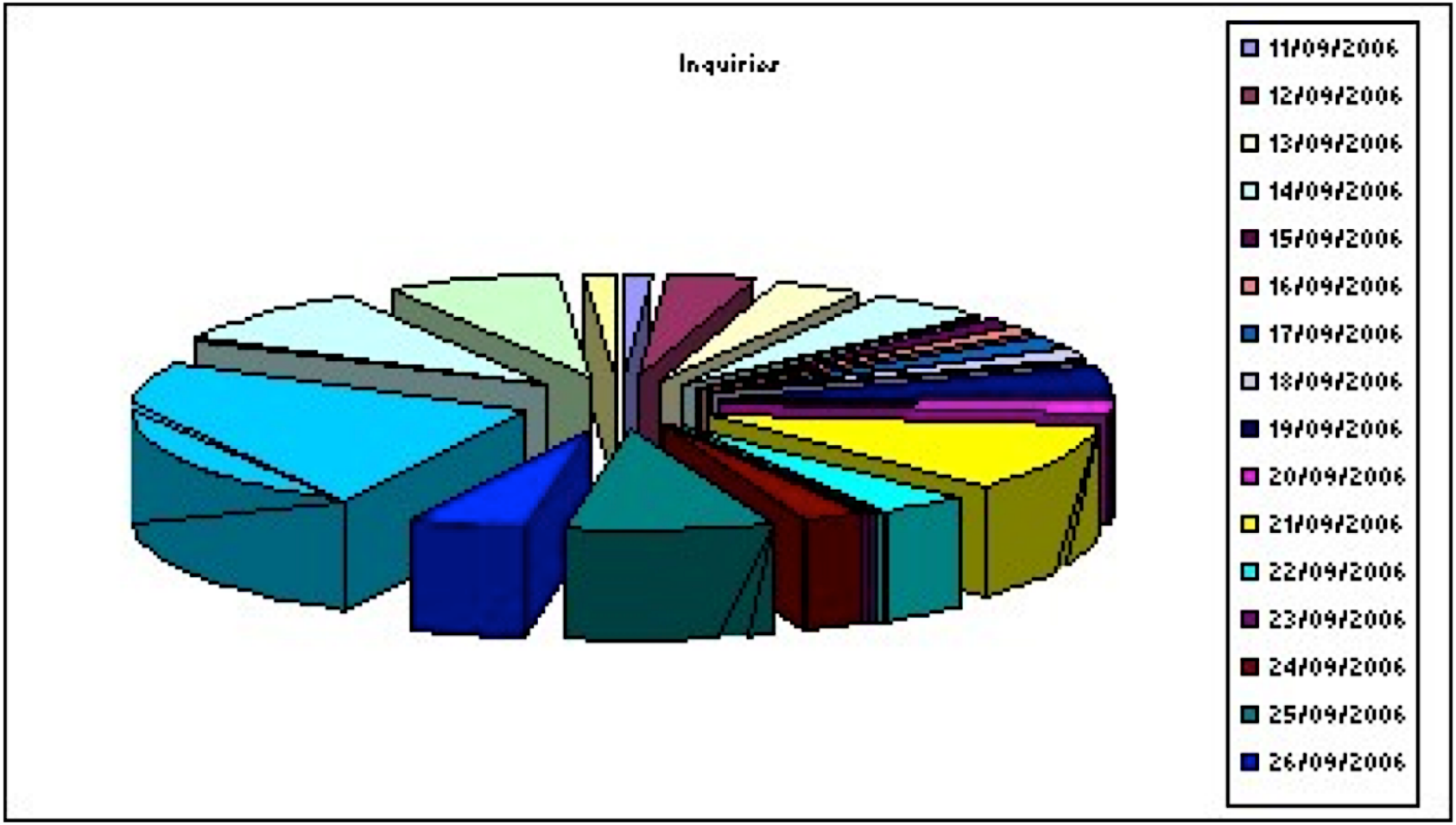

JEFFREY A HULTS
STEVE W LEWICKI
LESTER E MAYNARD
DENNIS D NAGELKIRK
RALPH E PETERS
RONALD D ROACH
VICTOR M STRIBLING
JAMES P VOJIR
WILLARD G WRIGHT
ROBERT G BURR
DONALD H COLEMAN
EDWARD S ESTES
D R HATTON

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



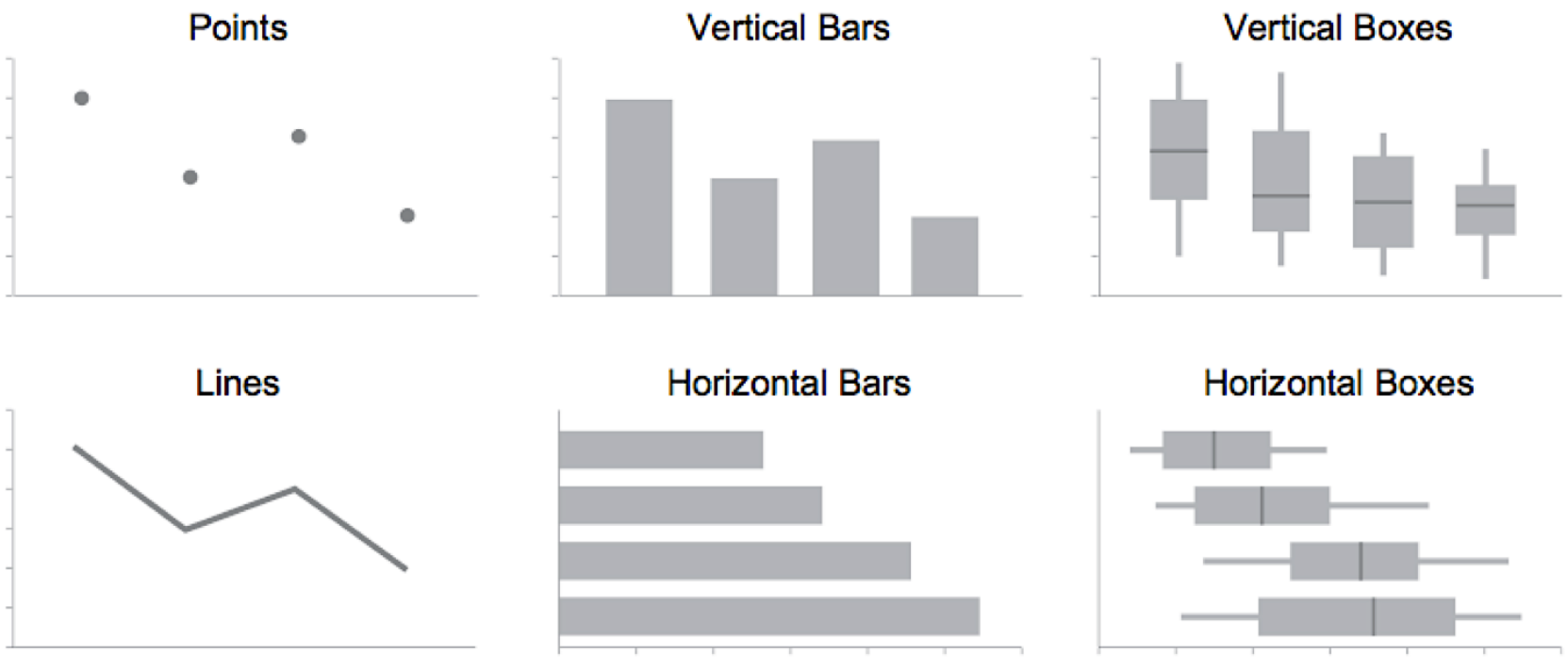
6. When to use a graph.

Graphs

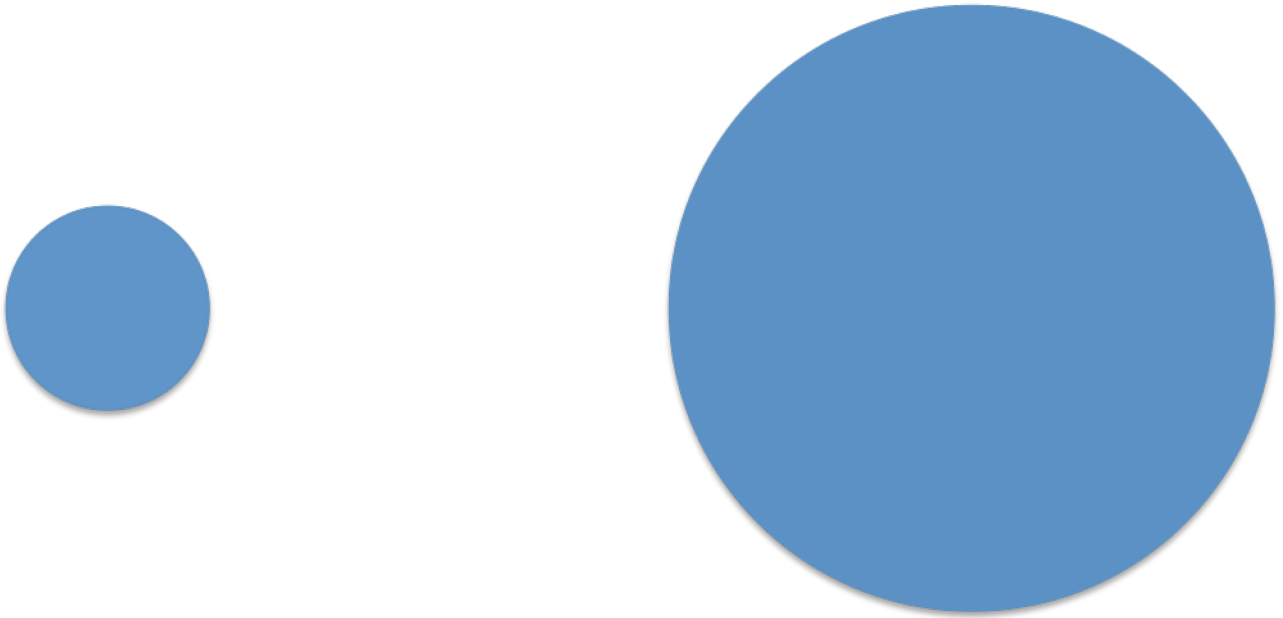
Use a GRAPH to:

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

Methods of Encoding Data on a Graph

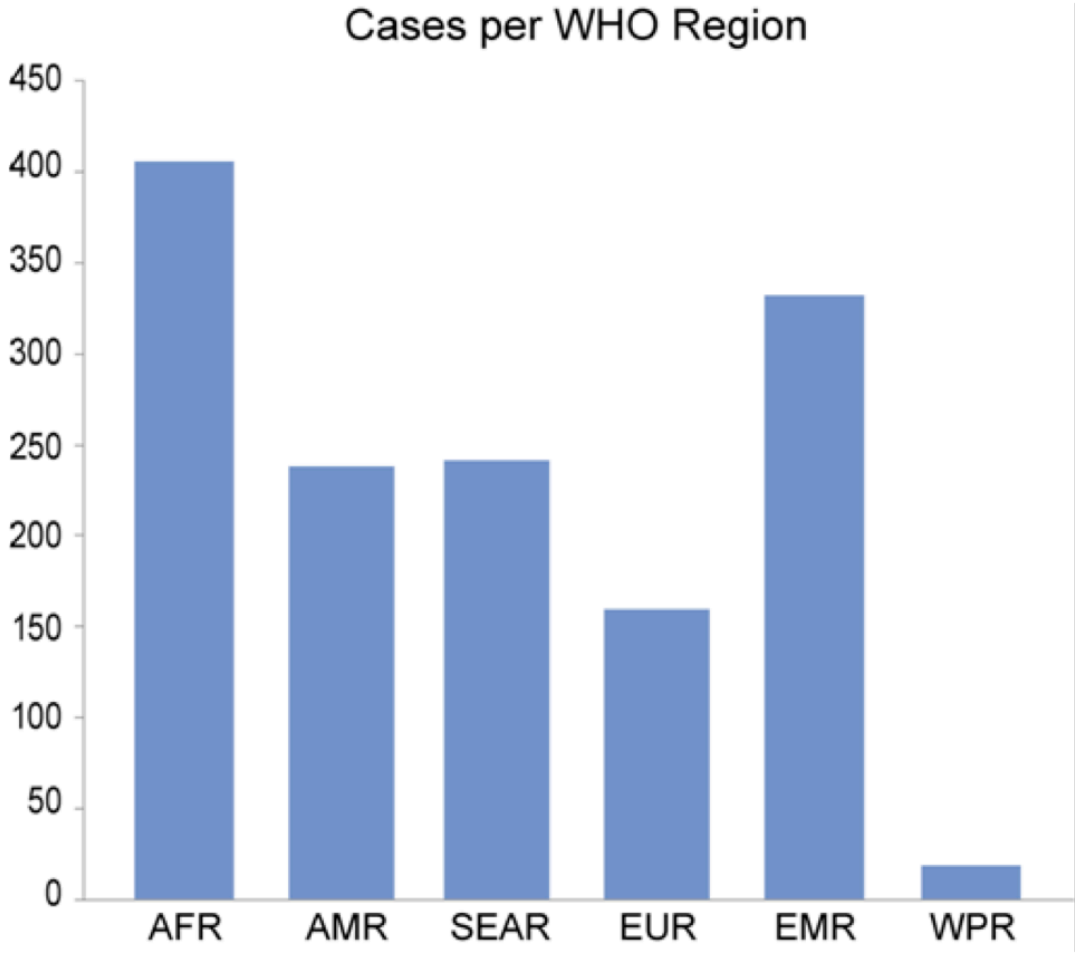


Shape and Color

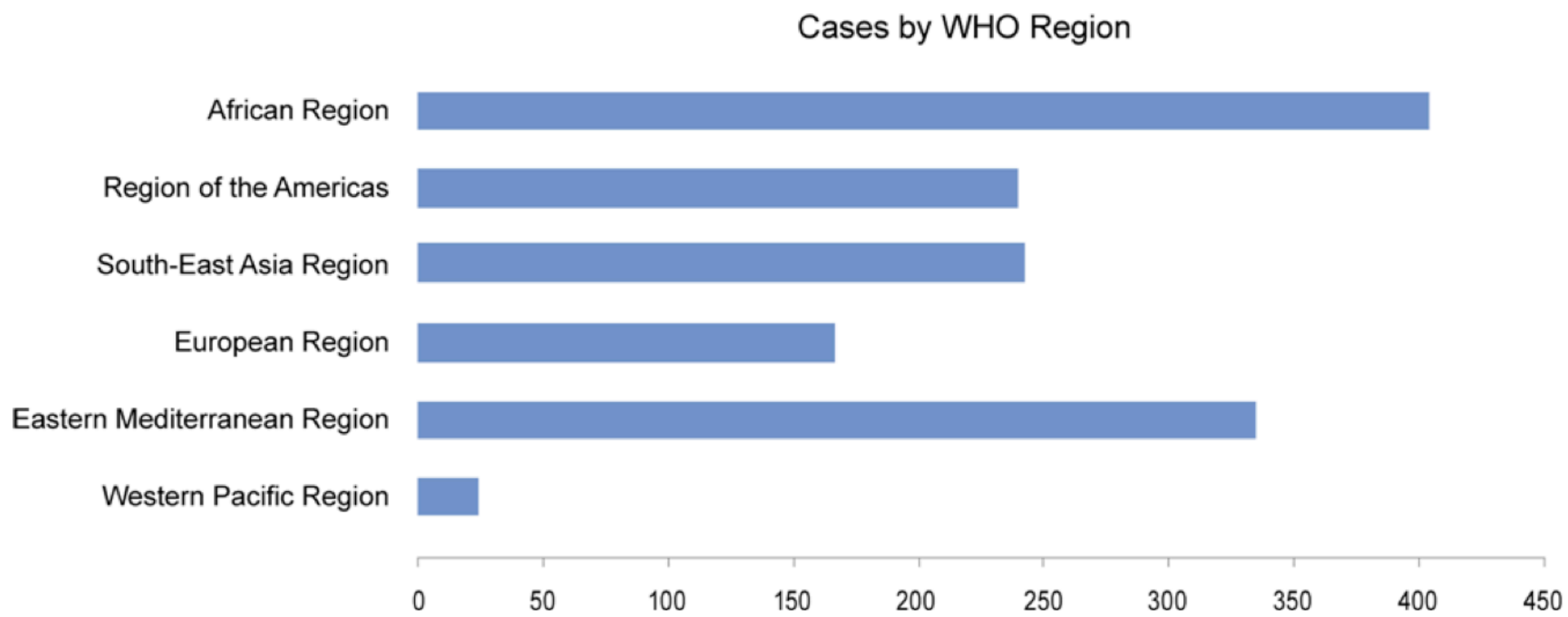


Graph Examples
and
Summary Best Practices

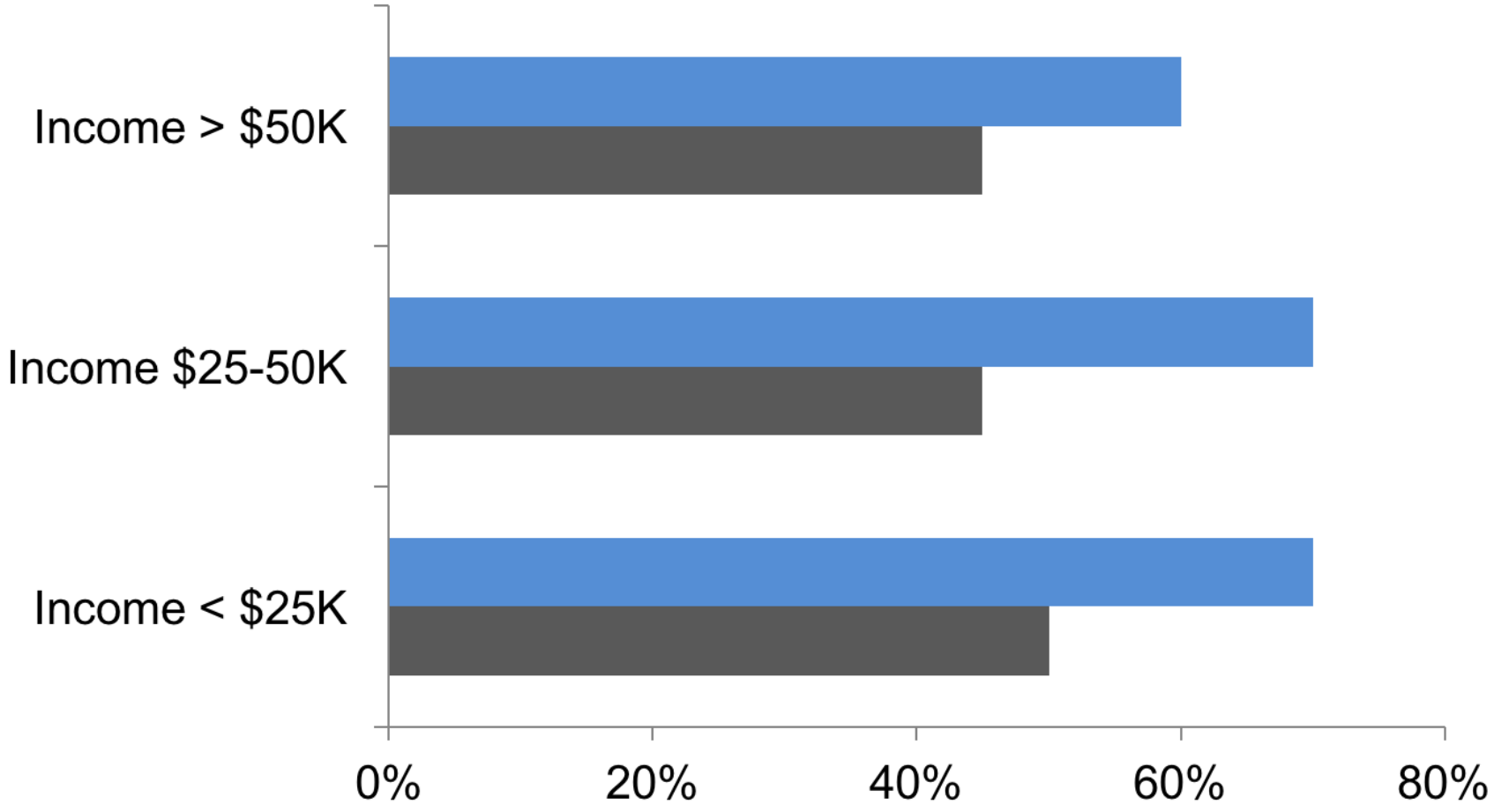
World Health Organization (WHO) Bar Chart Example



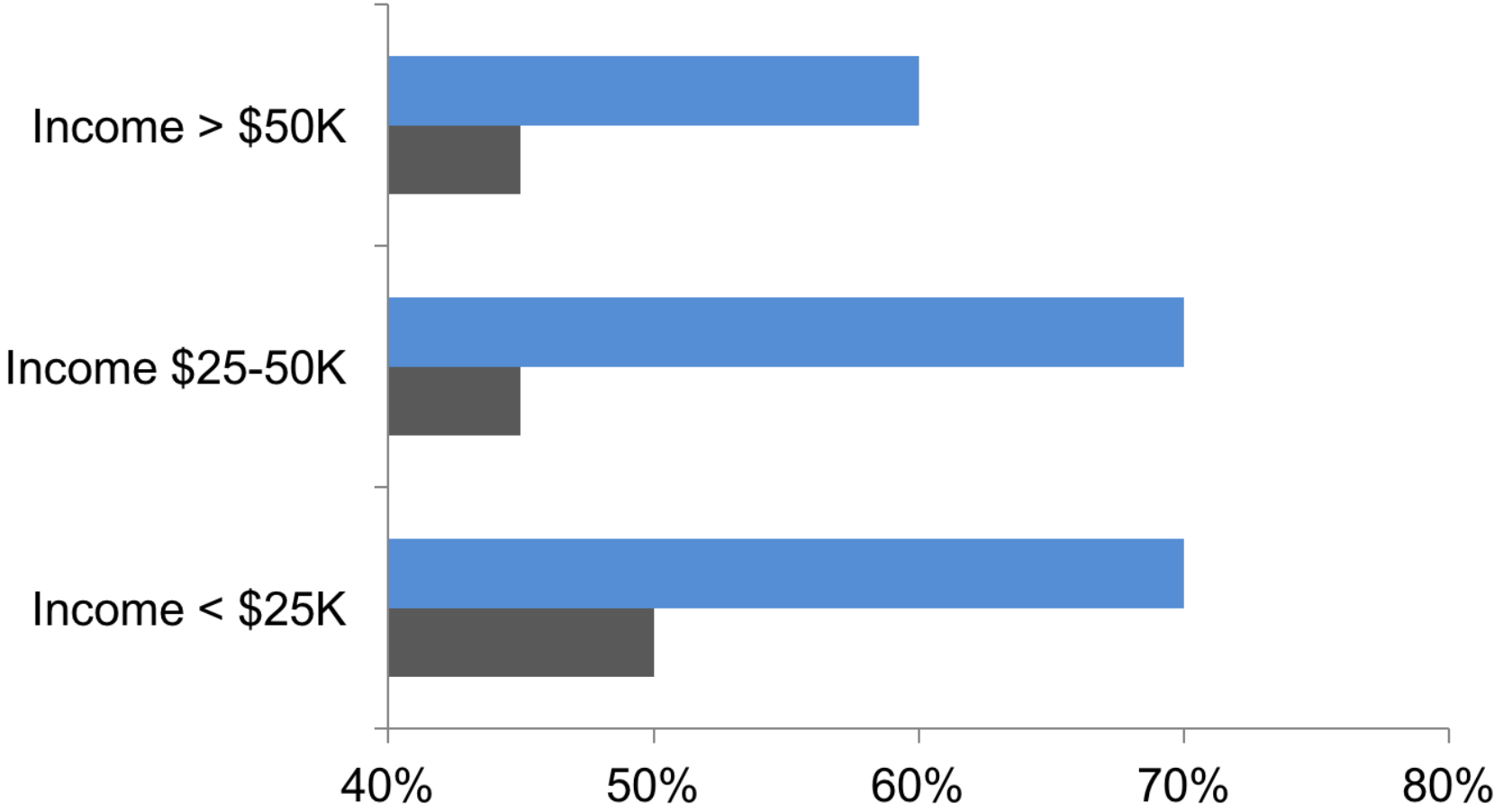
World Health Organization (WHO) Example 2



Black and White Boston Residents Who are Overweight or Obese by Income



Black and White Boston Residents Who are Overweight or Obese by Income

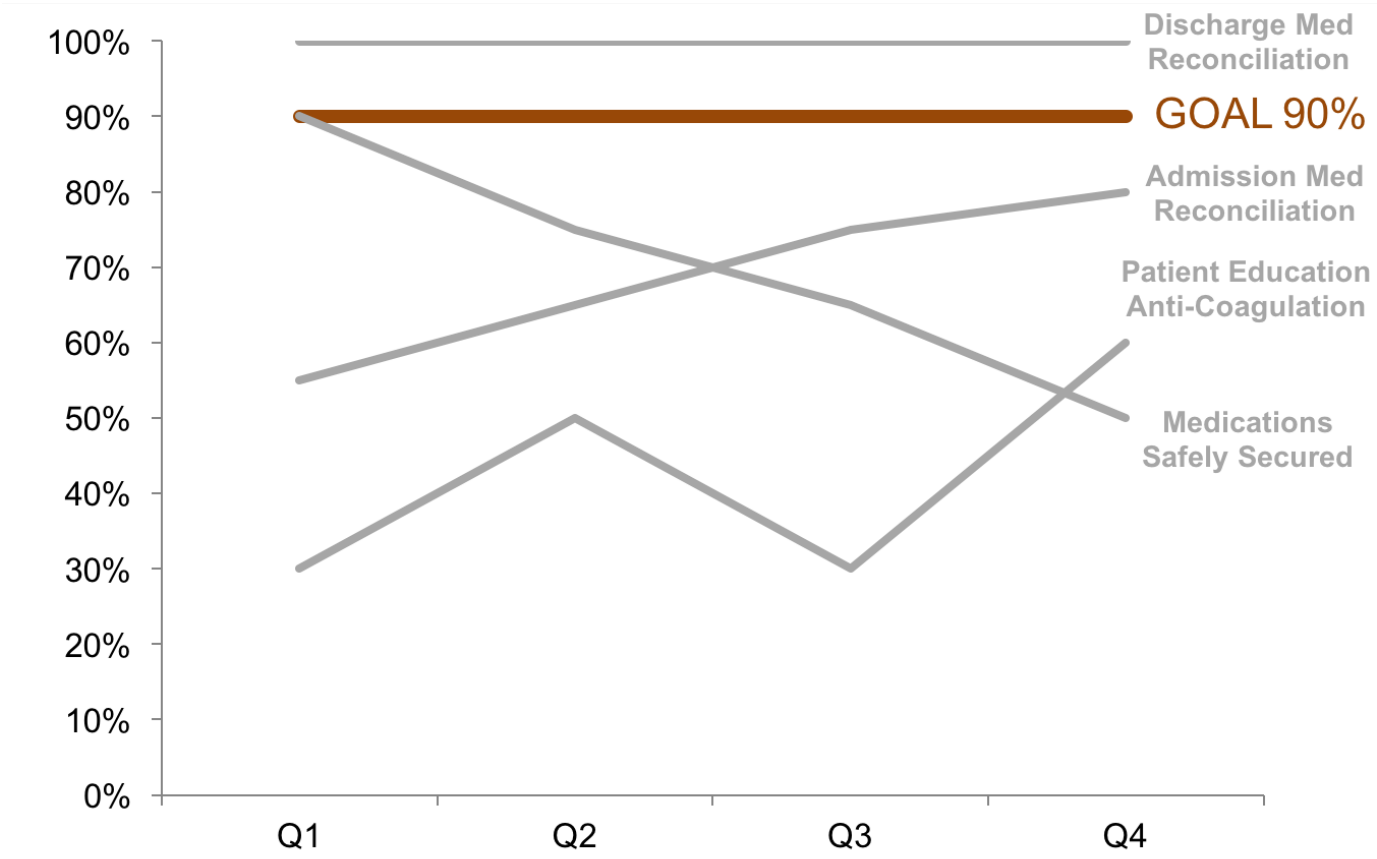


Bar graphs always start at 0 because they are displaying the size of the underlying values.

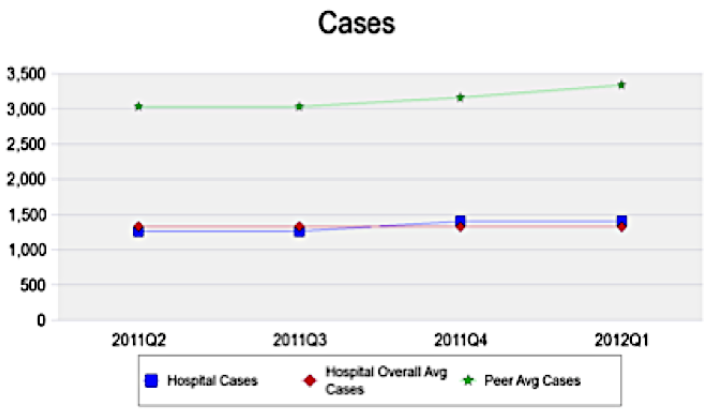
The exception is when you're working with a dataset with a wide range of values, then you can use a broken axis (as one option) to display the data.

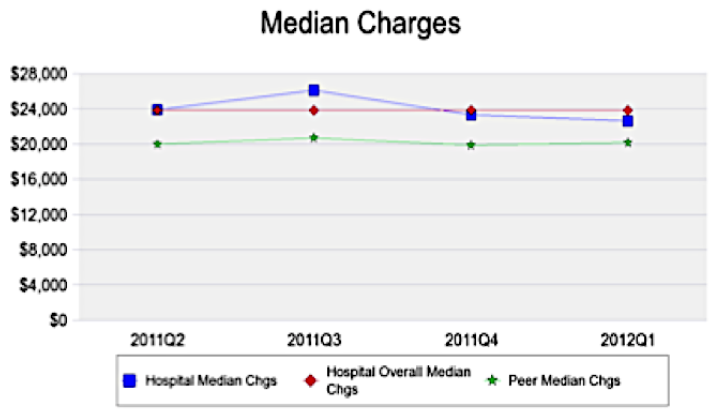
Priority Area	Accountability	CY10 Q1	Q2	Q3	Q4
Falls					
Patient Falls with Injury		0.46	0.45	0.41	
Serious Reportable Events		1	0	1	6
Medical Records					
MD Notes Composite		72%	66%	65%	67%
H&P Compliance		100%	96%	94%	95%
H&P Updated per Policy		41%	21%	80%	45%
Medication Management-Inpatient					
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					
UP Compliance (Procedural Areas)		96%	99%	94%	92%
UP Compliance (Ambulatory Areas)		71%	91%	64%	86%
Wrong Site Procedures-SRE		0	2	0	1
Other NPSGs					
Critical Value Callbacks		NA	NA	98%	98%
Worry Box					
Interventions without Orders		Data TBD			
Infection Control		Data TBD			
Internal Handoffs		Data TBD			

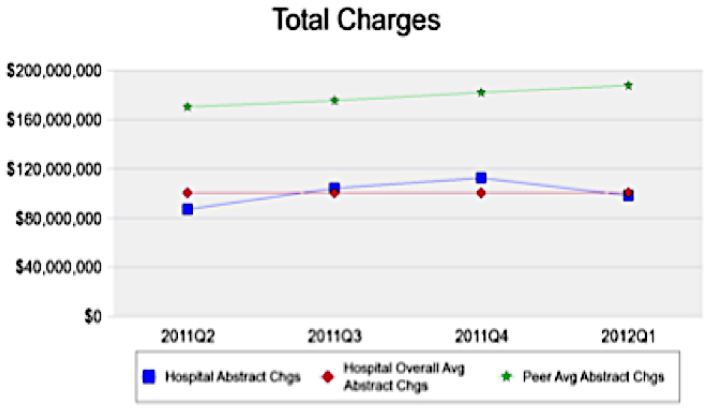
Medication Management

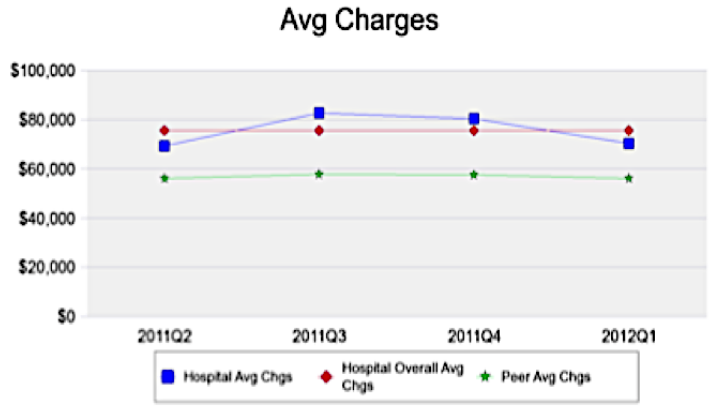


Scale and Arrangement - 1



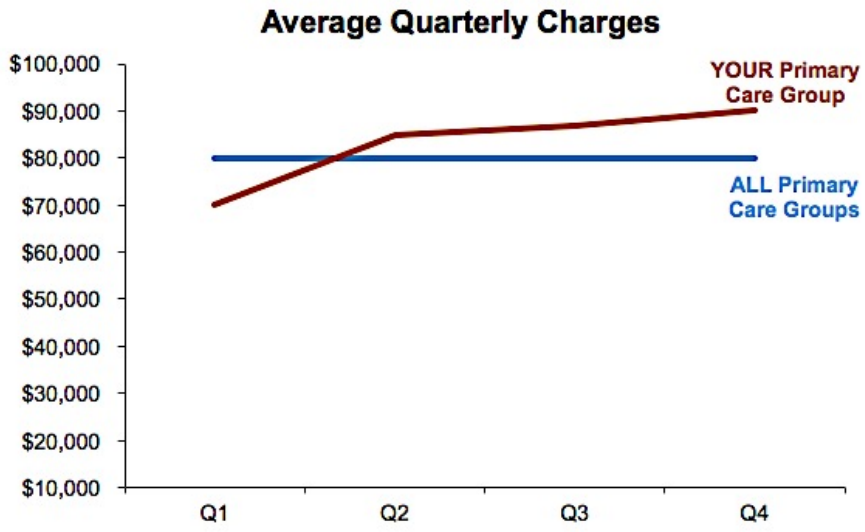


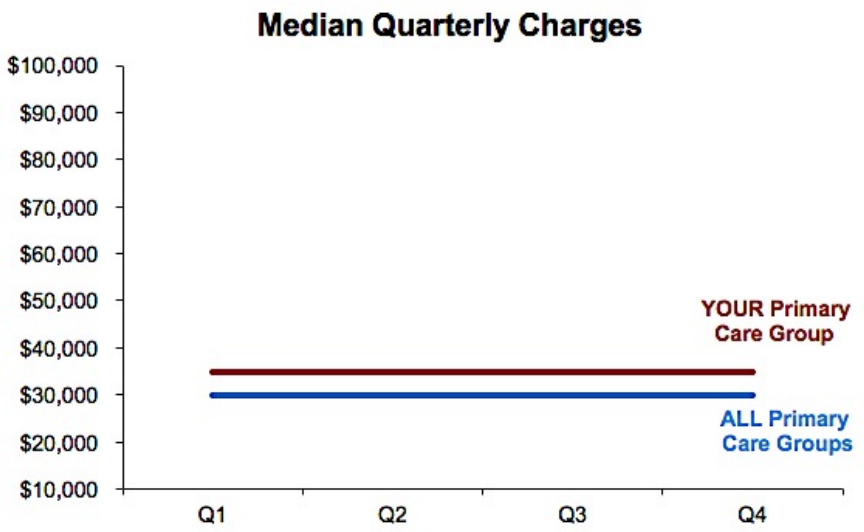




Scale and Arrangement - 2

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



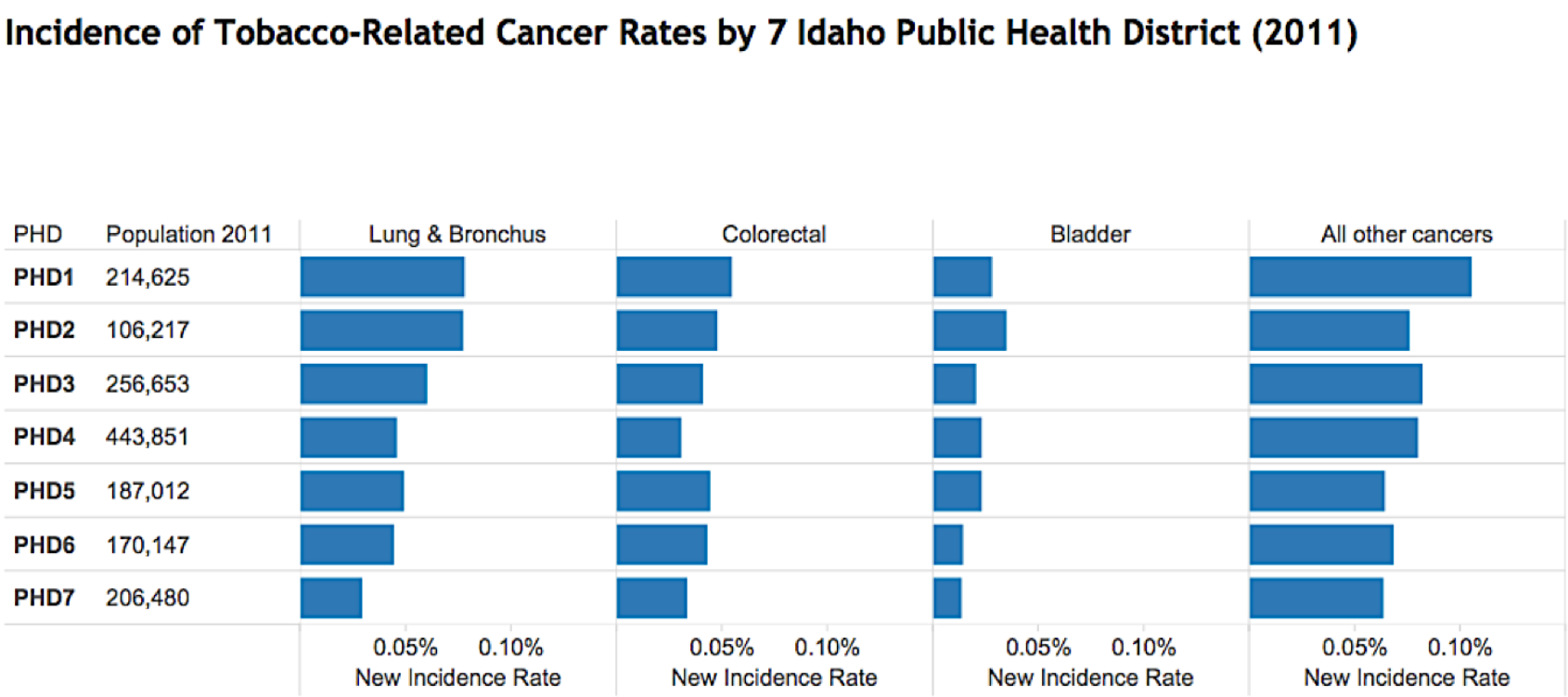


Incidence of Tobacco-Related Cancers* by Idaho Health District (2011)

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

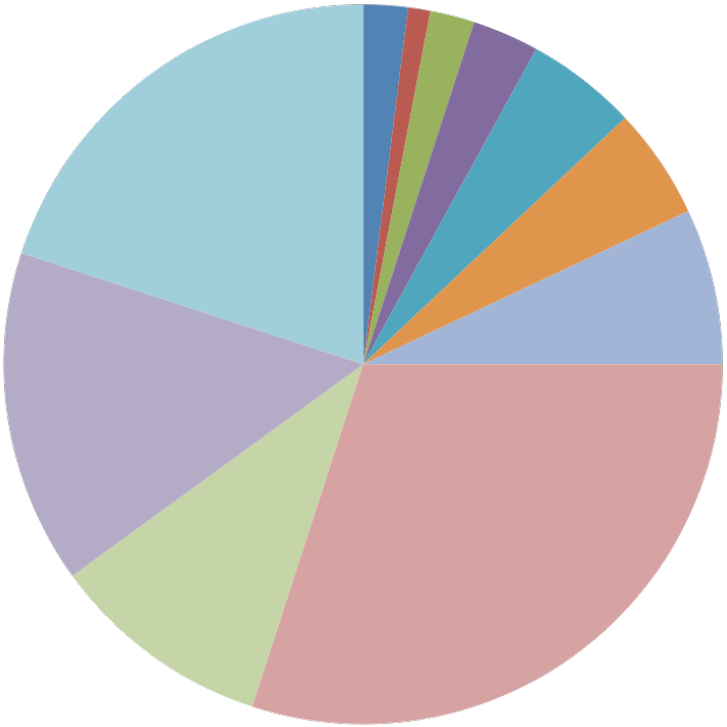
*Population attributable fractions for tobacco vary by cancer site

Small Multiples



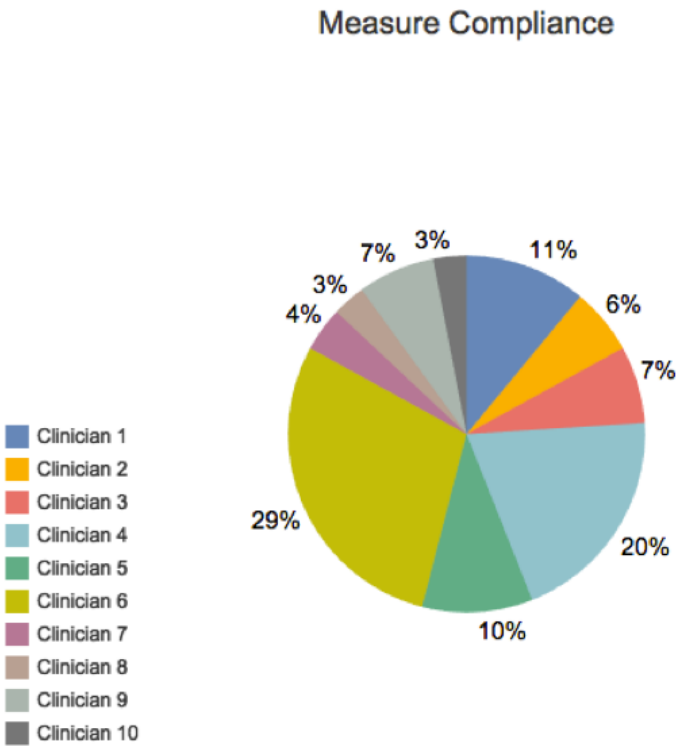
Pie Charts

Quantify the size of the slices.

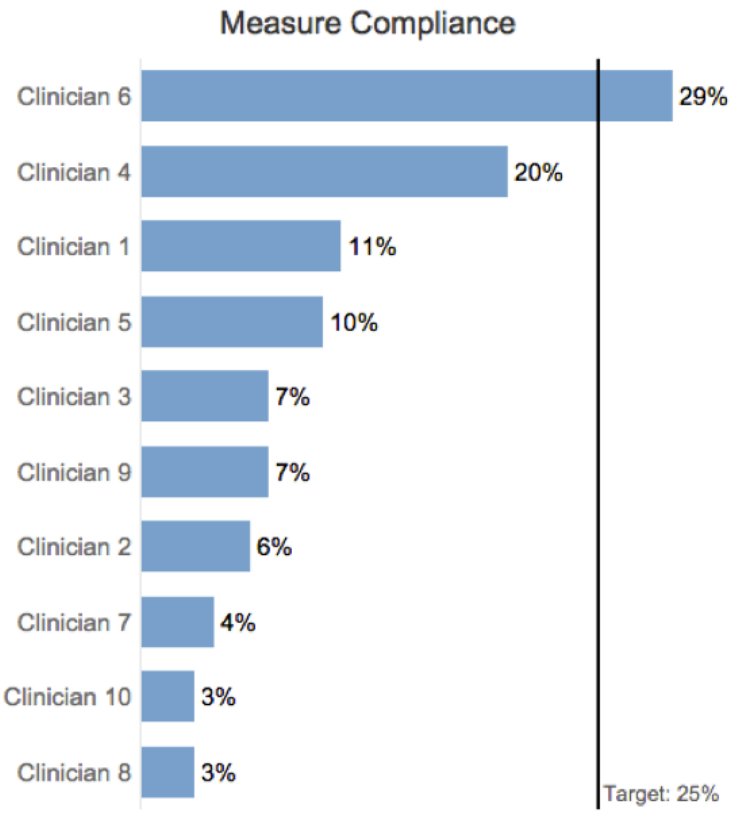


The Pie vs. The Bar

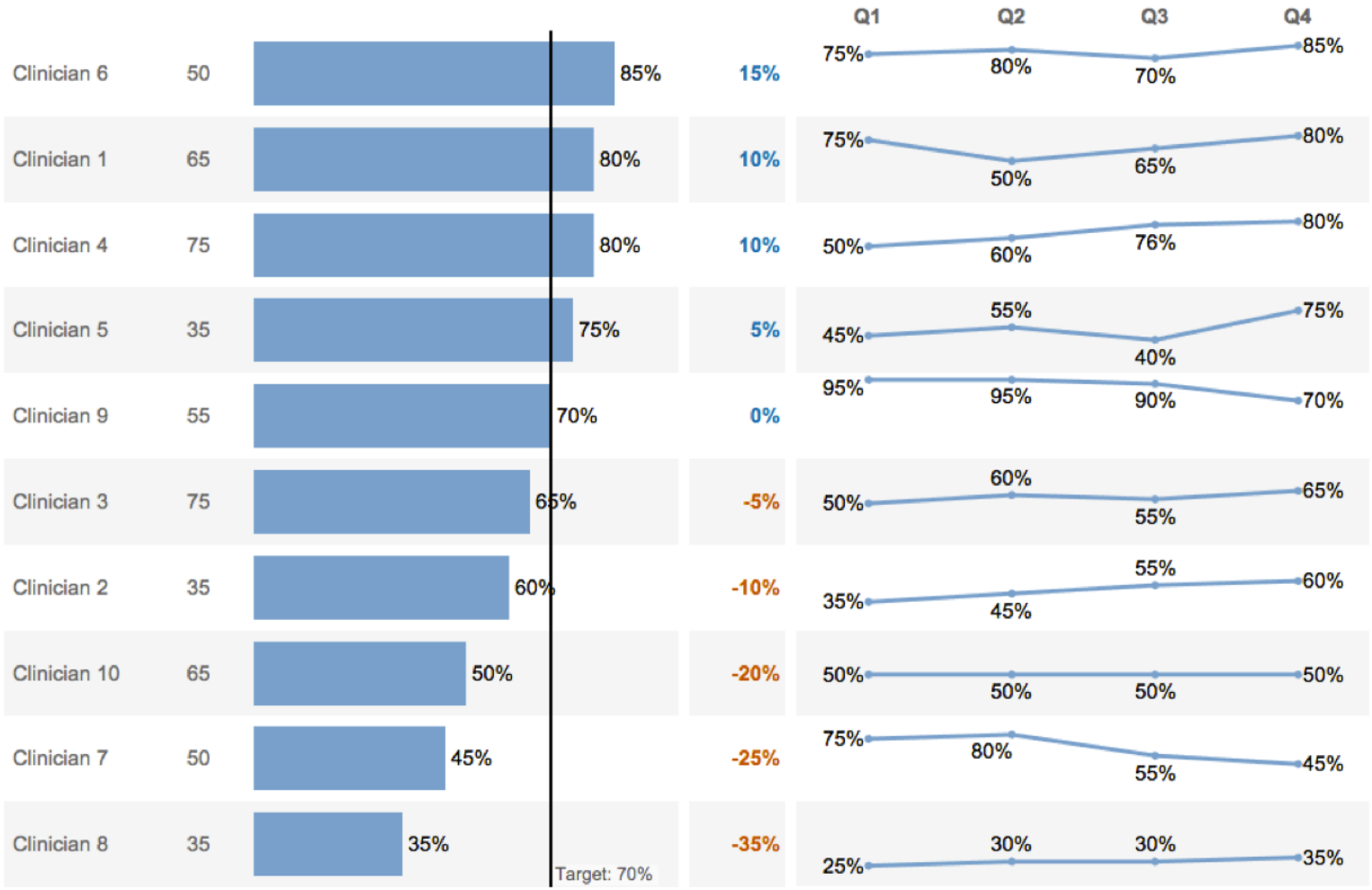
Don't Do This



Try This Instead



Measure Compliance



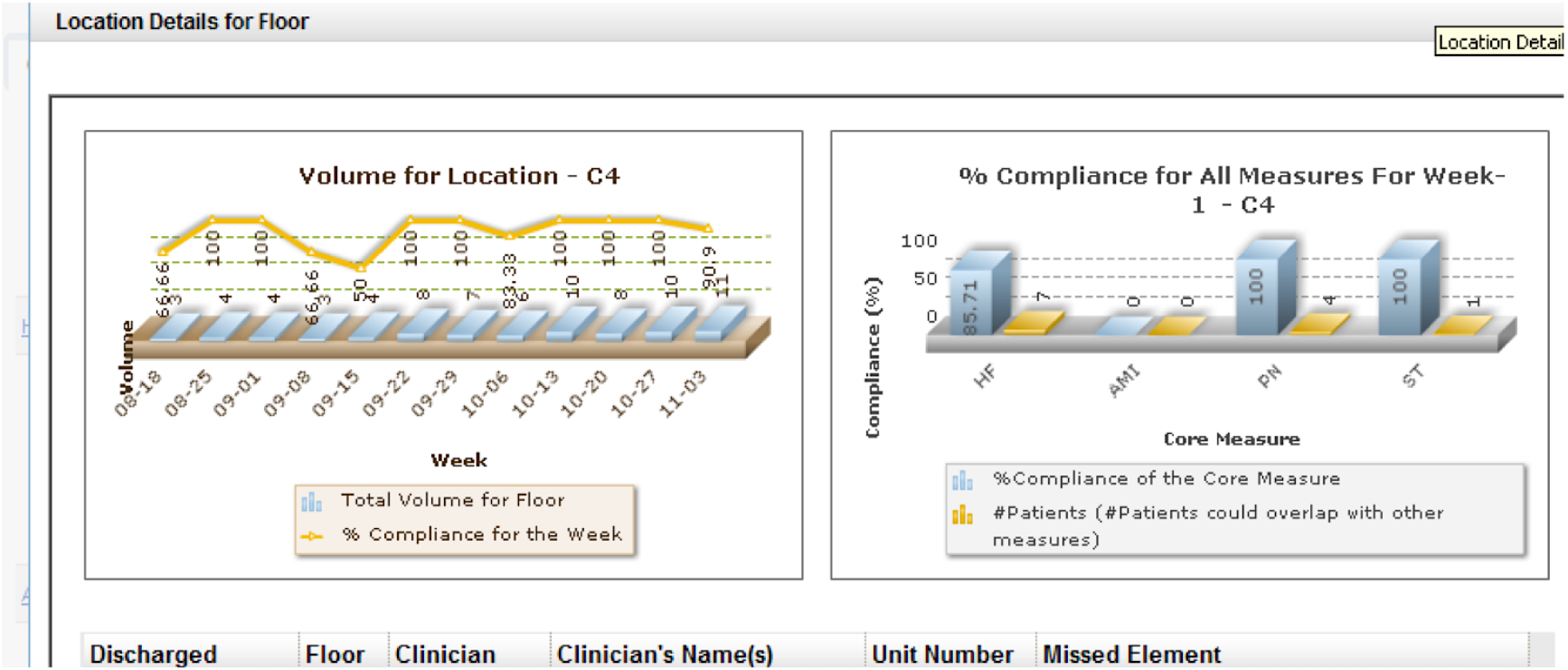
Bar charts are always superior to pie charts (and donut graphs and bubble charts).

Always.


Pie I have eaten
Pie I have not yet eaten

Using 3-D

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



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.

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

Focused Reports

Detailed Lists

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

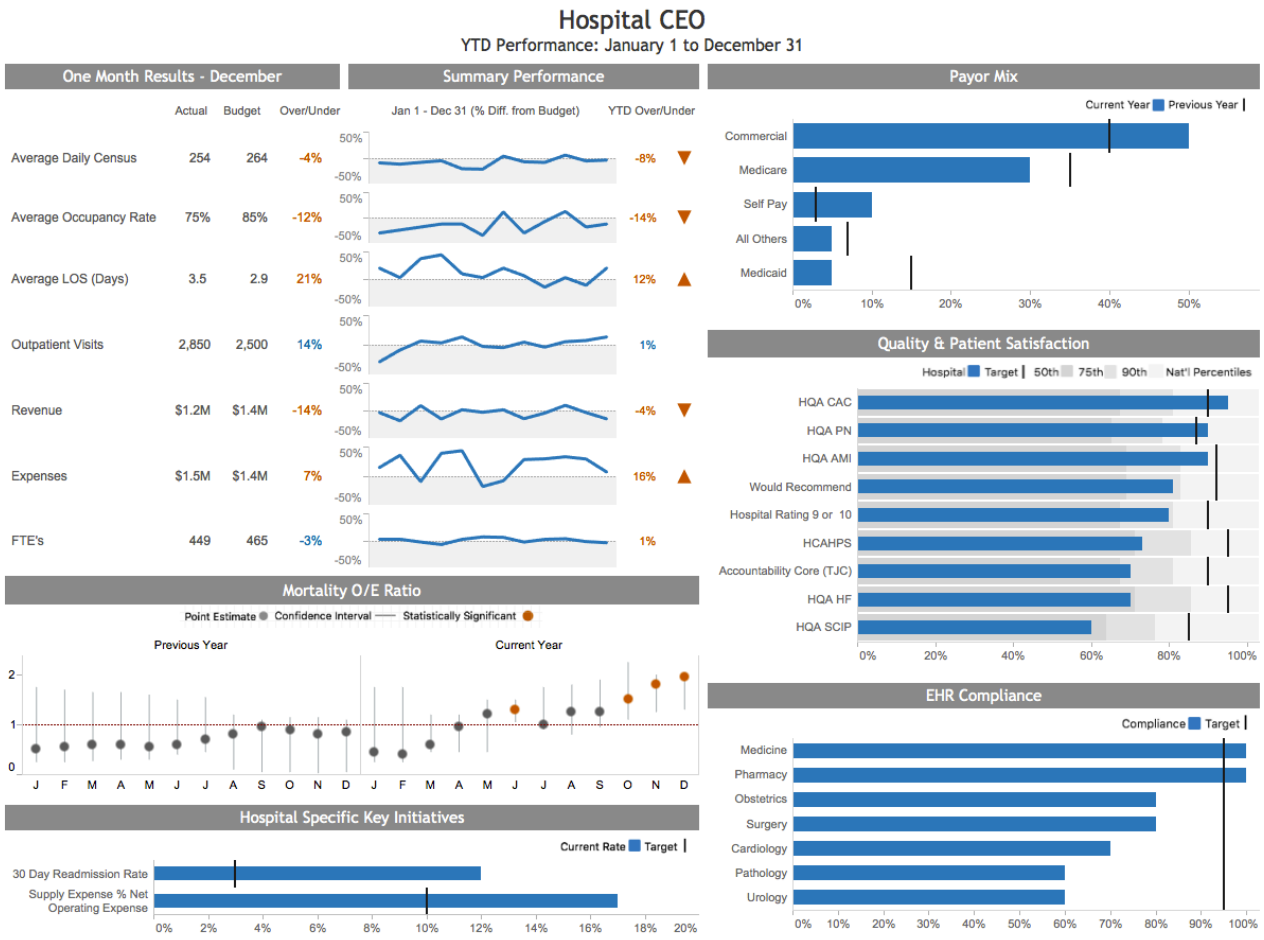
Mental Model – how do the viewers of the dashboards and reports you will create think about and use **data in the context of their:**

- **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?

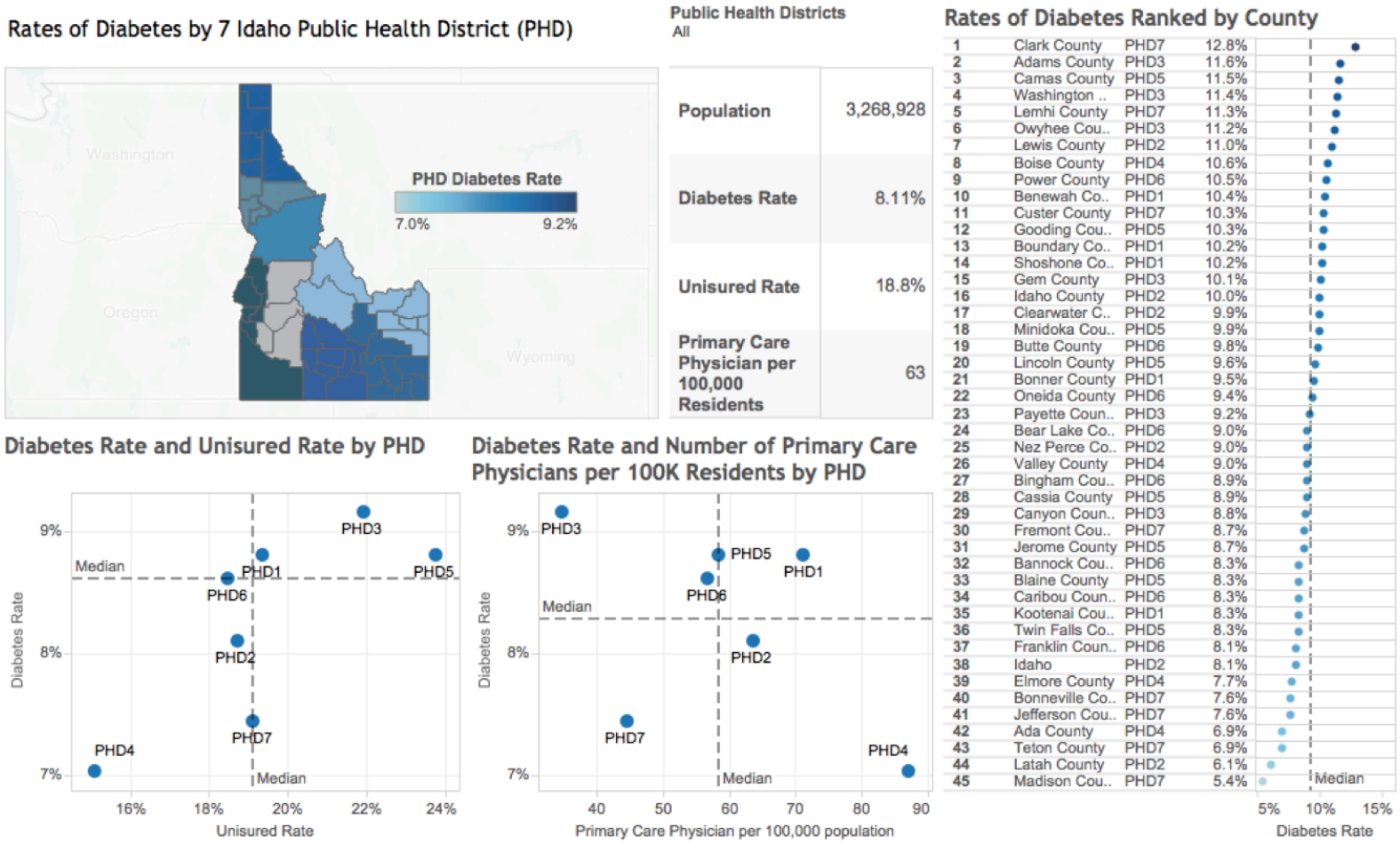
Features of Great Dashboard Design

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

Example CEO Dashboard

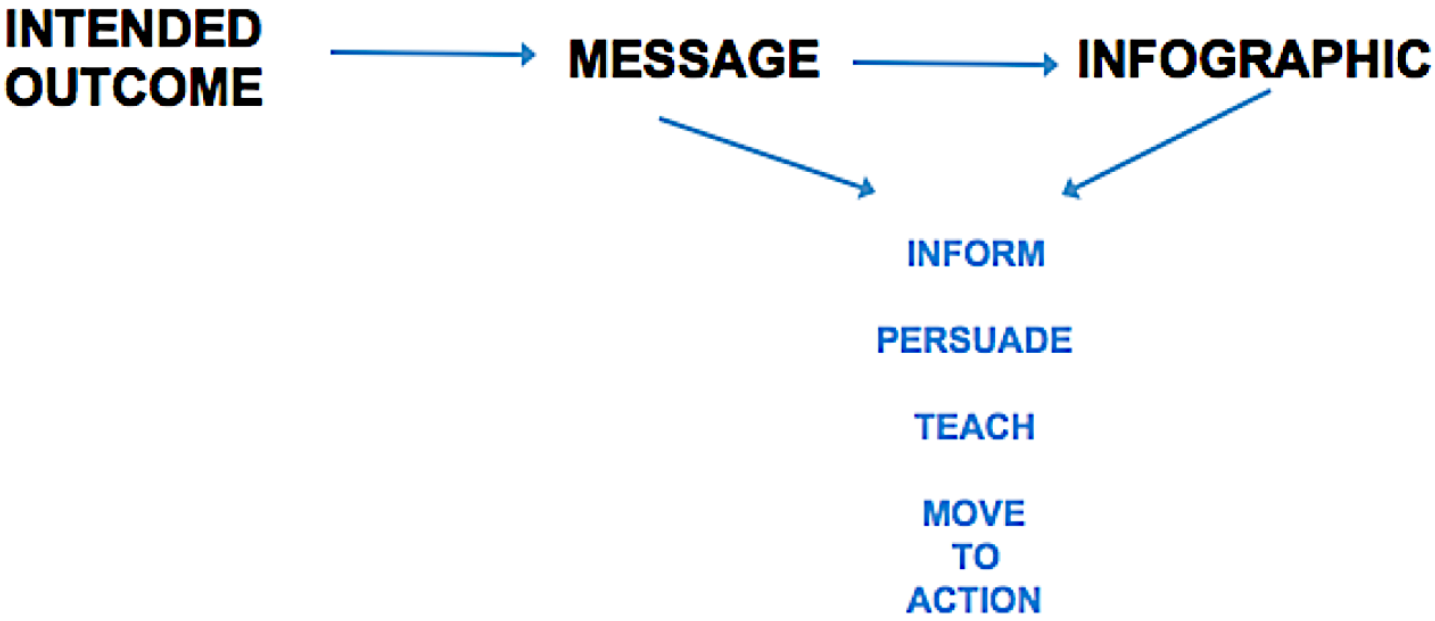


Prototype State Public Dashboard

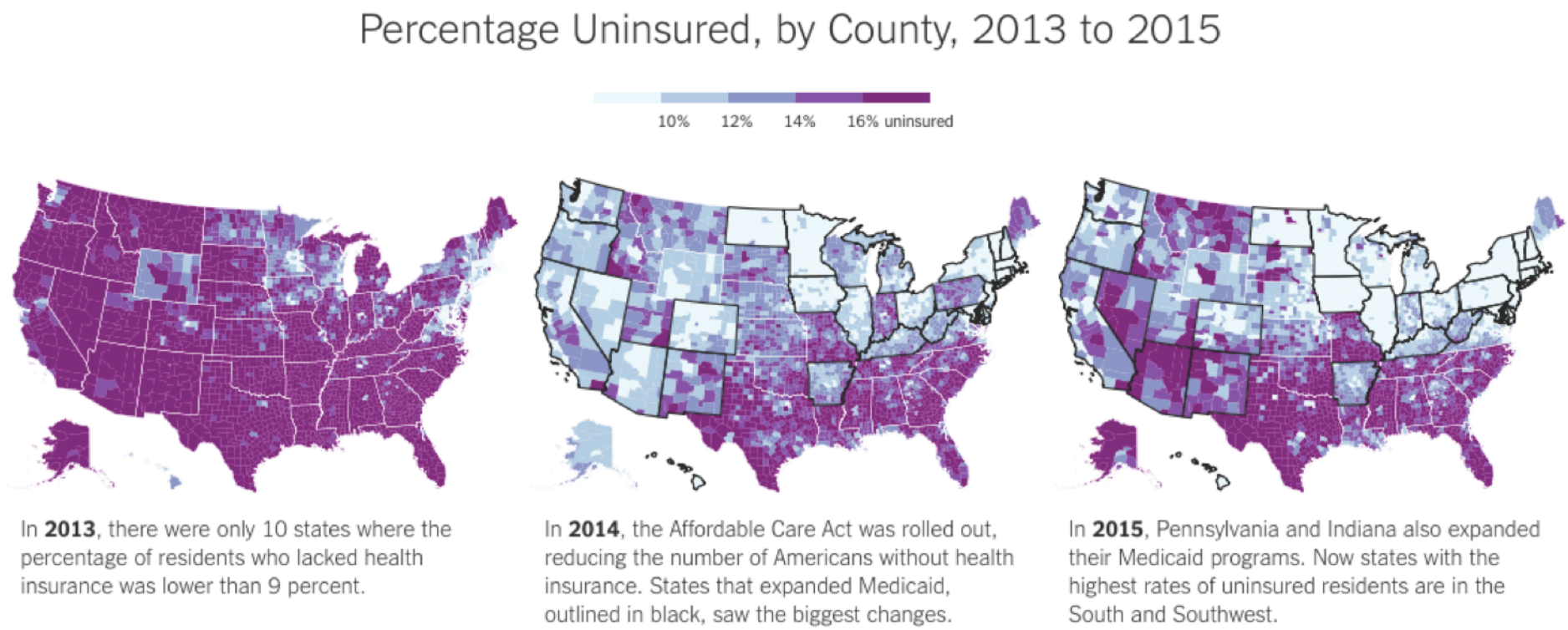


9. What's an infographic anyway?

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



Uninsured Infographic



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

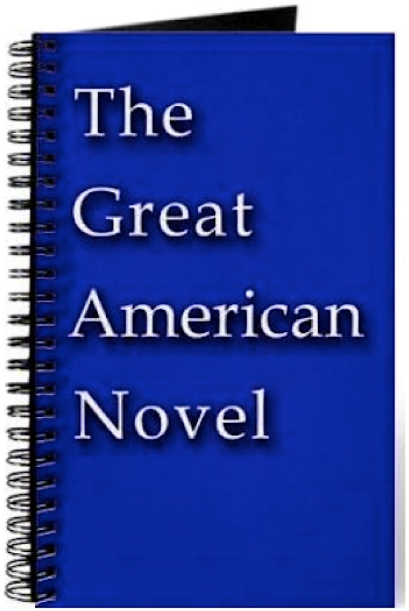
10. Technology alone is NOT the solution.

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: MedicaidIAP@cms.hhs.gov

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 IAP Data Analytics website.

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

Questions or Comments?