Preparing for this workshop:

Have your smartphone with QR code reader

Sense of adventure

Pen or Pencil

MAKING DATA COUNT

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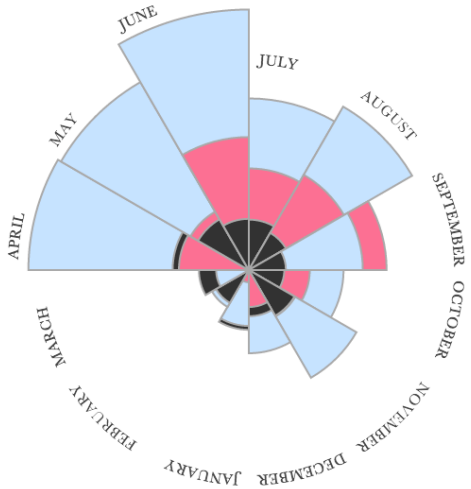
DIAGRAM OF THE CAUSES OF MORTALITY IN THE ARMY OF THE EAST

APRIL 1855 - MARCH 1856



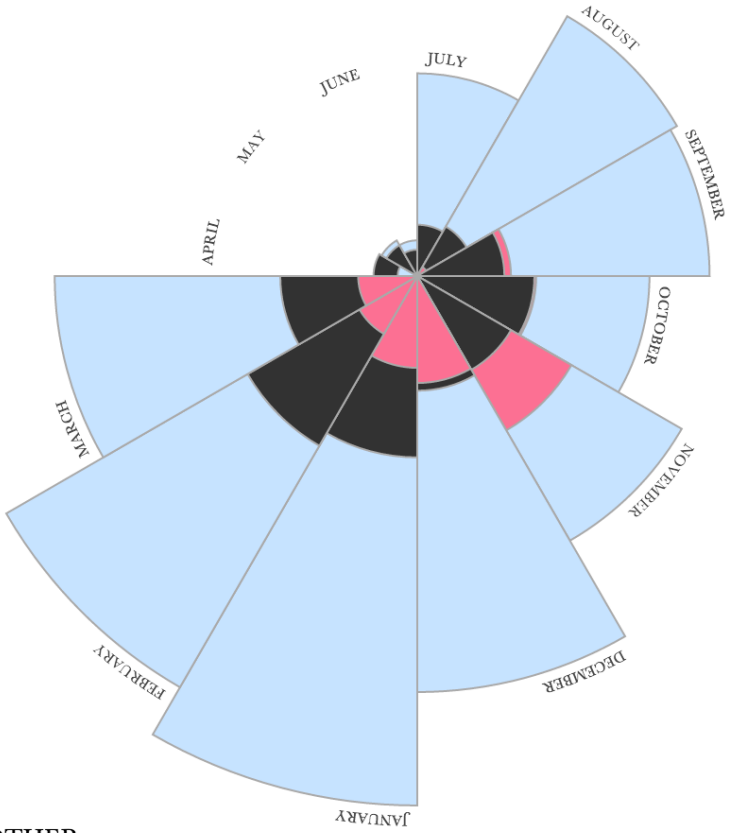
The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex

The blue wedges measured from the centre of the circle represent area for area the deaths from Preventible or Mitigable Zymotic Diseases, the red wedges measured from the center the deaths from wounds, & the black wedges measured from the center the deaths from all other causes

In October 1844, & April 1855, the black area coincides with the red, in January & February 1856, the blue coincides with the black

The entire areas may be compared by following the blue, the red & the black lines enclosing them.

APRIL 1854 - MARCH 1855



DISEASE WOUNDS OTHER

slido

Join at slido.com
#8806790

ⓘ Start presenting to display the joining instructions on this slide.

slido

What do you want to get out of this session?

ⓘ Start presenting to display the poll results on this slide.

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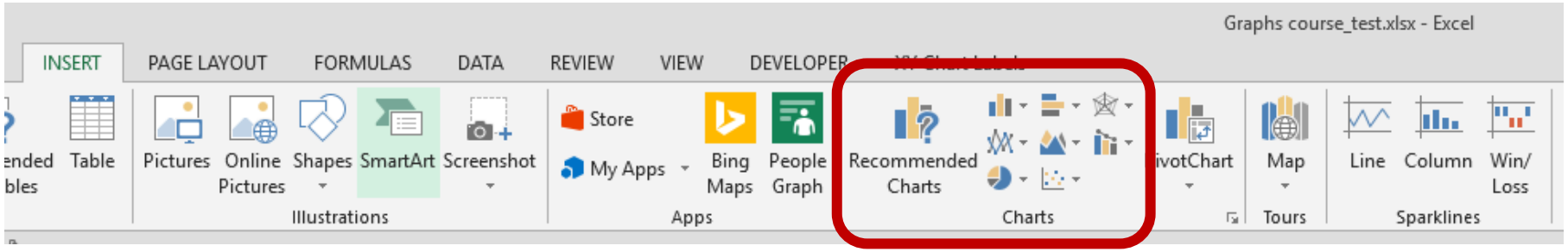
What frustrates you when looking at data?

ⓘ Start presenting to display the poll results on this slide.

The trouble with charts…


Graphs course_test.xlsx - Excel
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Online Pictures
Shapes
SmartArt
Screenshot
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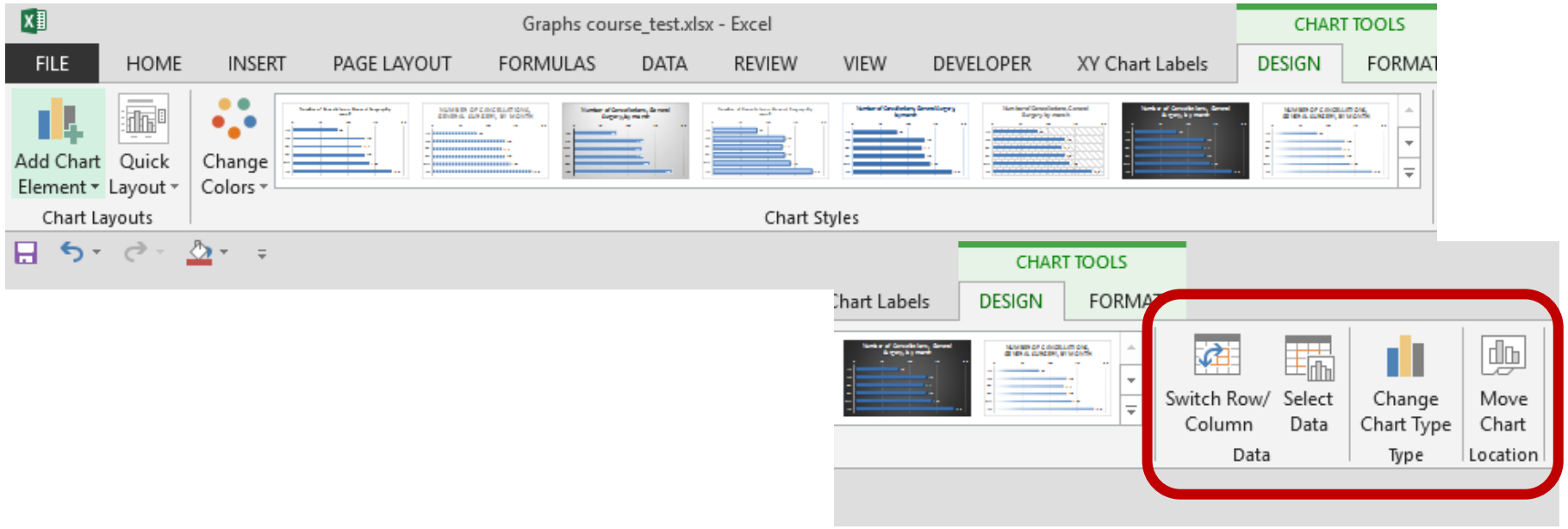
Store
My Apps
Bing Maps
People Graph
Apps
Recommended Charts
Charts
Map
Tours
Line
Column
Win/ Loss
Sparklines


Graphs course_test.xlsx - Excel
CHART TOOLS
FILE
HOME
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FORMULAS
DATA
REVIEW
VIEW
DEVELOPER
XY Chart Labels
DESIGN
FORMAT
Add Chart Element
Quick Layout
Chart Layouts
Change Colors
Chart Styles
Switch Row/ Column
Select Data
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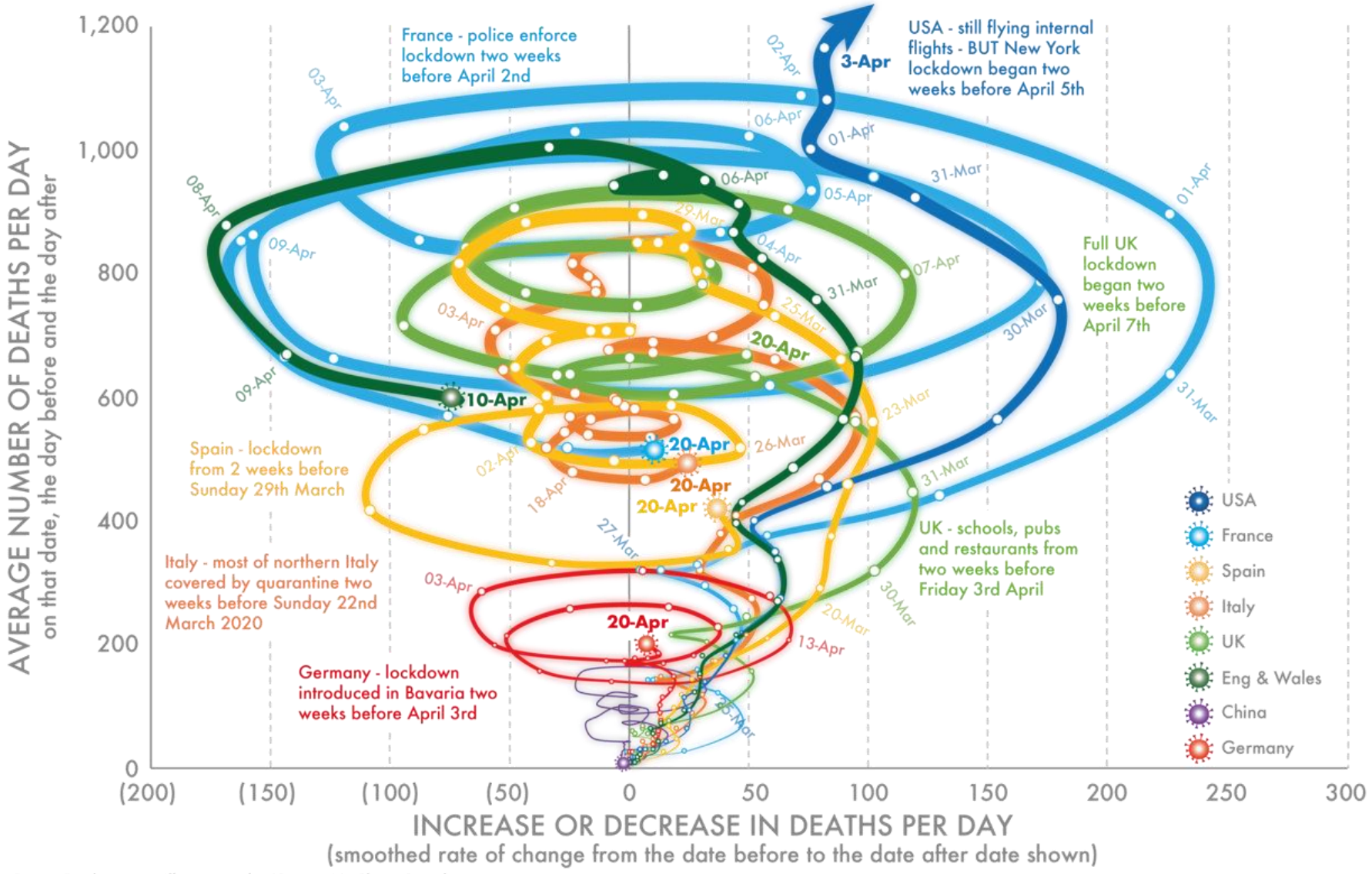
Change Chart Type
Type
Move Chart
Location



DannyDorling.org. Illustration by Kirsten McClure @orpheuscat

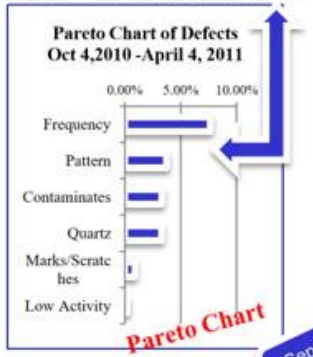
Finding the Skinny on Thin Film Sensor Reject Rates

DEFINE – 5/15/11

1) Problem Statement:
Production reject rate of thin film sensors increases after process change.

Box Plot

2) Work on largest category of defect for MAXIUM IMPACT



Pareto Chart

3) Business Impact:
Reducing/eliminating frequency rejects will prevent reworking of part, extra inventory and labor from 100% testing which could potentially save

$300K!

Thanks to the team:

MEASURE - 6/1/11

4) Out-of-Control:
Process is highly variable to begin w/ but much worse after change.

Control Chart

5) Change of Focus
The change did cause an increase in variability, but the process is not very good to start w/ a **DPMO of** 19,263! Finding the root cause of the inherent process variability should solve the new issue.

6) Identify Primary Inputs (Y)

Separated wheat from chaff

Cause & Effect Matrix

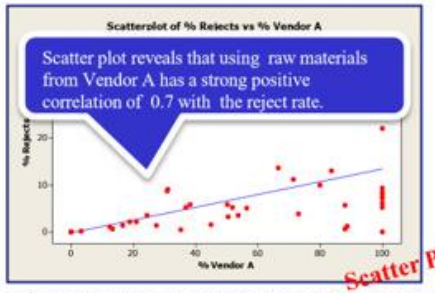
Scoring:1=low, 3 = med, 5=high,
...ce to Customer (sensors w/ correct frequency) = 1

...puts	Effect	Rating	Probability	Score
Vendor frequency sorting quality	Allow accurate calculation of thickness	5	High, makes adjustments when providing thickness data to techs	25
Fixture Geometry	Even coating thickness	5	High, location determines the thickness of the coating	25

C&E Matrix

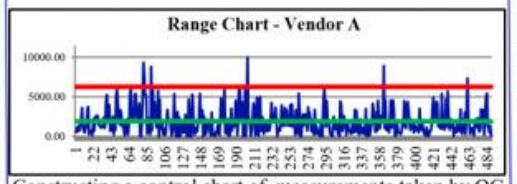
ANALYZE - 7/1/11

7) Probable Cause 1 - Raw Material Supply



Scatter Plot

The r^2 shows that the amount of raw material used from Vendor A explains 46.6 % of the change in reject rate.



Constructing a control chart of measurements taken by QC of frequency illustrates that the vendors process is out of control.

8) Probable Cause 2 – Evaporation Fixture Geometry

The sensors are held in a fixture positioned over a evaporation source that coats them with metal. I performed a test run to measure baseline performance. The data revealed that the metallic coating has too much variation in thickness w/ a mean of 2235 Å, but the range should be 500 Å. This could be caused by the position of the source, size of mask or angle of the holding fixture.

H_o: Test 1 thickness variability ≤ Test 2

$$Z = \frac{\bar{x}1 - \bar{x}2}{\sqrt{\frac{s1^2}{n} + \frac{s2^2}{n}}} = \frac{2235 - 2264}{\sqrt{\frac{333^2}{252} + \frac{242^2}{252}}}$$

Hypothesis Test

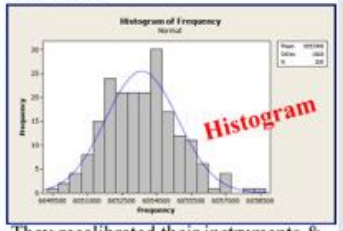
$Z = -1.19$ $P = 1 - Z = 1 - 1.19 = 0.86 = 86\%$

A second run was done to test if a centered evaporation source would decrease thickness variability (Ha). A one-tail test was performed & the P value was high, thus it did not significantly improve the process. This

IMPROVE - 8/1/11

9) Solution to Probable Cause 1

-Receipt of material from Vendor A was halted. A comparison of their measurements vs. ours found a 7.6 KHz difference!

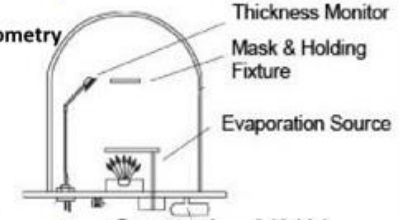


Histogram

They recalibrated their instruments & next shipment was markedly improved with a mean very close to the center of our specification range of 6.055 as shown on this histogram.

10) Solution to Probable Cause 2

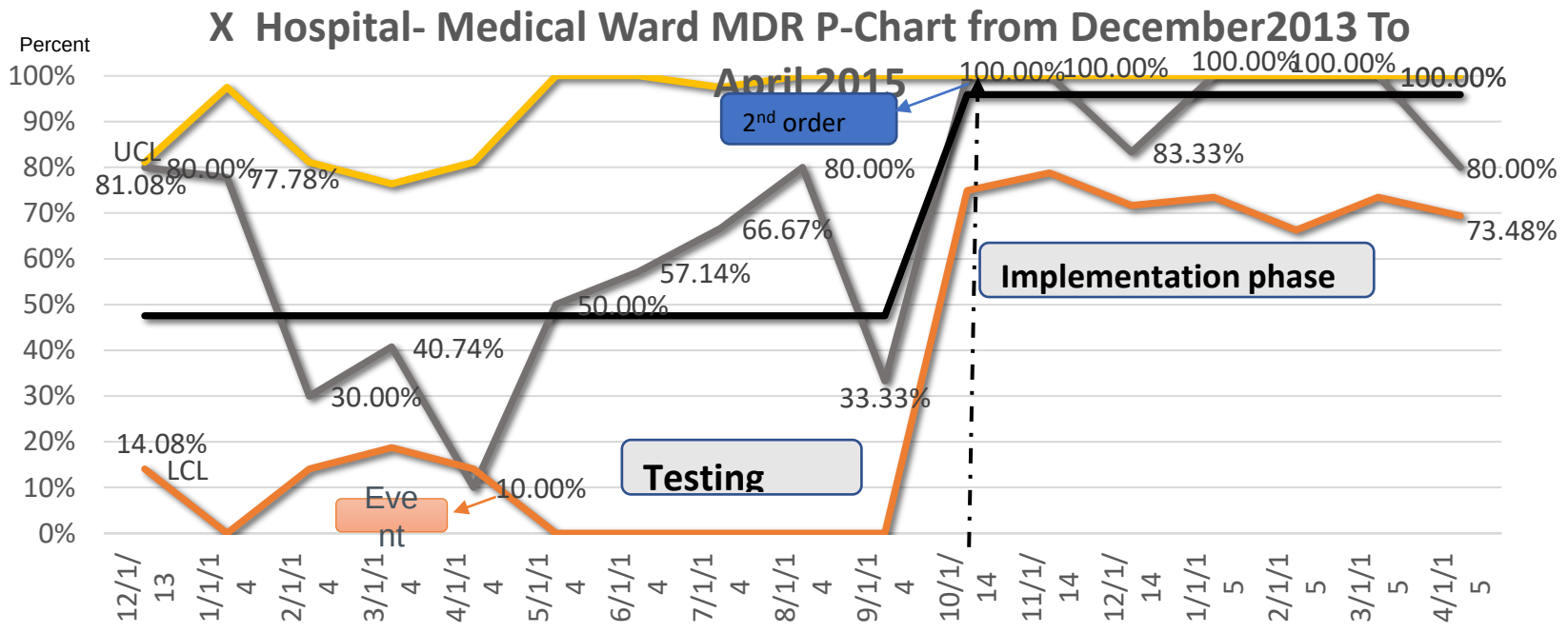
I'm working with engineering to develop a new fixture that will improve the geometry.



Control – 8/8/11

10) Changes to be Made:

✓QC technician does acceptance testing of raw materials w/ zero tolerance.
✓Vendor supplies Certificate of Analysis w/ test statistics.
✓Control chart created for raw materials.
✓New fixture for more uniform

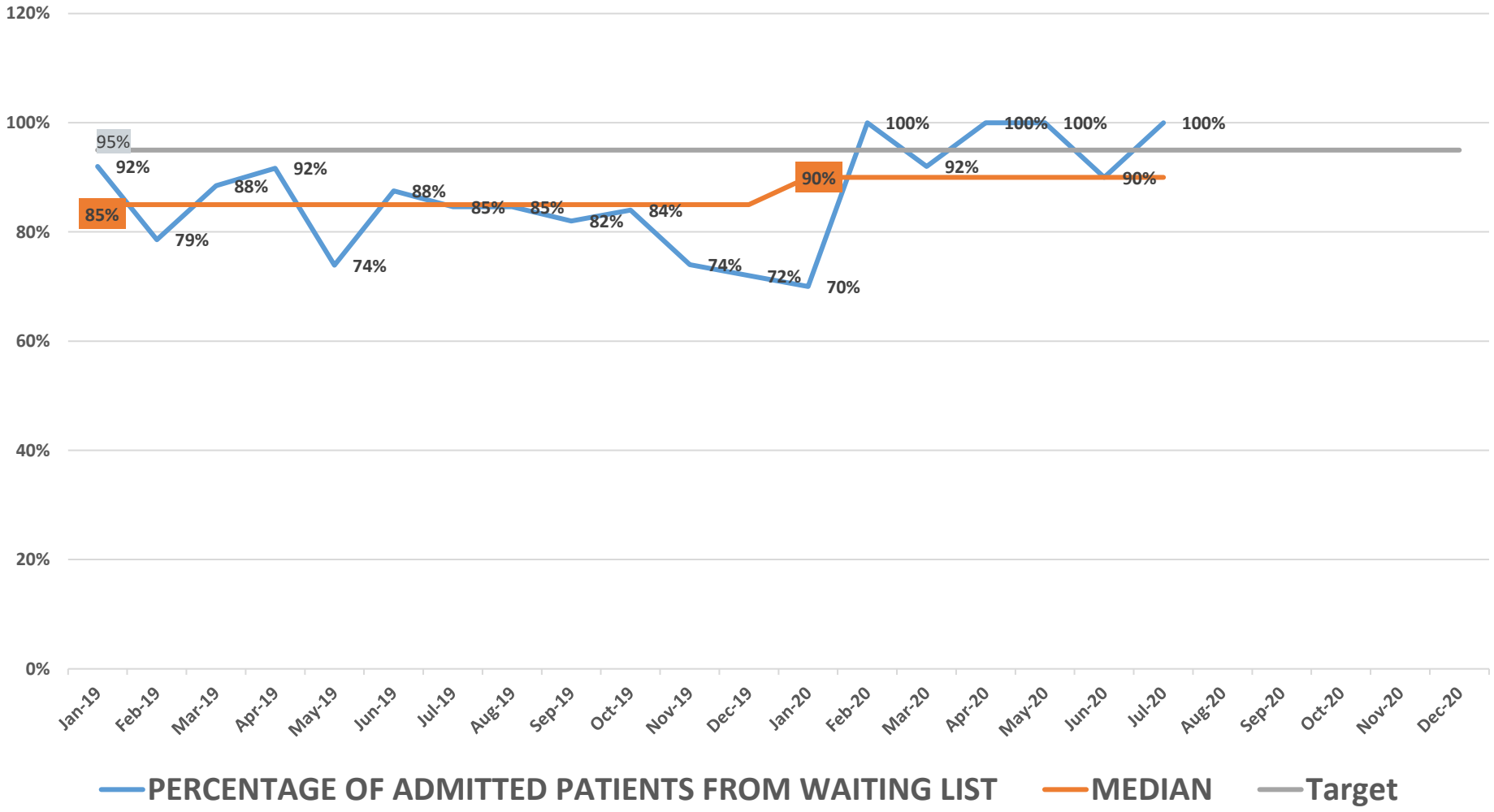

X Hospital- Medical Ward MDR P-Chart from December2013 To April 2015
Percent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
UCL
81.08%
80.00%
77.78%
14.08%
LCL
30.00%
40.74%
10.00%
50.00%
57.14%
66.67%
80.00%
33.33%
100.00%
100.00%
100.00%
100.00%
100.00%
83.33%
80.00%
73.48%
2nd order
Testing
Implementation phase
Event
12/1/13
1/1/14
2/1/14
3/1/14
4/1/14
5/1/14
6/1/14
7/1/14
8/1/14
9/1/14
10/1/14
11/1/14
12/1/14
1/1/15
2/1/15
3/1/15
4/1/15

slido

Which is the more distinctive line for you?

ⓘ Start presenting to display the poll results on this slide.

Percentage Of The Monthly LTC Admissions To Long Term Facilities out of The Total Demands in HMC.



What will you get out of this workshop

- Understand cognitive overload
- Overview of Gestalt principles for visual perception
- Reading a chart
- Good chart design principles

A TEST FOR YOU

HOW MUCH IS:

15 + 6 =

56 + 3 =

89 + 2 =

12 + 53 =

75 + 26 =

123 + 5 =

NOW THINK OF A TOOL AND A COLOUR

Frustration?

Cognitive Overload?

WE HAVE TO KNOW OUR ‘MESSAGE’

RAG overload

Legend for Status of Goals (Based on Annual Goal)
- Goal Met (GREEN)
- Goal 75% Met (YELLOW)
- Goal Not Met (RED)

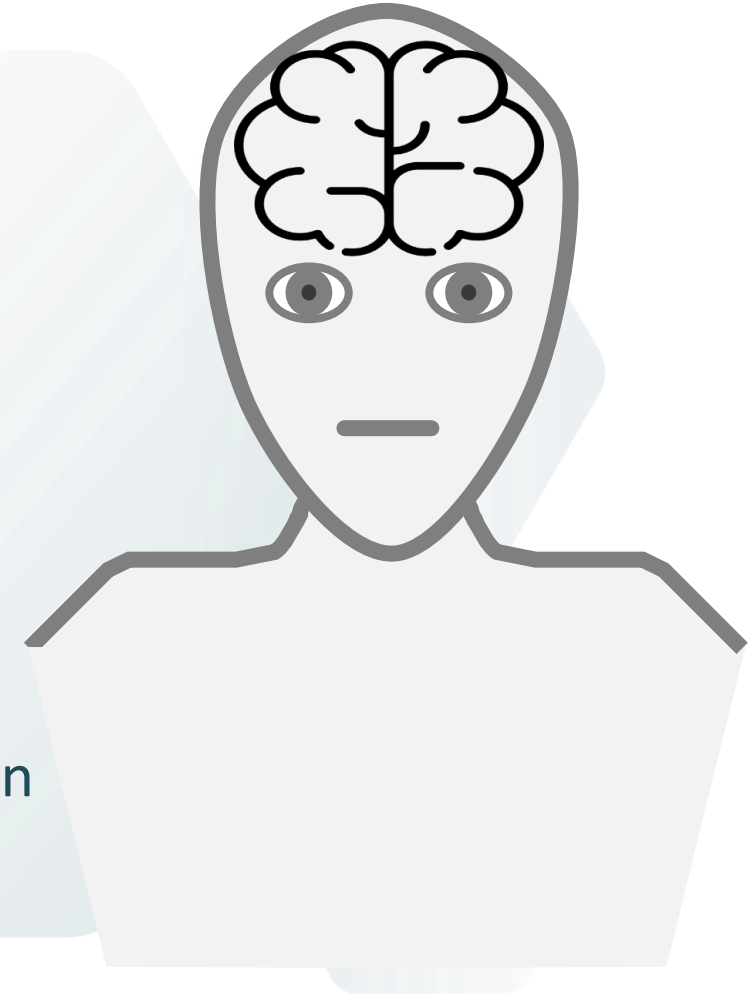
FY 2009 Hospital System-Level Measures

	Good	Goals		FY 2007	FY 2008	FY 2009 Q1	FY 2009 Q2	FY 2009 Q3
		FY 09 Goal	Long Term Goal					
Patient Perspective								
1. Overall Satisfaction Rating: Percent Who Would Recommend (Includes inpatient, outpatient, ED, and Home Health)		60%	80%	37.98%	48.98%	57.19%	56.25%	51.69%
2. Wait for 3rd Next Available Appointment: Percent of Areas with appointment available in less than or equal to 7 business days (n=43)		65%	100%	53.5%	51.2%	54.3%	61.20%	65.1%
Patient Safety								
3. Safety Events per 10,000 Adjusted Patient Days	↓	0.28	0.20	0.35	0.31	0.31	0.30	0.28
4. Percent Mortality	↓	3.50	3.00	4.00	4.00	3.48	3.50	3.42
5.Total Infections per 1000 Patient Days	↓	2	0	3.37	4.33	4.39	2.56	1.95
Clinical								
6. Percent Unplanned Readmissions	↓	3.5%	1.5%	6.1%	4.8%	4.6%	4.1%	3.5%
7. Percent of Eligible Patients Receiving Perfect Care--Evidence Based Care (Inpatient and ED)		95%	100%	46%	74.1%	88.0%	91.7%	88.7%
Employee Perspective								
8. Percent Voluntary Employee Turnover	↓	5.80%	5.20%	5.20%	6.38%	6.10%	6.33%	6.30%
9. Employee Satisfaction: Average Rating Using 1-5 Scale (5 Best Possible)		4.00	4.25	3.90	3.80	3.96	3.95	3.95
Operational Performance								
10. Percent Occupancy		88.0%	90.0%	81.3%	84.0%	91.3%	85.6%	87.2%
11. Average Length of Stay	↓	4.30	3.80	5.20	4.90	4.60	4.70	4.30
12. Physician Satisfaction: Average Rating Using 1-5 Scale (5 Best Possible)		4.00	4.25	3.80	3.84	3.96	3.80	3.87
Community Perspective								
13. Percent of Budget Allocated to Non-recompensed Care		7.00%	7.00%	5.91	7.00%	6.90%	6.93%	7.00%
14. Percent of Budget Spent on Community Health Promotion Programs		0.30%	0.30%	0.32%	0.29%	0.28%	0.31%	0.29%
Financial Perspective								
15. Operating Margin-Percent		1.2%	1.5%	-0.5%	0.7%	0.9%	0.4%	0.7%
16. Monthly Revenue (Million)-change so shows red--but sp cause good related to occupancy		20.0	20.6	17.6	16.9	17.5	18.3	19.2

FIGURE 12.1 Tabular Vector of Measures Using Green, Yellow, and Red Indicator, p353-354, The Healthcare Data Guide, Provost & Murray, 2011

Memory

- **Iconic**
  - Very short
  - Looks for patterns (pre-attentive attributes)
- **Short term**
  - Most people can handle 4 chunks of visual information
- **Long term**

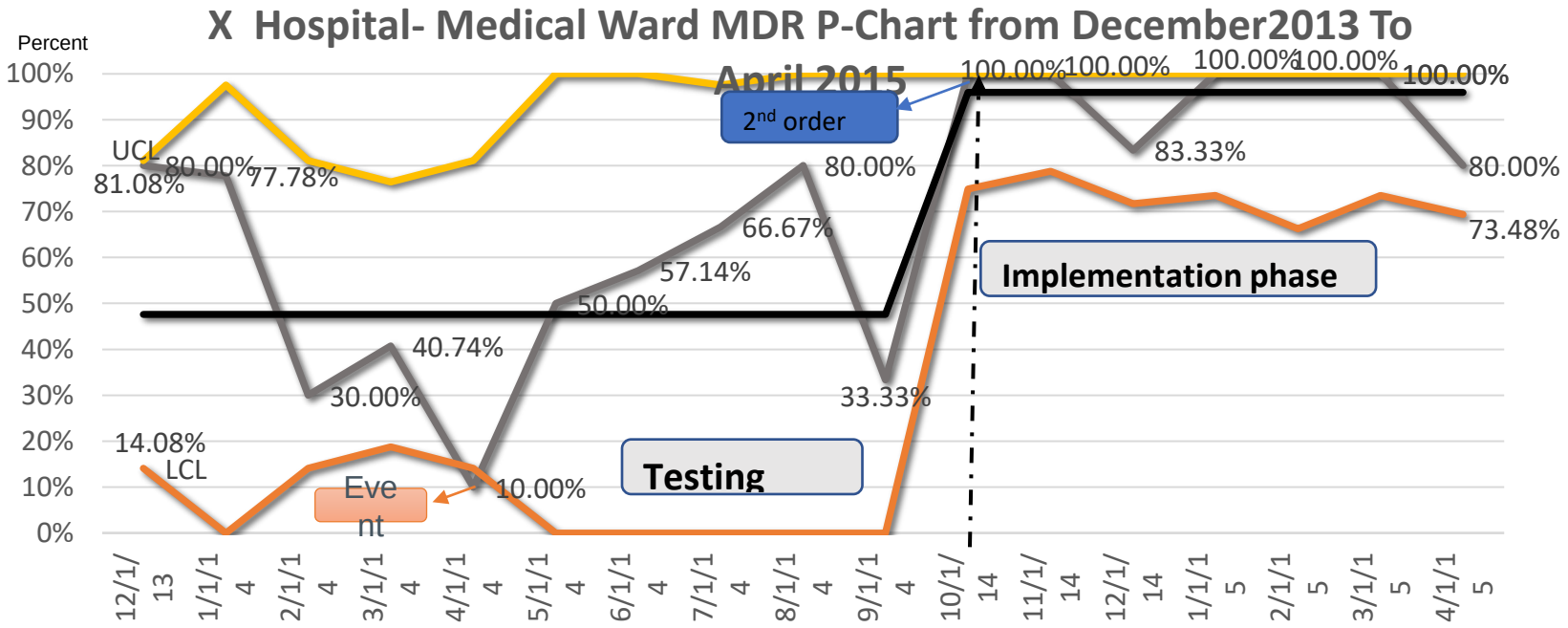


What is the ‘Message’ you are trying to convey?

Who is my audience?

What do I want to convey?

What type of visualisation to pick?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10.00%
50.00%
57.14%
66.67%
80.00%
33.33%
100.00%
100.00%
100.00%
100.00%
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2nd order
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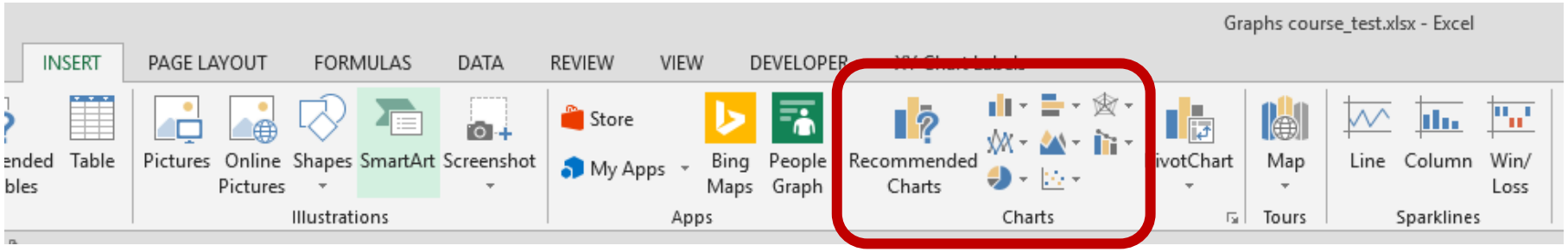
7/1/14
8/1/14
9/1/14
10/1/14
11/1/14
12/1/14
1/1/15
2/1/15
3/1/15
4/1/15

DON'T MAKE THE AUDIENCE WORK FOR THE INFORMATION.

YOU WON'T HELP THEM LEARN

“Data should always be presented in such a way that preserves the evidence in the data …”

Walter Shewhart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Shapes
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People Graph
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Recommended Charts
Charts
Map
Tours
Line
Column
Win/ Loss
Sparklines

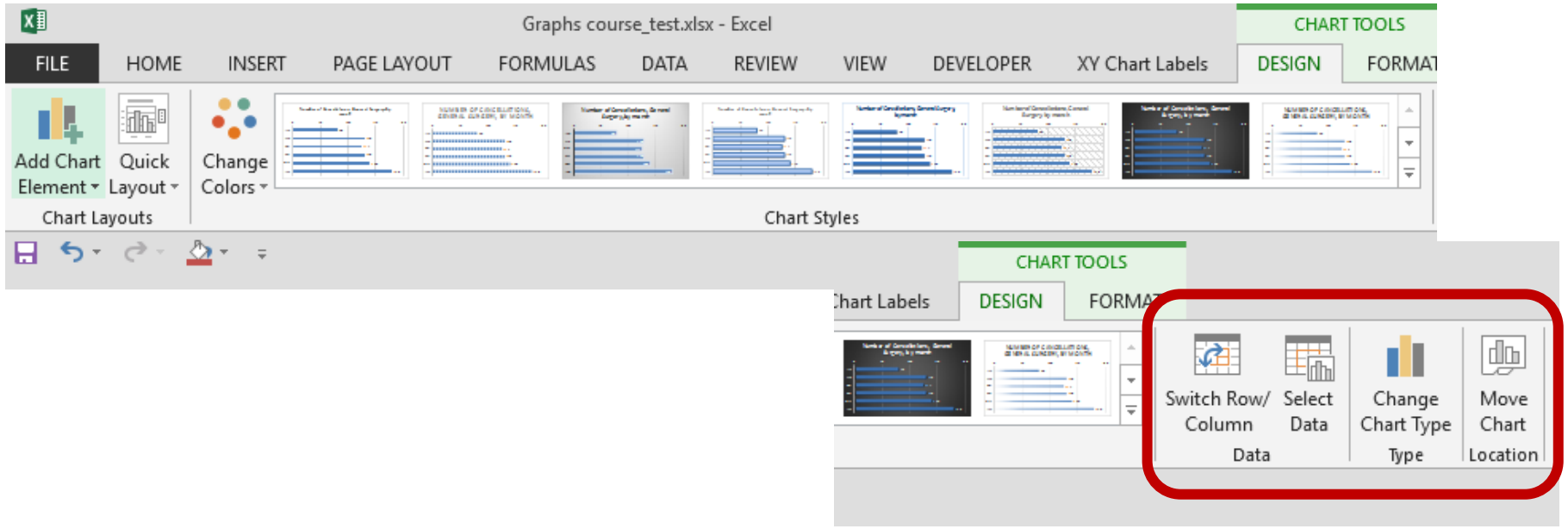
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CHART TOOLS
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Chart Layouts
Change Colors
Chart Styles
Switch Row/ Column
Select Data
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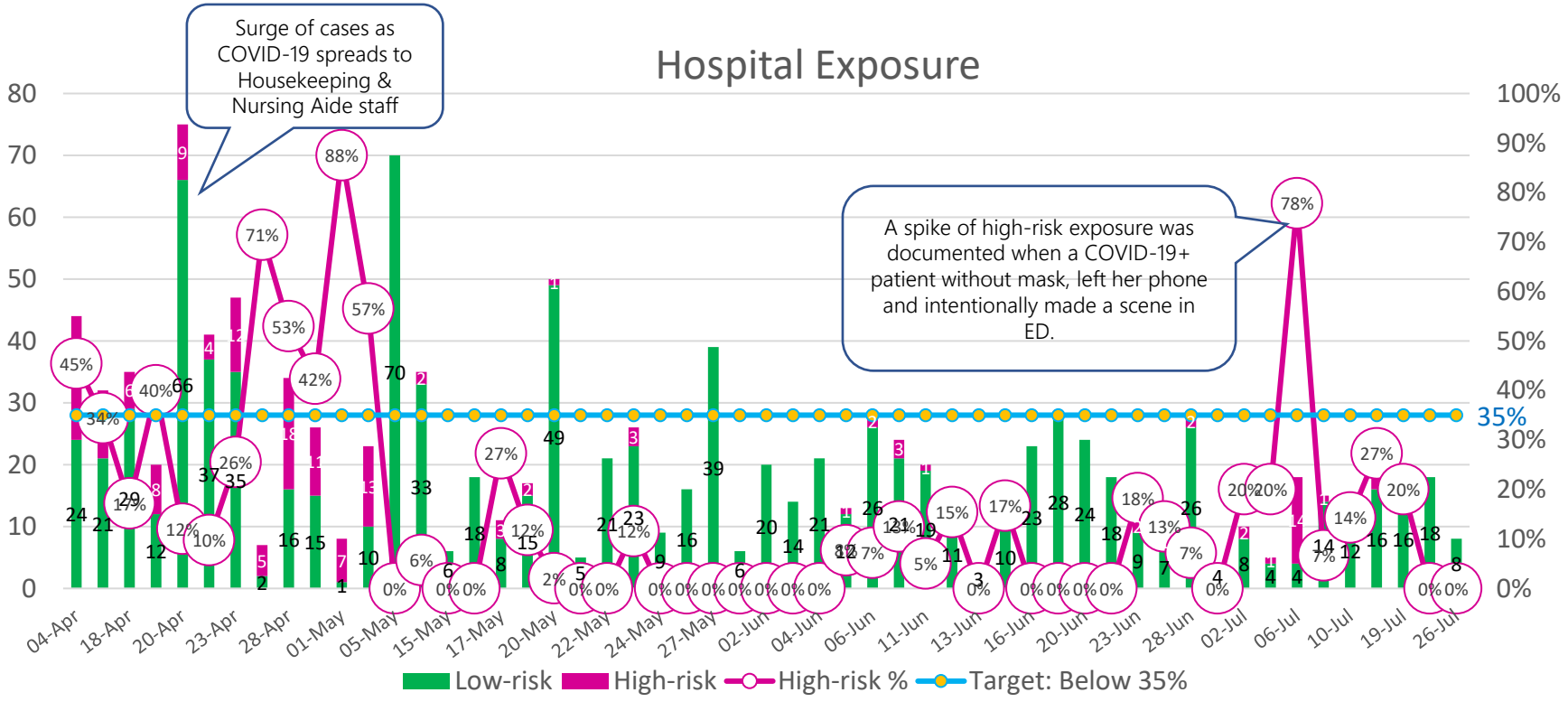
Location

To reduce the number of hospital high-risk exposure to below 35% by June 2020.



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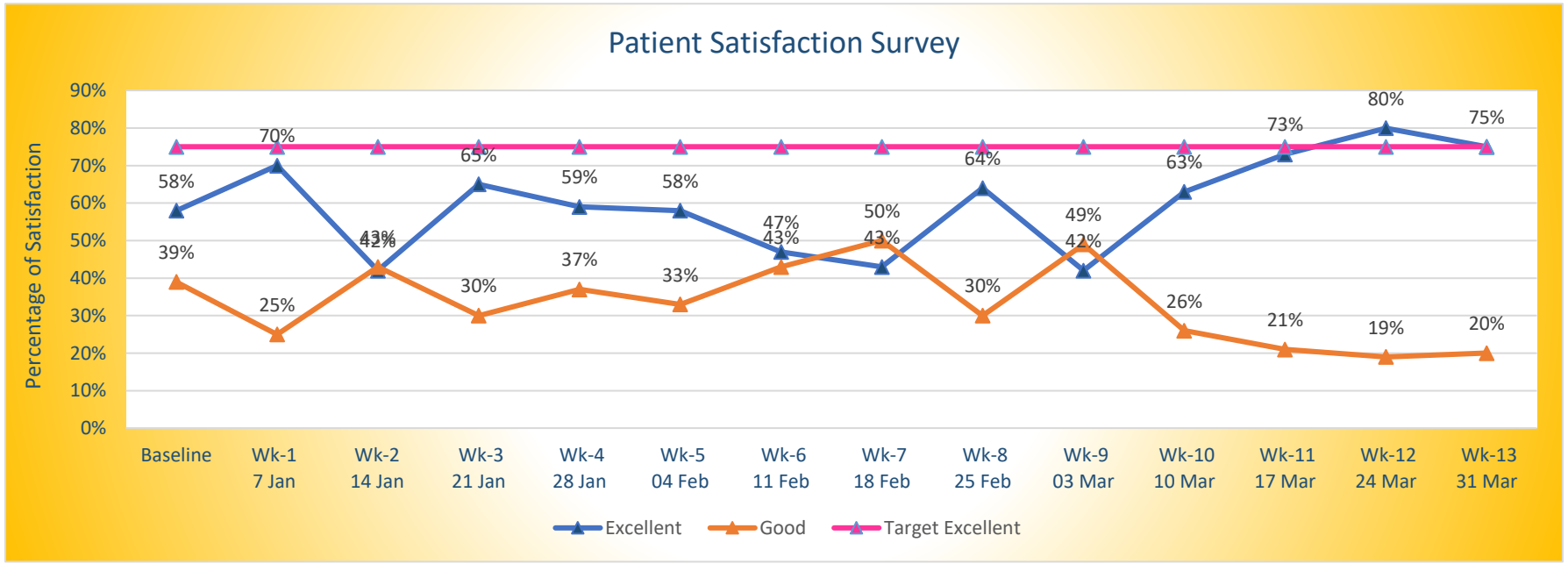
Balance Measure



	Baseline	Wk-1 7 Jan	Wk-2 14 Jan	Wk-3 21 Jan	Wk-4 28 Jan	Wk-5 04 Feb	Wk-6 11 Feb	Wk-7 18 Feb	Wk-8 25 Feb	Wk-9 03 Mar	Wk-10 10 Mar	Wk-11 17 Mar	Wk-12 24 Mar	Wk-13 31 Mar
Excellent	58%	70%	42%	65%	59%	58%	47%	43%	64%	42%	63%	73%	80%	75%
Good	39%	25%	43%	30%	37%	33%	43%	50%	30%	49%	26%	21%	19%	20%
Fair	3%	5%	14%	4%	4%	7%	10%	7%	6%	9%	11%	6%	1%	1%
Poor			1%	1%	0%	2%	0%	0%	0%	0%	0%	0%	0%	4%

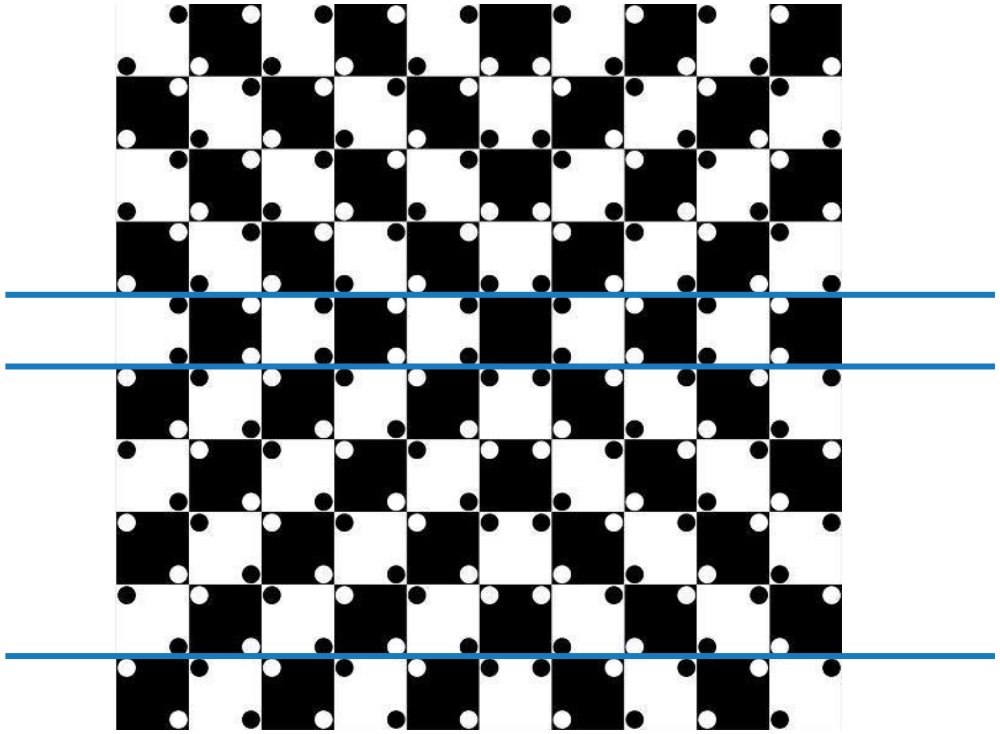
“The end point is not the creation of the chart, it is the conversation you have with your audience”

John Boulton

GWELLIANT CYMRU IMPROVEMENT CYMRU

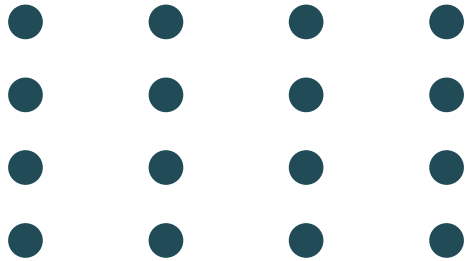
Visual Perception

Perception and clutter



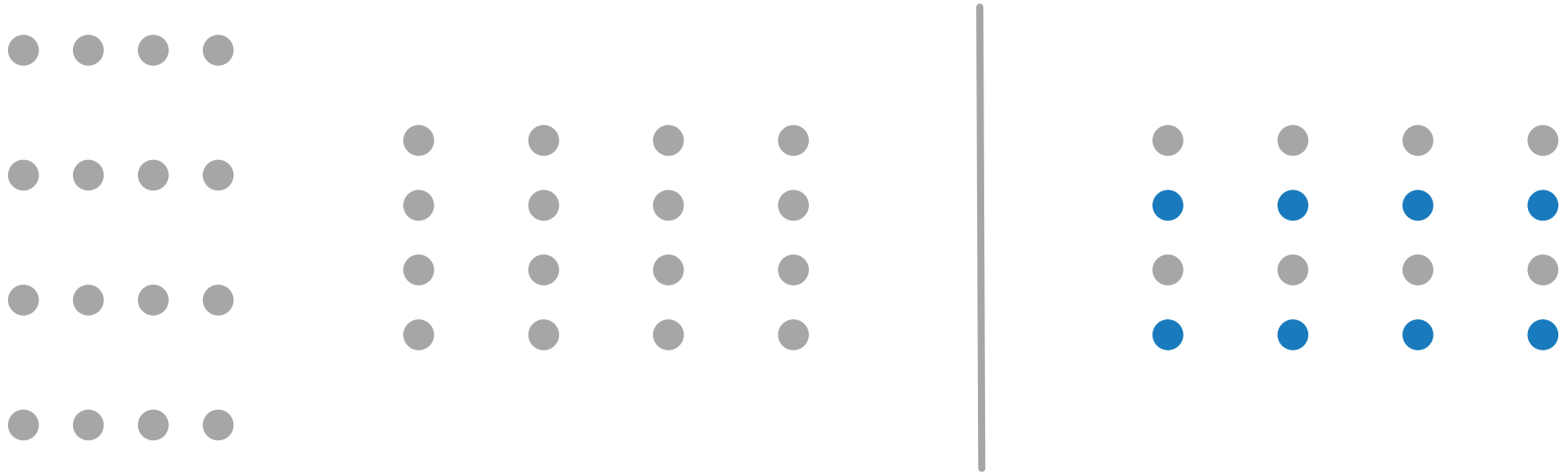
Wertheimer, M. (1938). Gestalt theory. In W. D. Ellis (ed.), *A Source Book of Gestalt Psychology*. London, England: Routledge & Kegan Paul, 1997.

Proximity



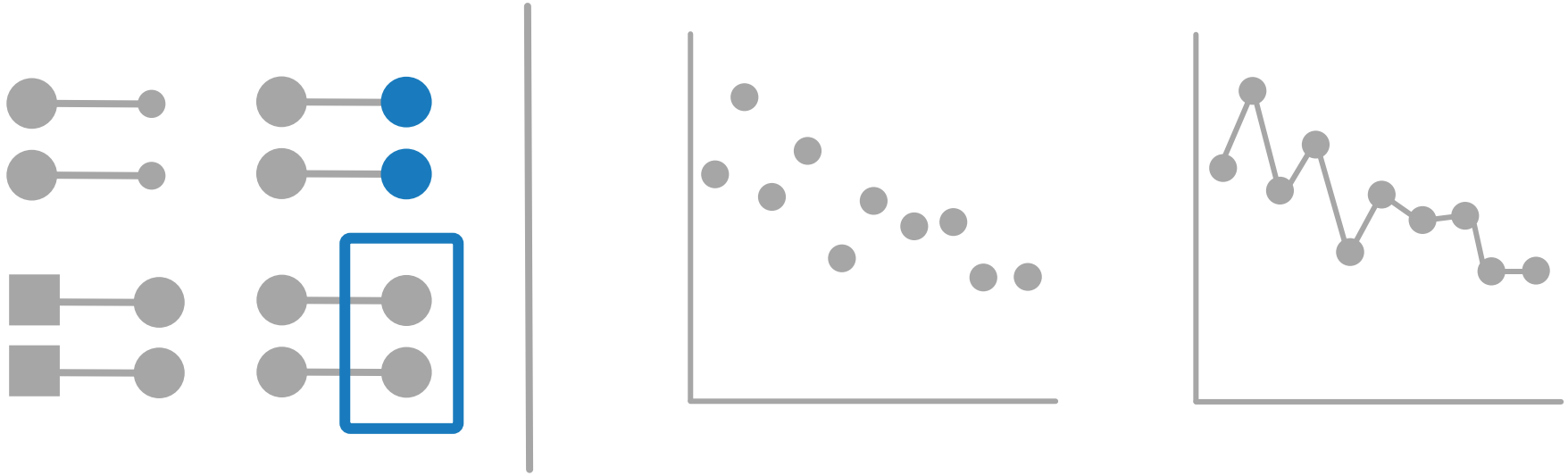
Examples: Cole Nussbaumer Knaflic, Storytelling with data, Wiley, 2015, page 75

Proximity and Similarity



Examples: Cole Nussbaumer Knaflic, Storytelling with data, Wiley, 2015, page 75

Connectivity



Examples: Cole Nussbaumer Knaflic, Storytelling with data, Wiley, 2015, page 80

Gestalt Principles

Cole Nussbaumer Knaflic, Storytelling with data, Wiley, 2015

- Proximity: defines the formation of groups
- Similarity: establishes connection
- Enclosure: elements physically enclosed together belong to part of a group
- Closure: simple and well-known figures
- Continuity: aesthetics of alignment and visual order
- Connection: lines linking points

GWELLIANT CYMRU IMPROVEMENT CYMRU

Reading a chart

Where to look?

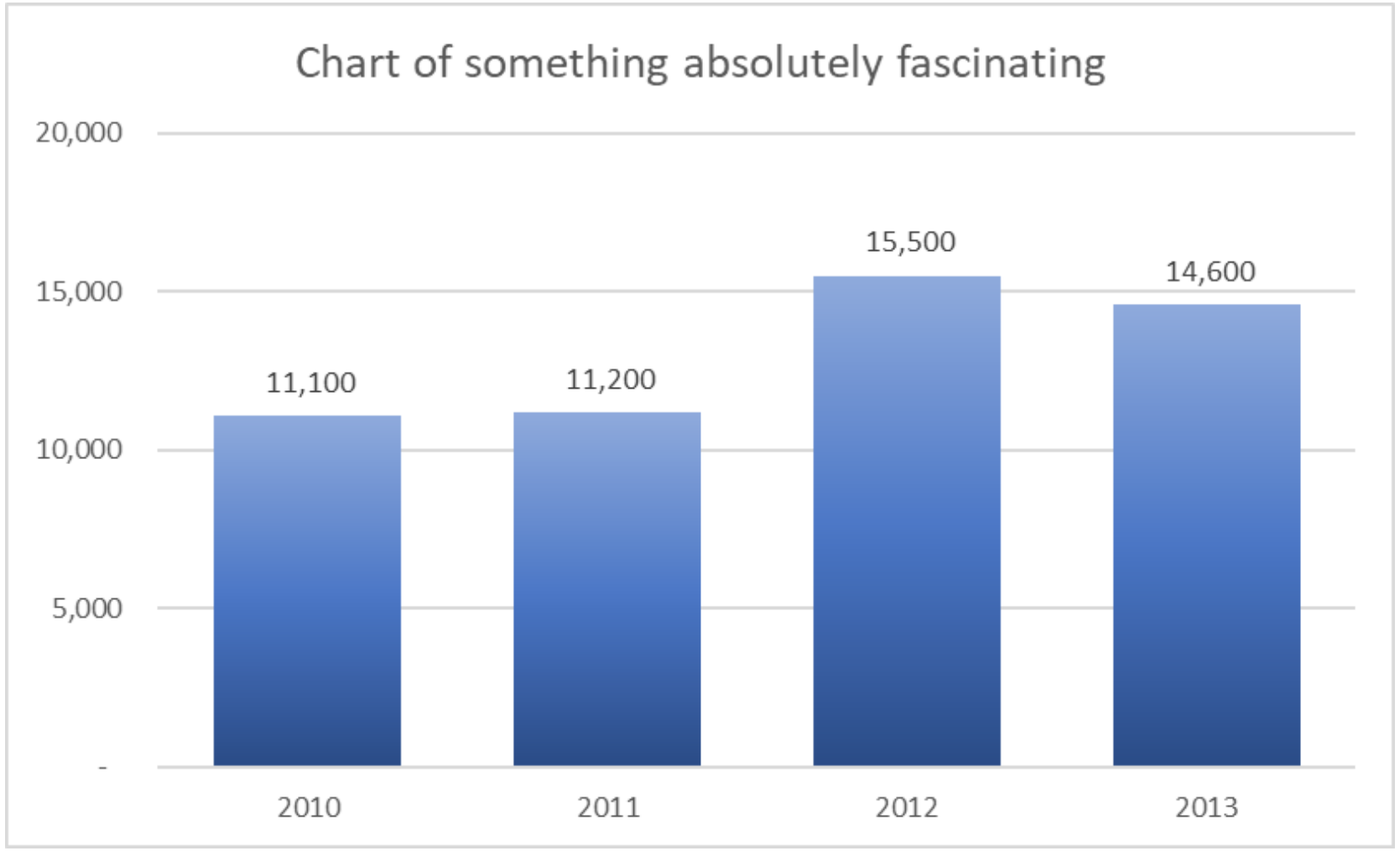
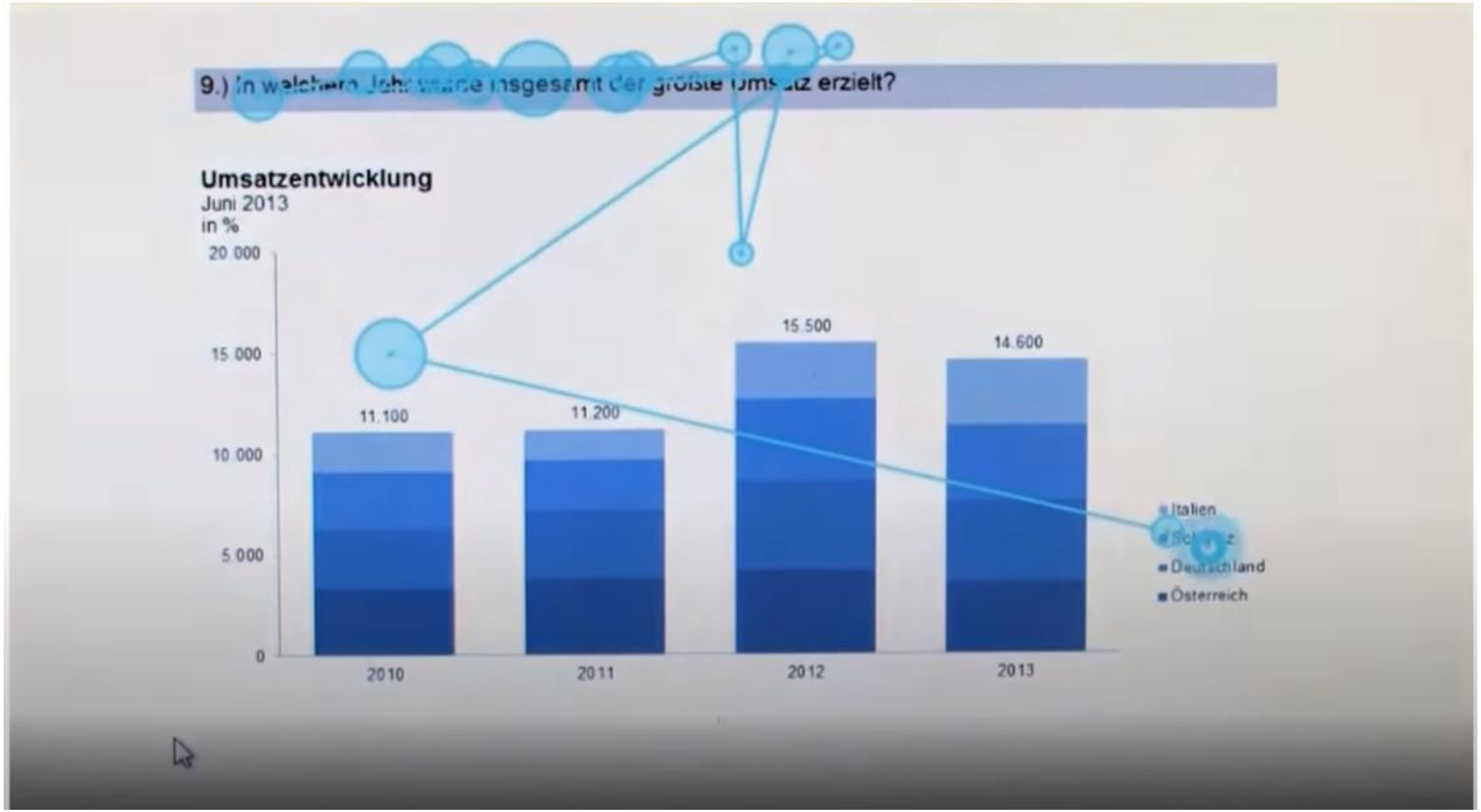
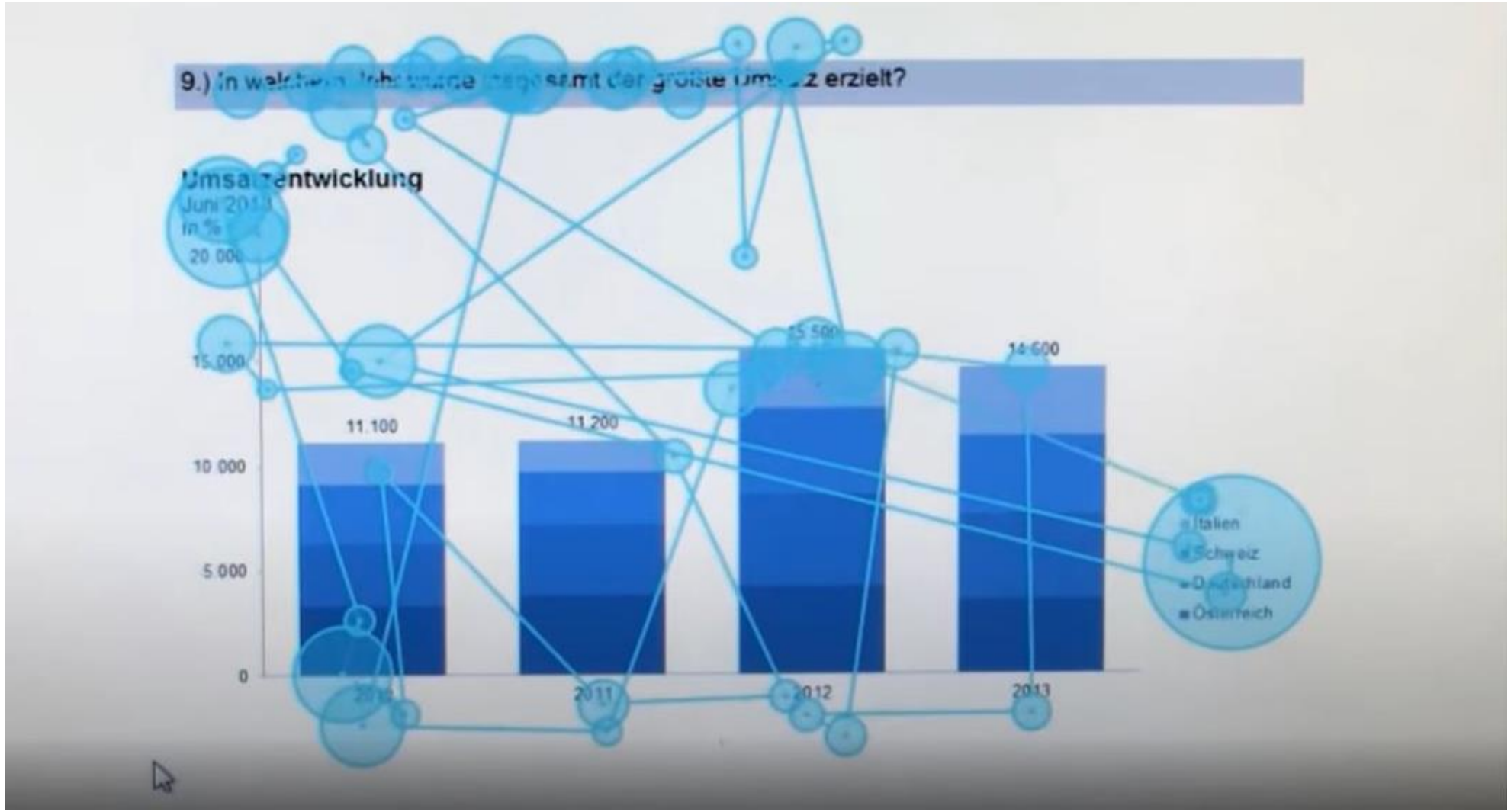


Chart of something absolutely fascinating
20,000
15,000
10,000
5,000
-
11,100
11,200
15,500
14,600
2010
2011
2012
2013


9.) In welchem Jahr wurde insgesamt der größte Umsatz erzielt?
Umsatzentwicklung
Juni 2013
in %
20.000
15.000
10.000
5.000
0
11.100
11.200
15.500
14.600
2010
2011
2012
2013
Italien
Deutschland
Österreich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in %
20.000
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5.000
0
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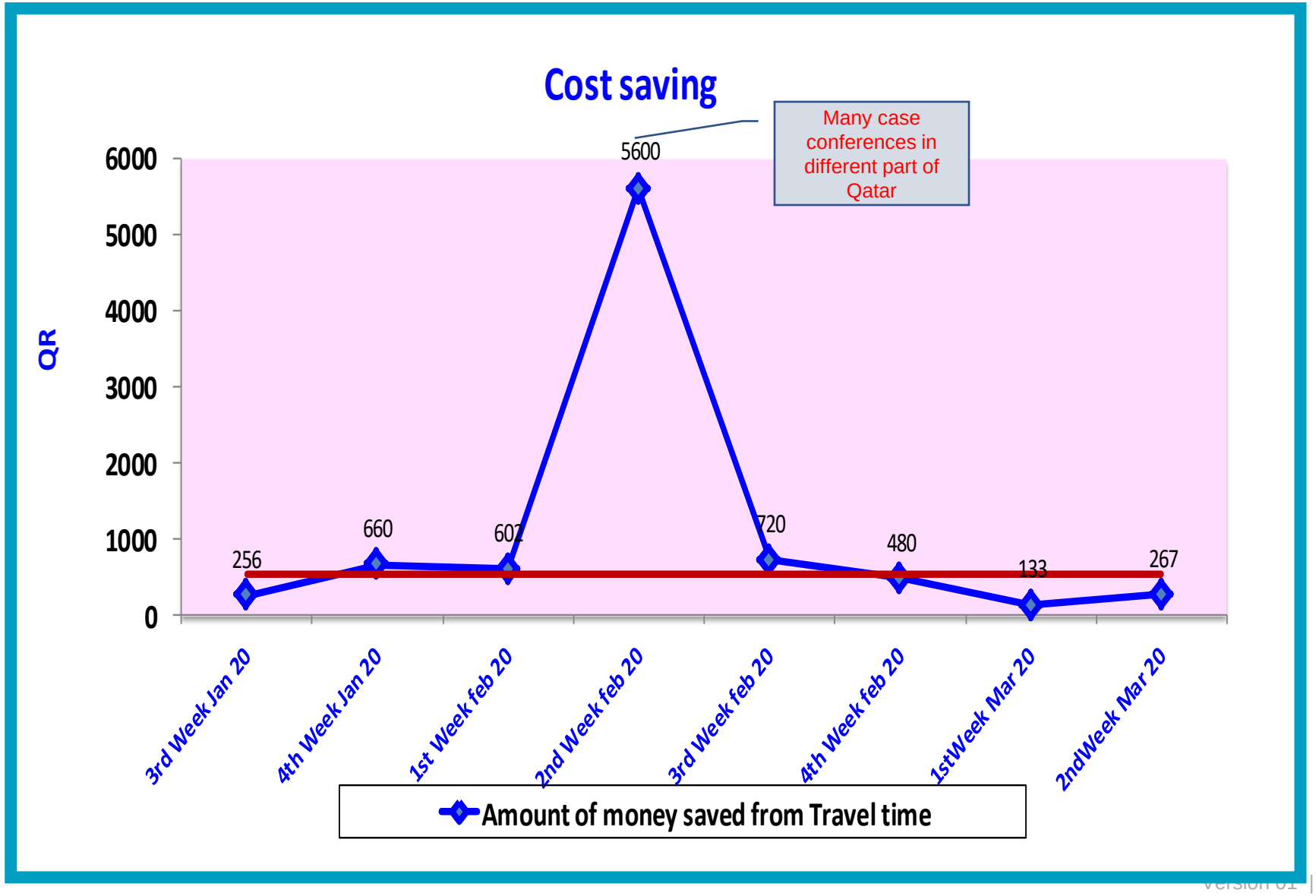
11.200
15.500
14.600
2011
2012
2013
Italien
Schweiz
Deutschland
Österreich

GWELLIANT CYMRU IMPROVEMENT CYMRU

Reading a chart

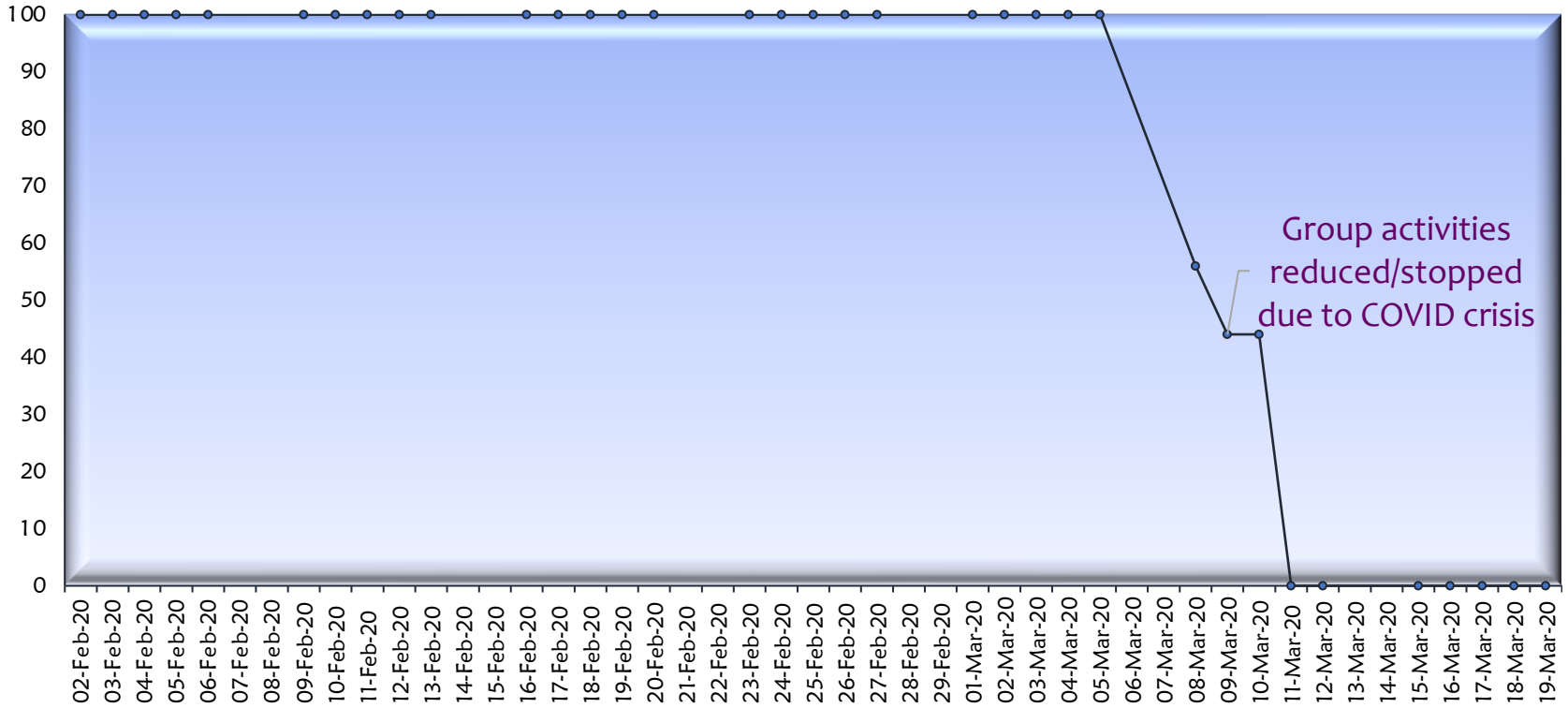
Chart Design

DECLUTTER



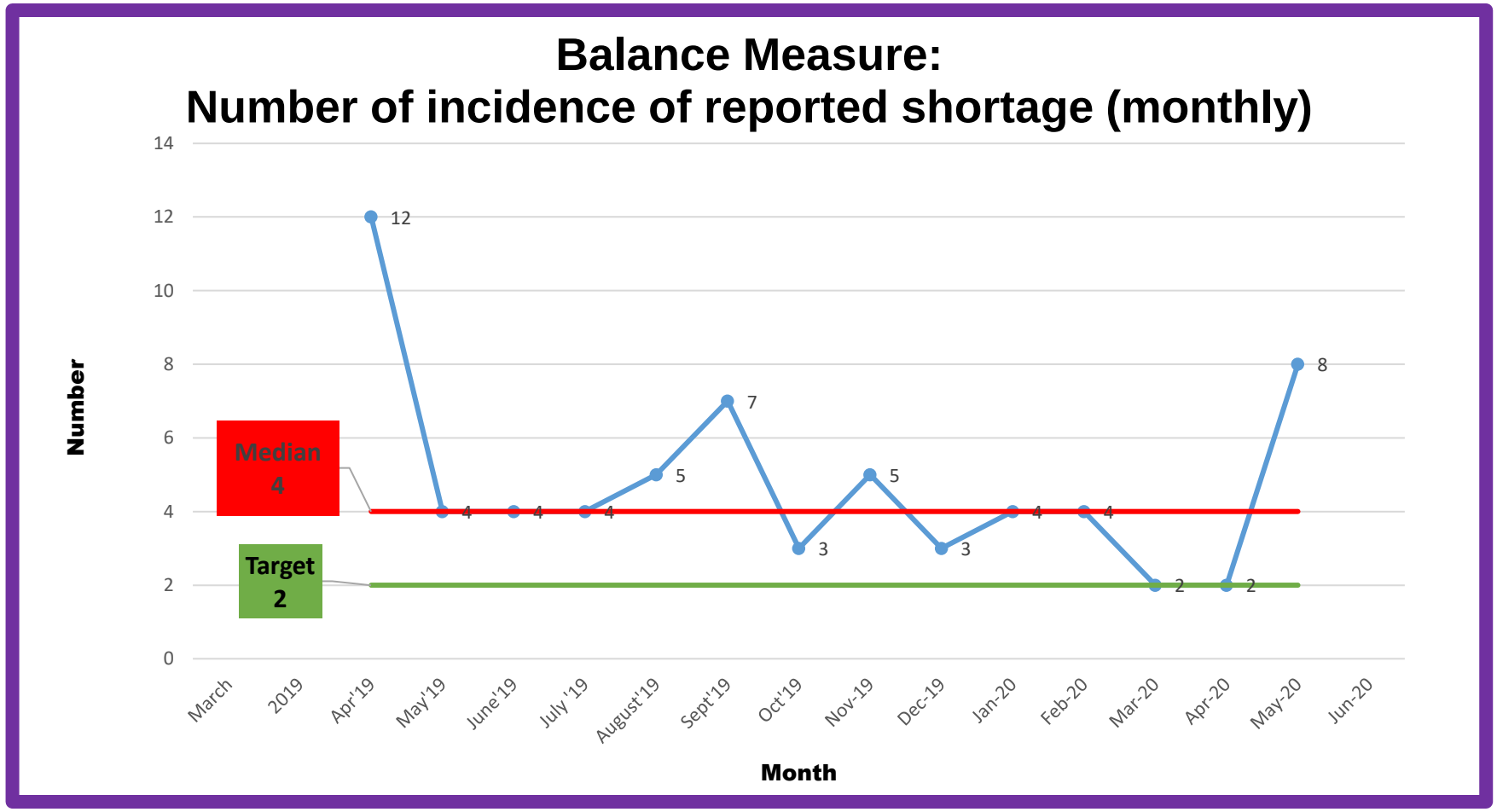
 |

% compliance with patient participation in the evening activities during week days



 |

GRABBING ATTENTION



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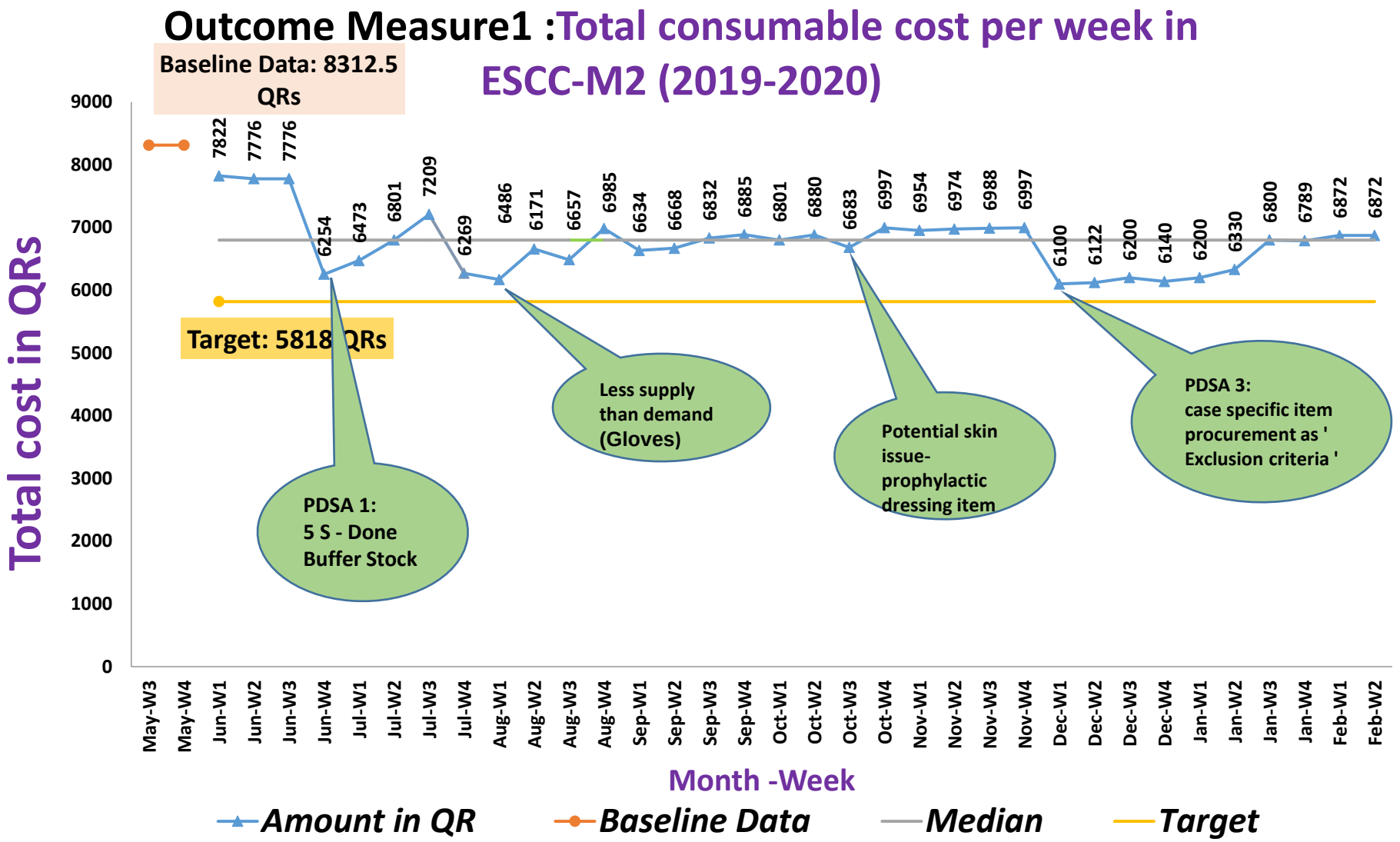
Data to Date


Outcome Measure1 :Total consumable cost per week in ESCC-M2 (2019-2020)
Baseline Data: 8312.5 QRs
Target: 5818 QRs
Total cost in QRs
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
7822 7776 7776 6254 6473 6801 7209 6269 6486 6171 6657 6985 6634 6668 6832 6885 6801 6880 6683 6997 6954 6974 6988 6997 6100 6122 6200 6140 6200 6330 6800 6789 6872 6872
May-W3 May-W4 Jun-W1 Jun-W2 Jun-W3 Jun-W4 Jul-W1 Jul-W2 Jul-W3 Jul-W4 Aug-W1 Aug-W2 Aug-W3 Aug-W4 Sep-W1 Sep-W2 Sep-W3 Sep-W4 Oct-W1 Oct-W2 Oct-W3 Oct-W4 Nov-W1 Nov-W2 Nov-W3 Nov-W4 Dec-W1 Dec-W2 Dec-W3 Dec-W4 Jan-W1 Jan-W2 Jan-W3 Jan-W4 Feb-W1 Feb-W2
Month -Week
PDSA 1: 5 S - Done Buffer Stock
Less supply than demand (Gloves)
Potential skin issue- prophylactic dressing item
PDSA 3: case specific item procurement as ' Exclusion criteria '
Amount in QR
Baseline Data
Median
Target

PRE ATTENTIVE ATTRIBUTES

598302898394 8

457349230578 0

34932055438 83

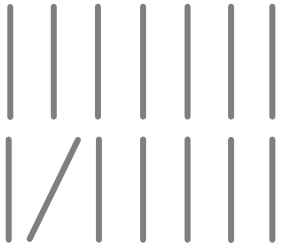
12938234789 22

5983028983948

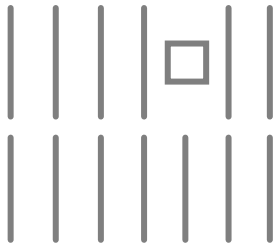
4573492305780

3493205593883

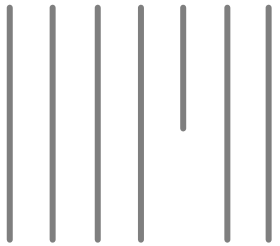
1293823478922



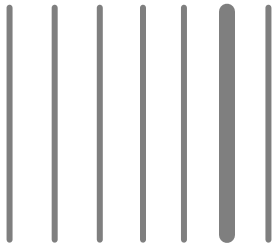
Orientation



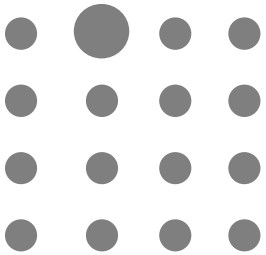
Shape



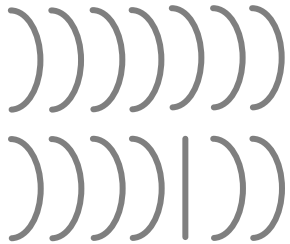
Line length



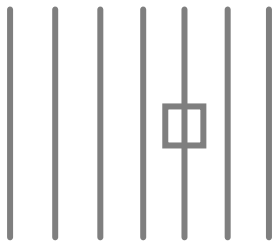
Line width



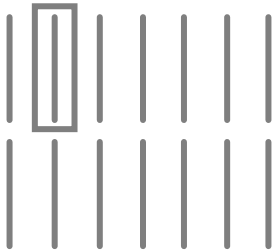
Size



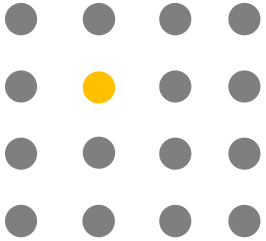
Curvature



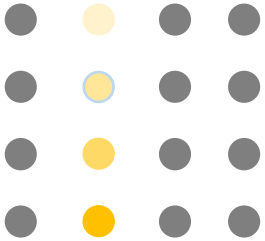
Added marks



Enclosure

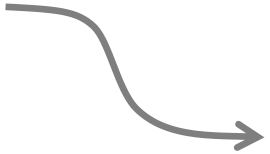


Hue



Intensity

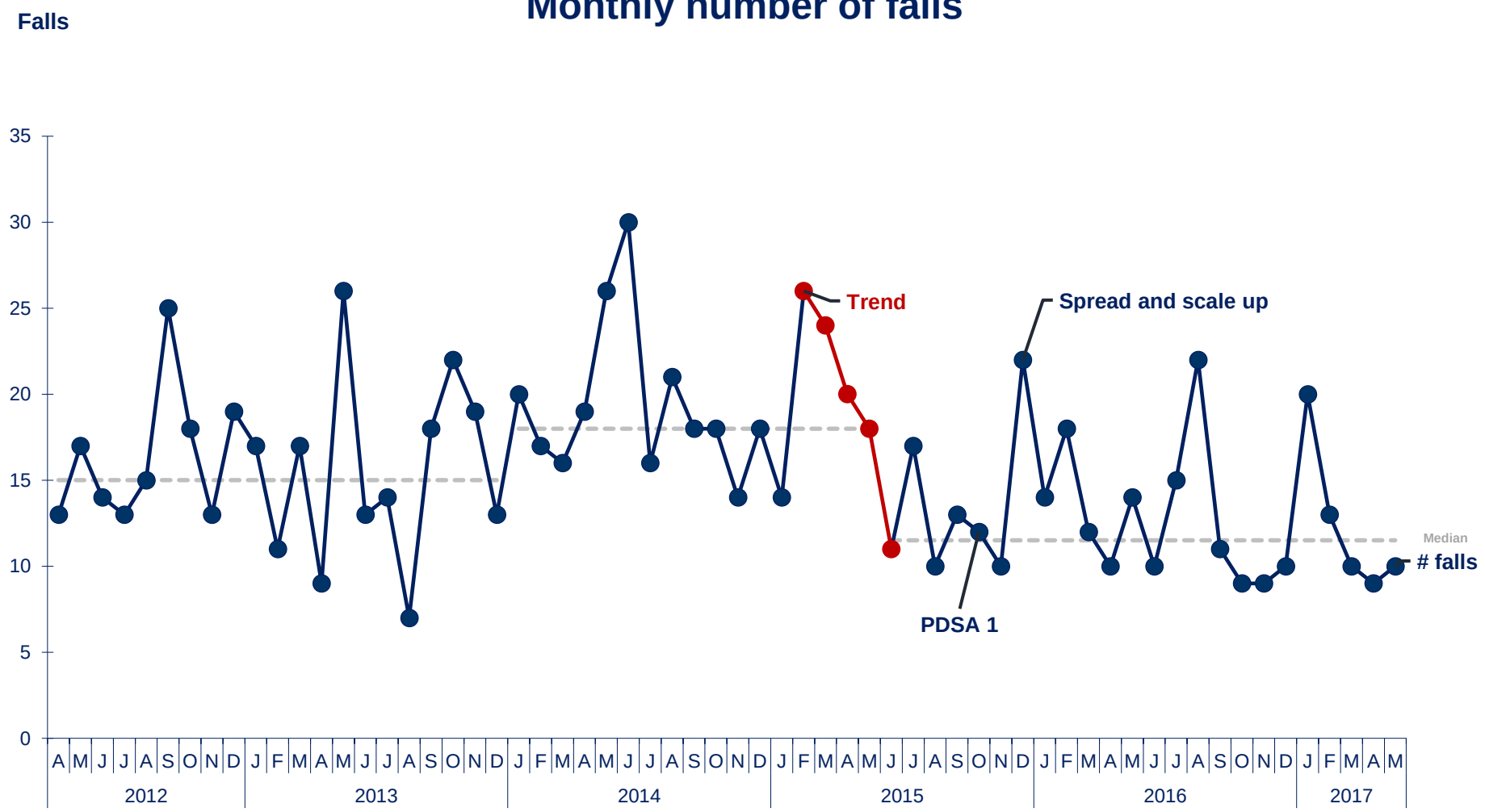
Spatial position

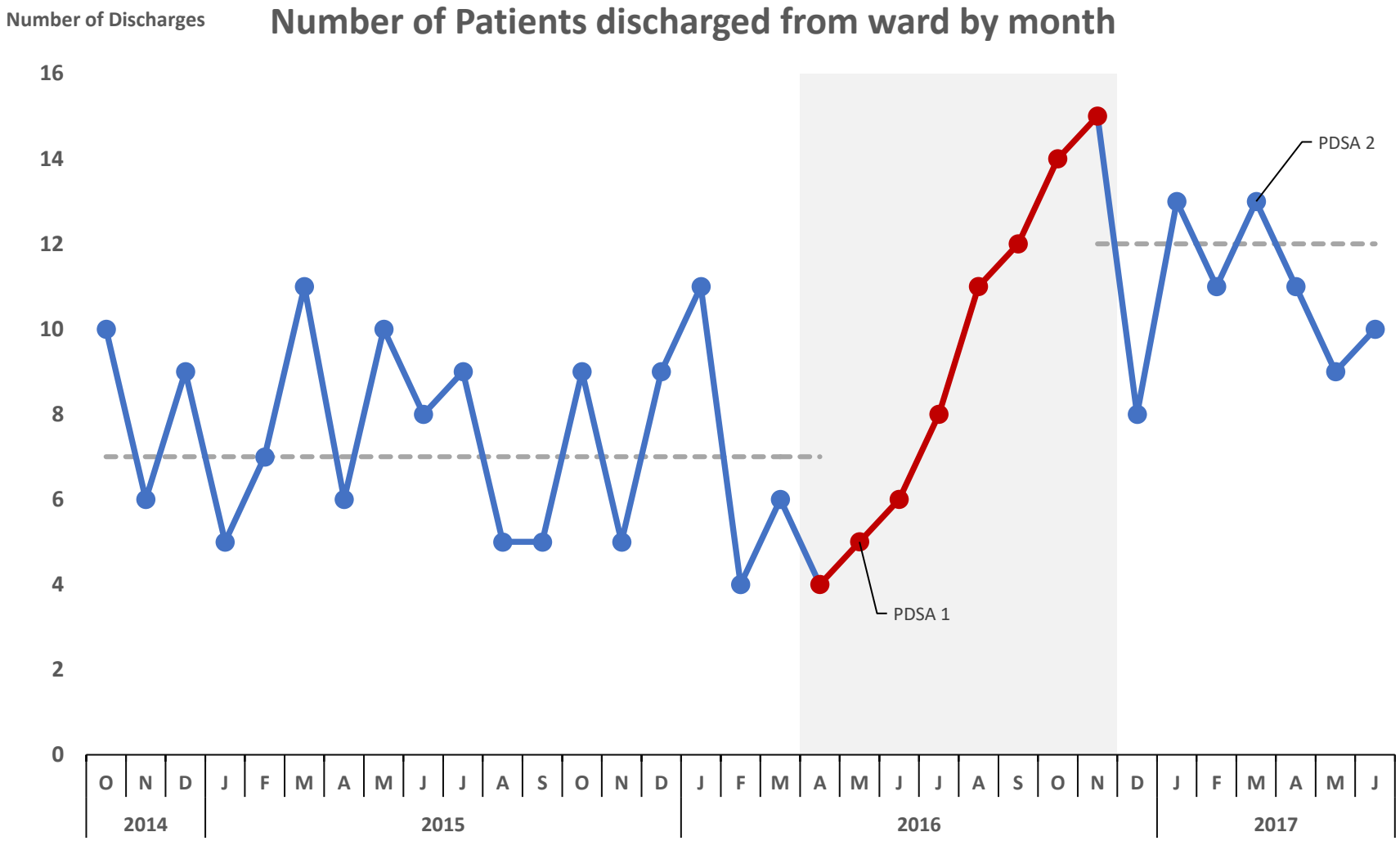


Motion

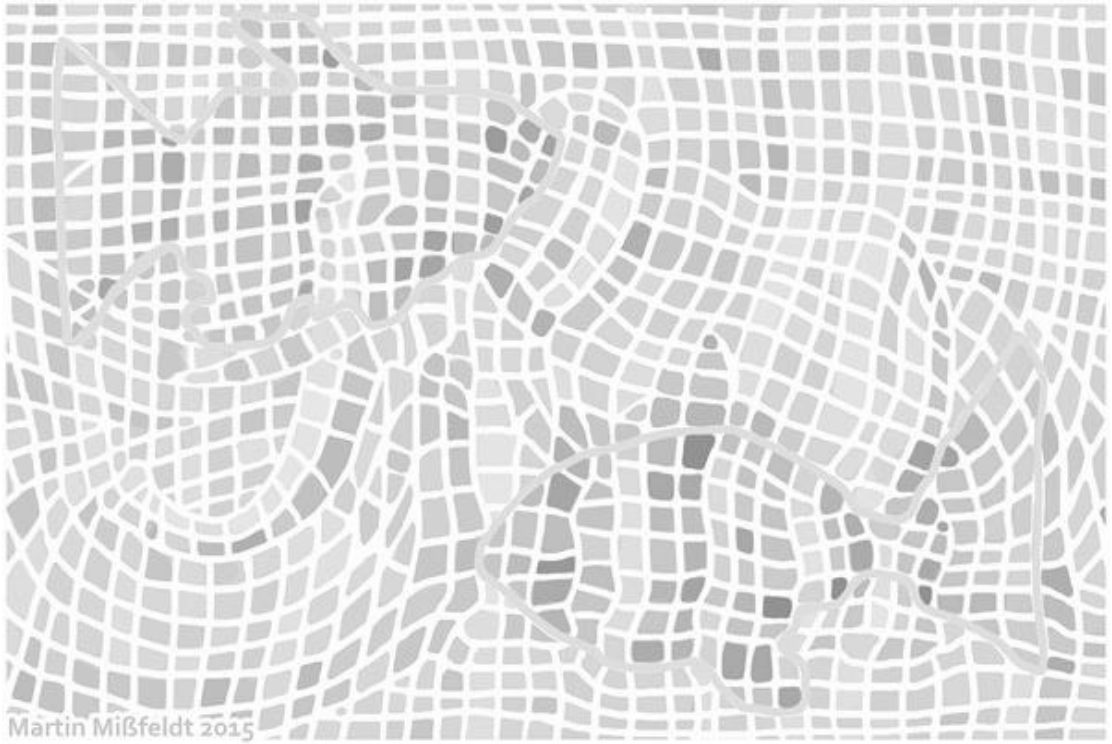
(c) cole nussbaumer knaflic, storytelling with data, wiley, 2015, page 105

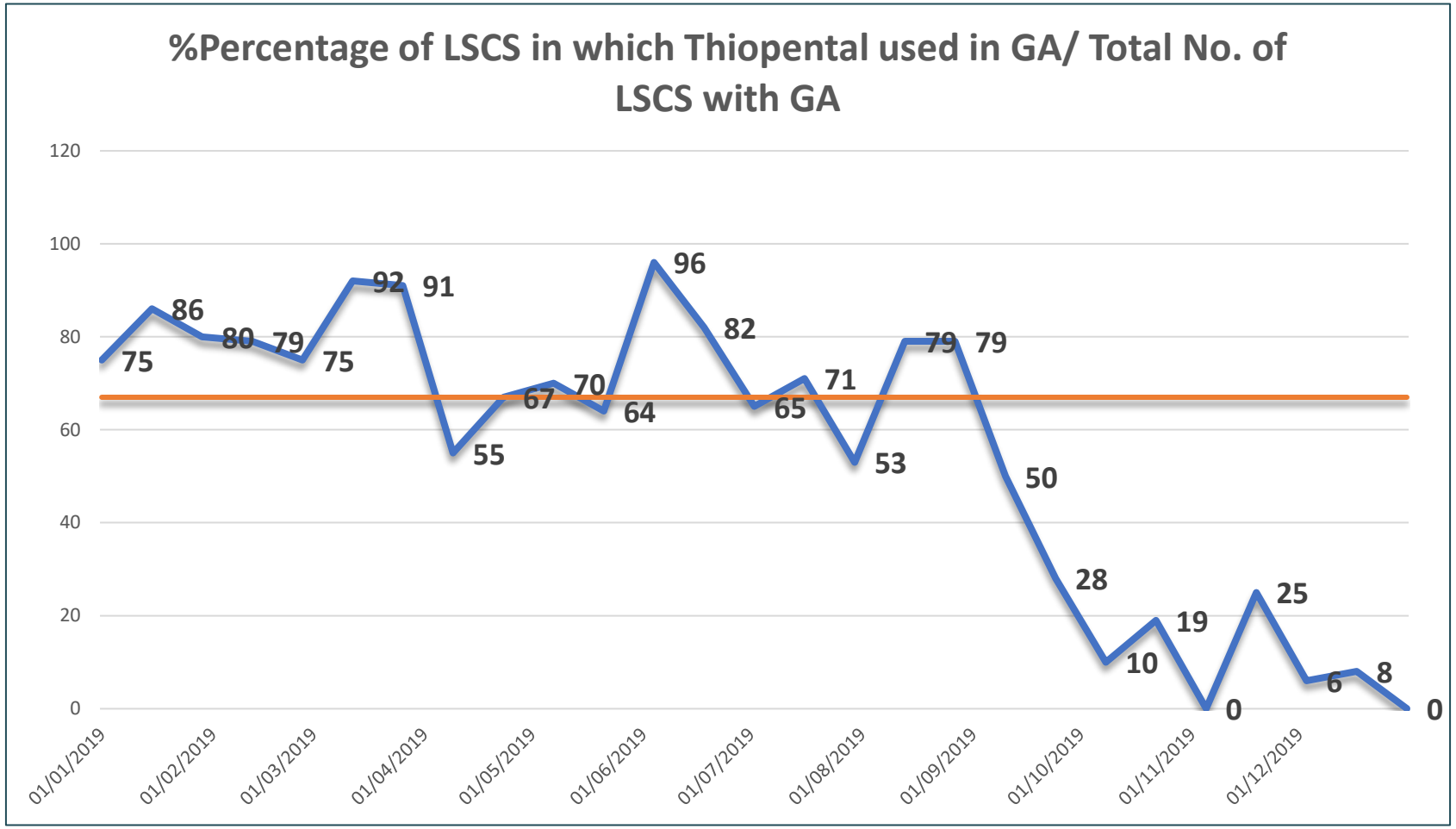
Monthly number of falls




Number of Discharges
Number of Patients discharged from ward by month
16
14
12
10
8
6
4
2
0
PDSA 2
PDSA 1
O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J
2014
2015
2016
2017


Martin Mißfeldt 2015


Martin Mißfeldt 2015



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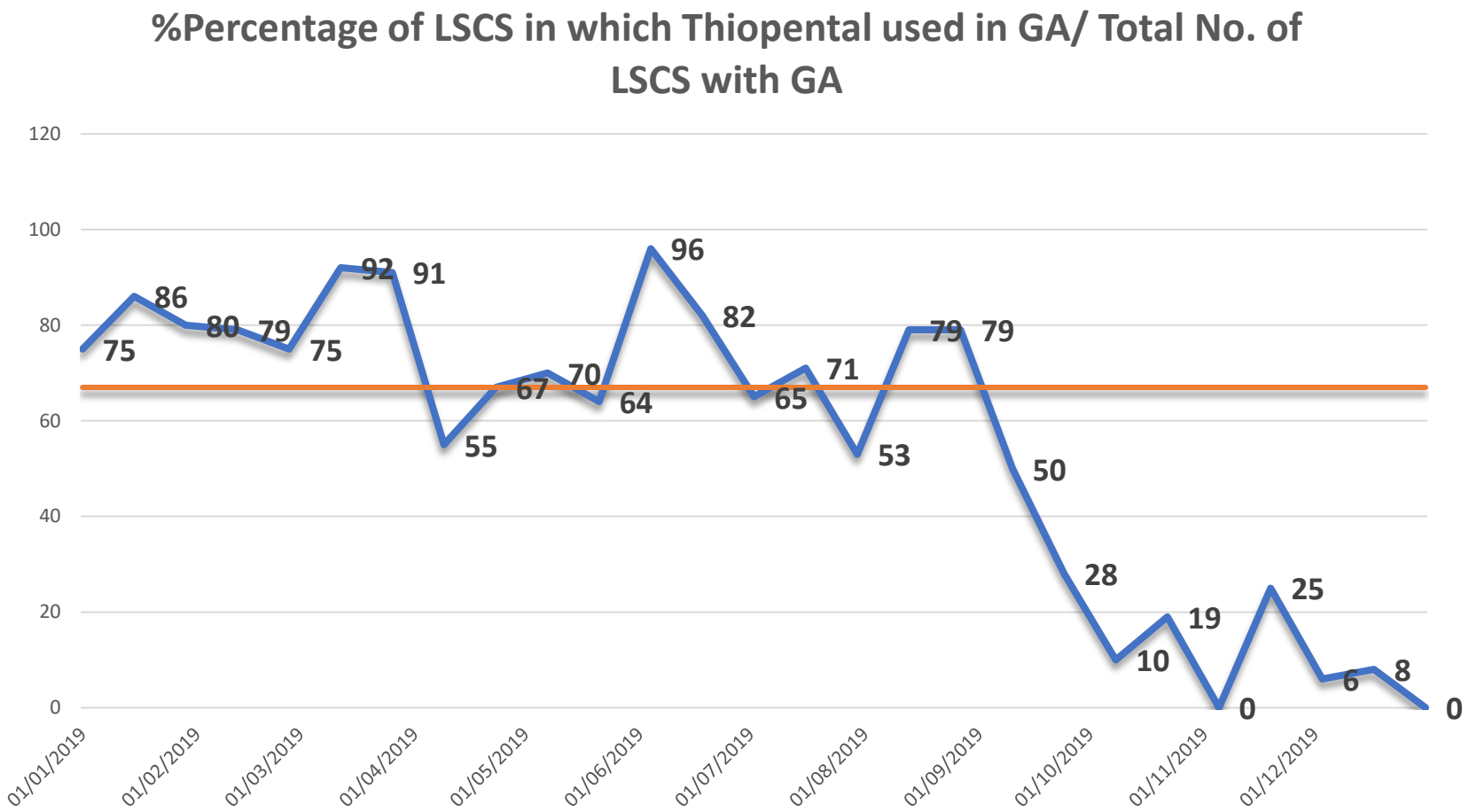
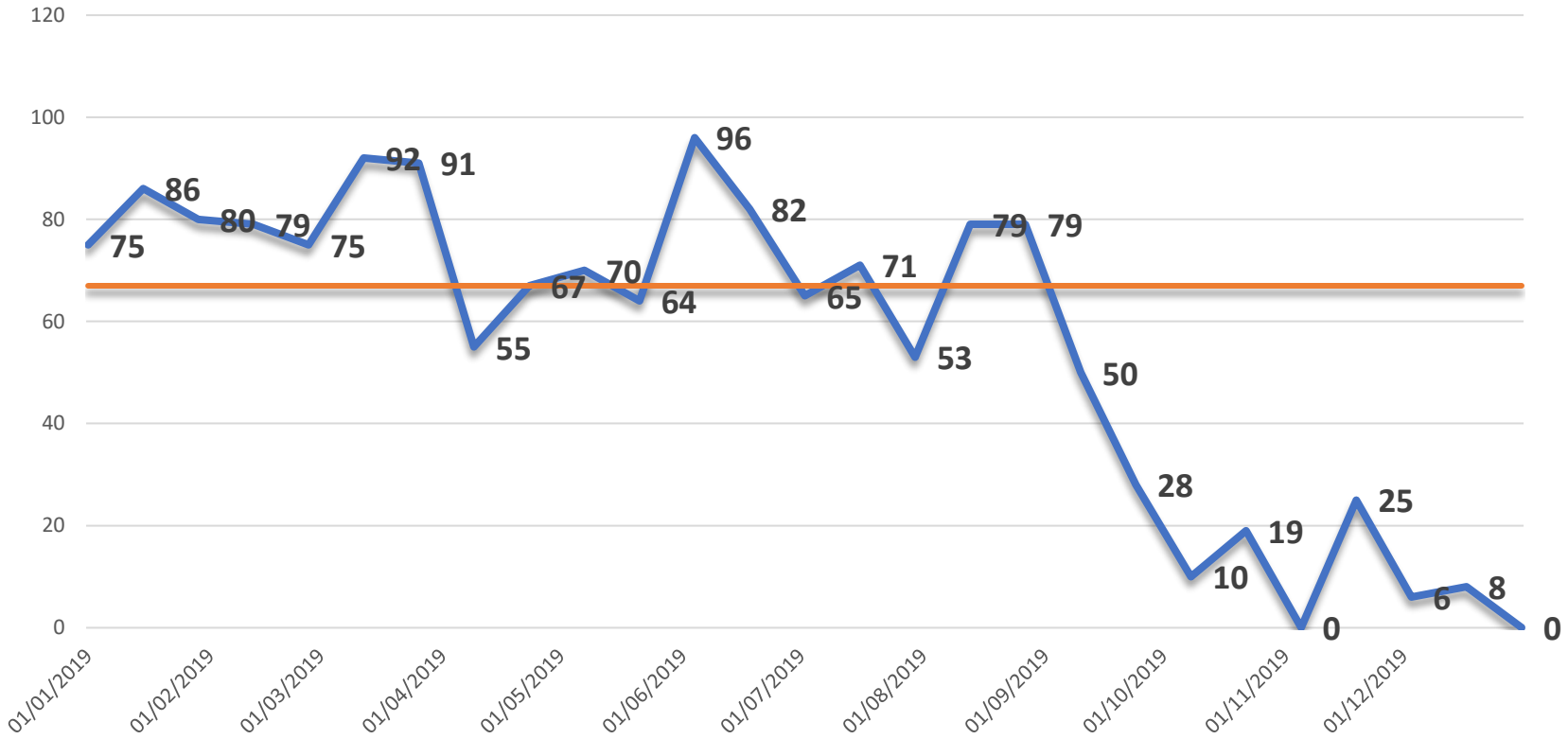


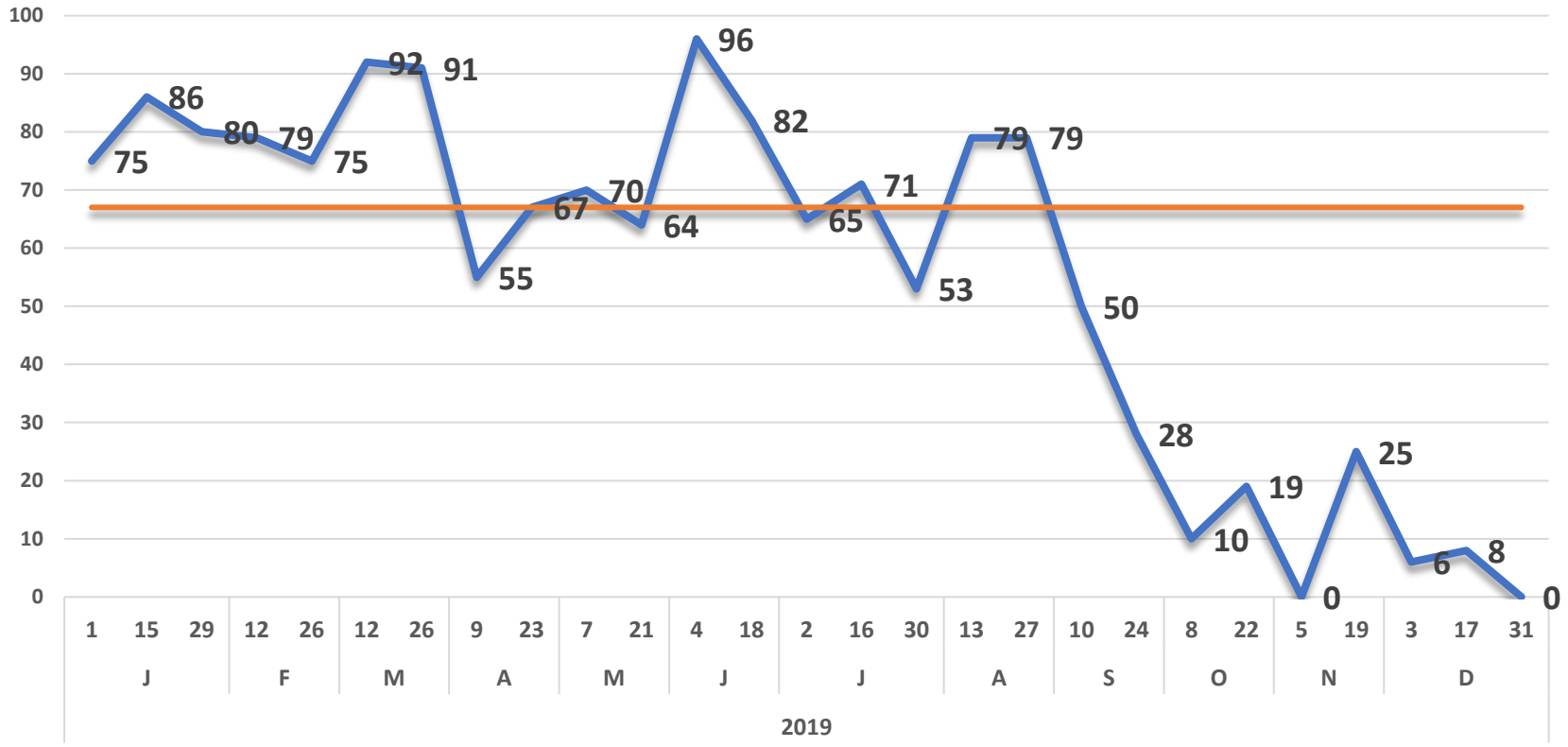
 |

Percentage of Thiopental usage in General Anaesthesia for Lower Segment Caesarean Section

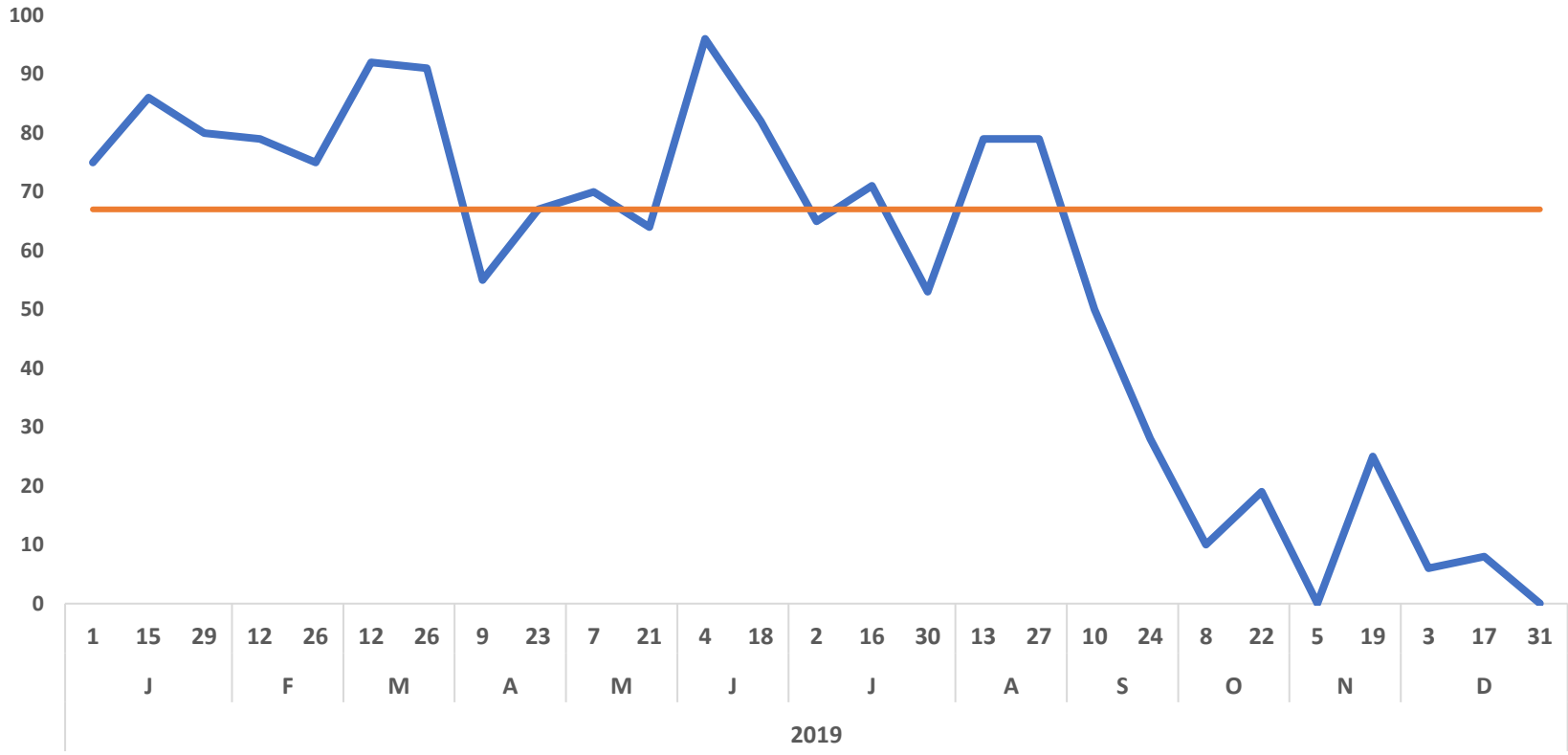


 |

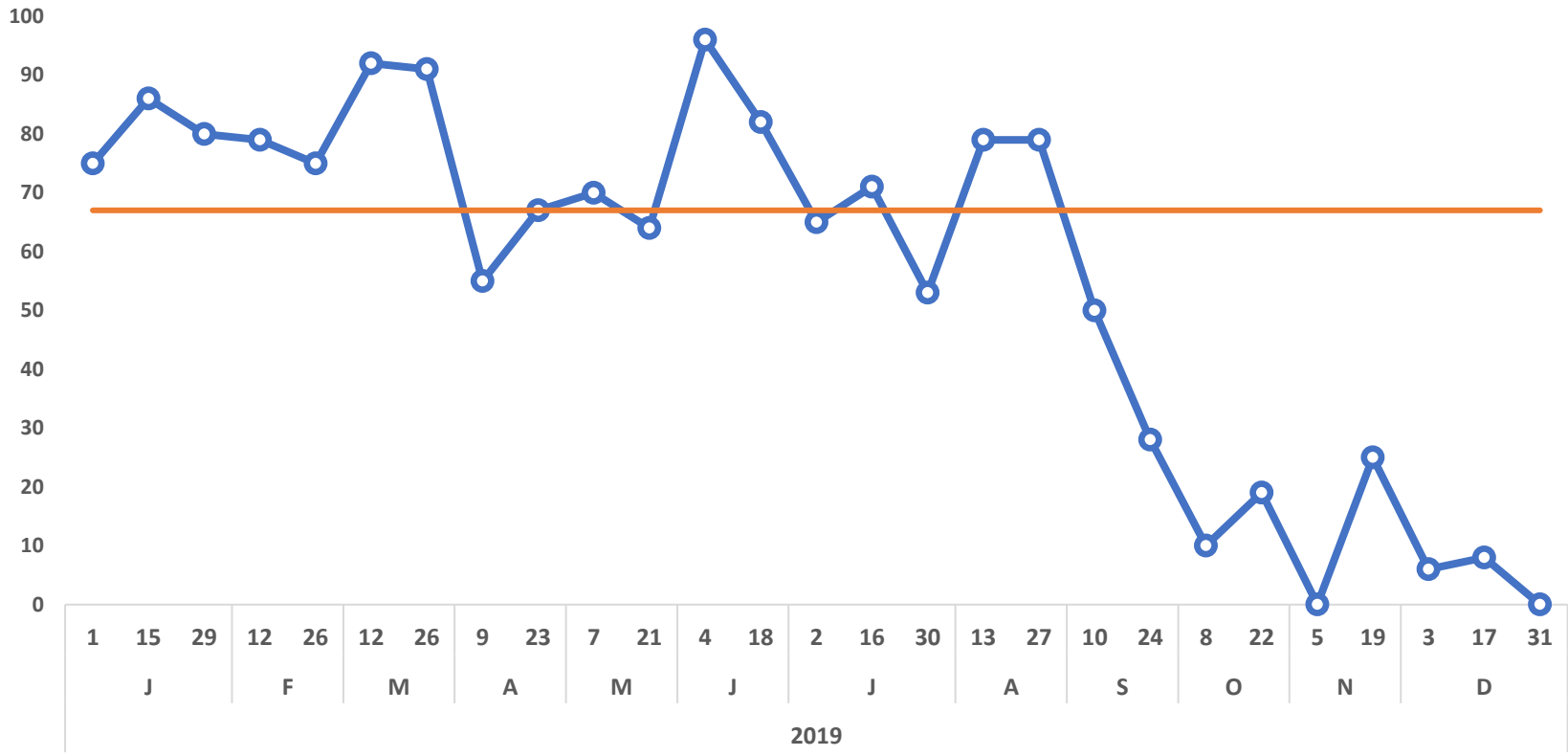
Percentage of Thiopental usage in General Anaesthesia for Lower Segment Caesarean Section



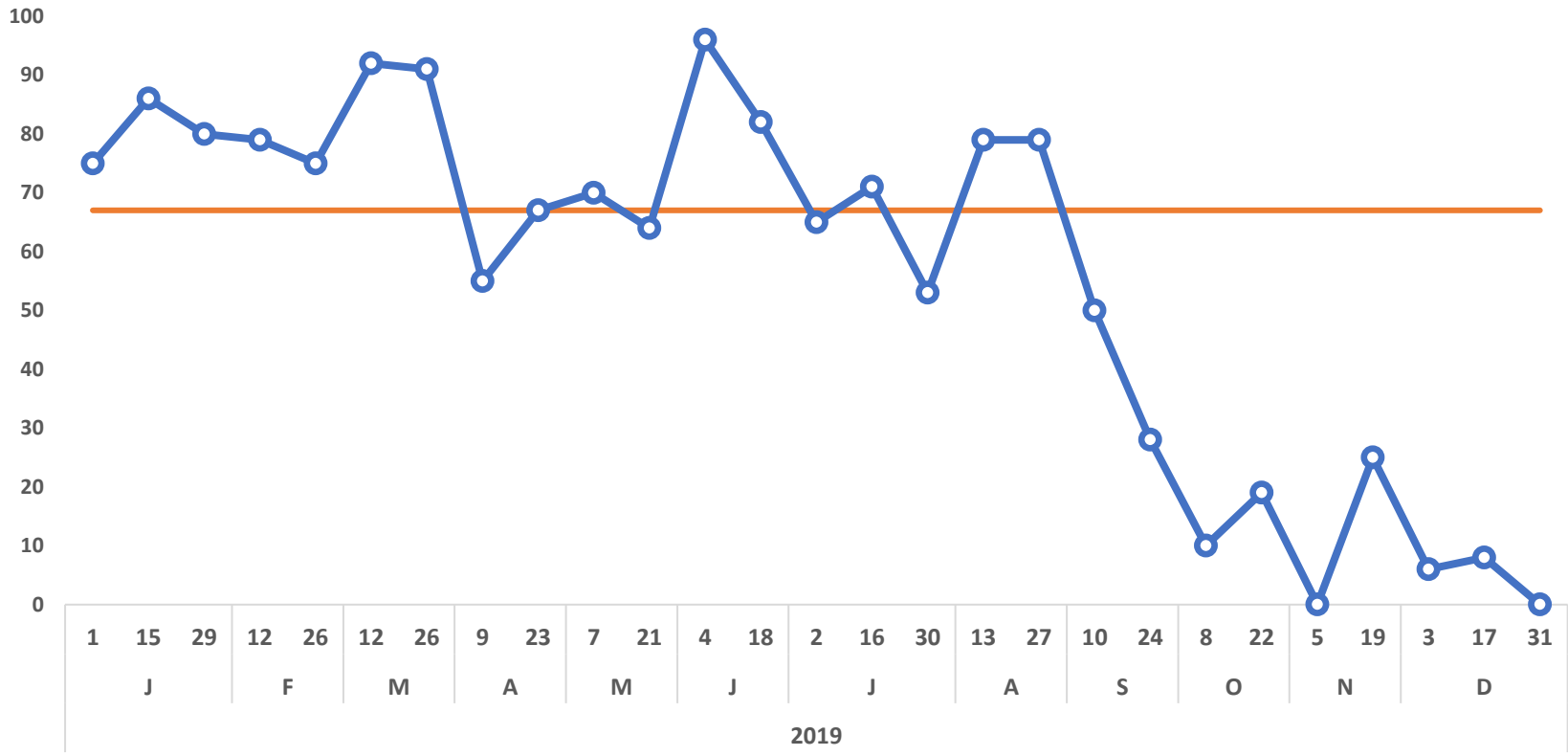
Percentage of Thiopental usage in General Anaesthesia for Lower Segment Caesarean Section



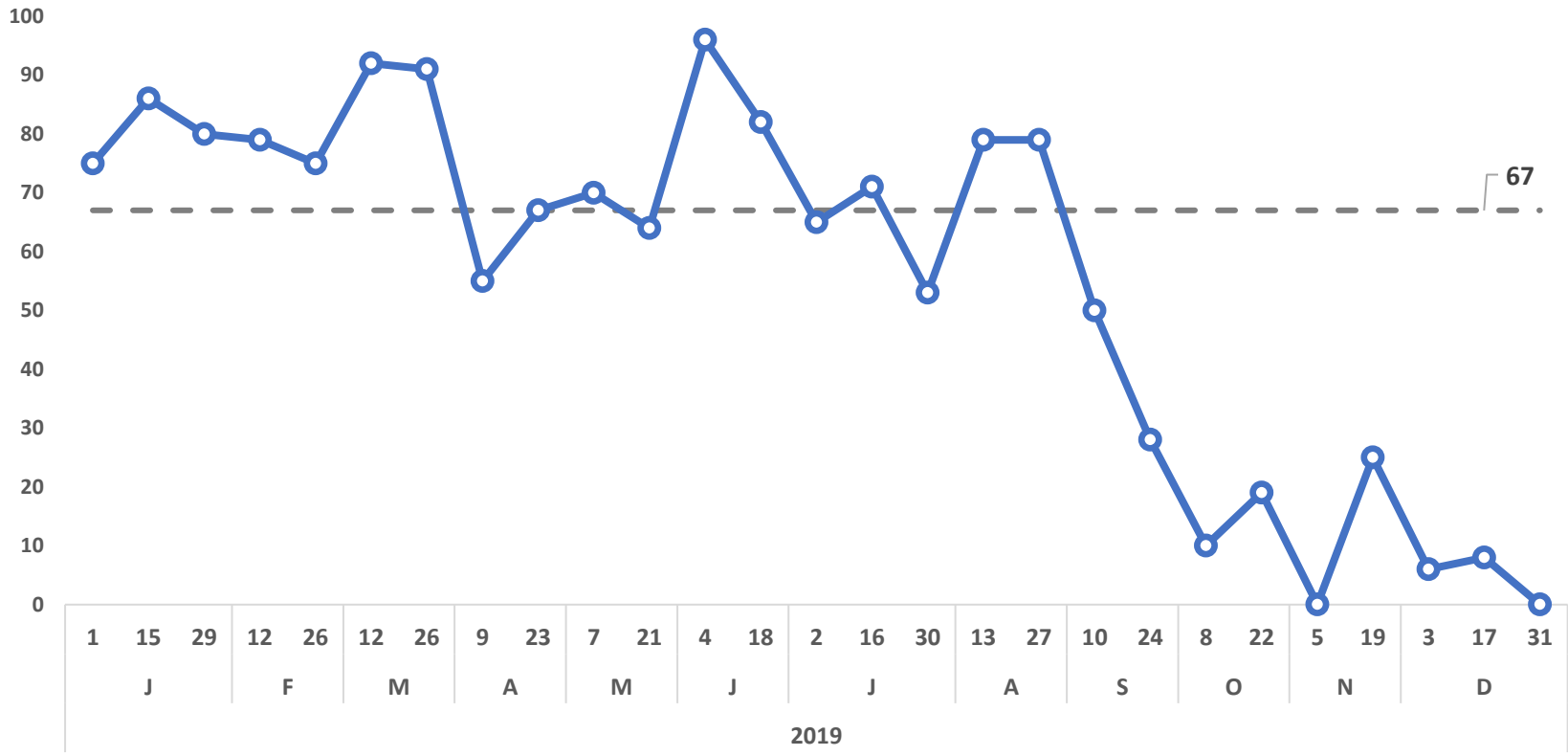
Percentage of Thiopental usage in General Anaesthesia for Lower Segment Caesarean Section



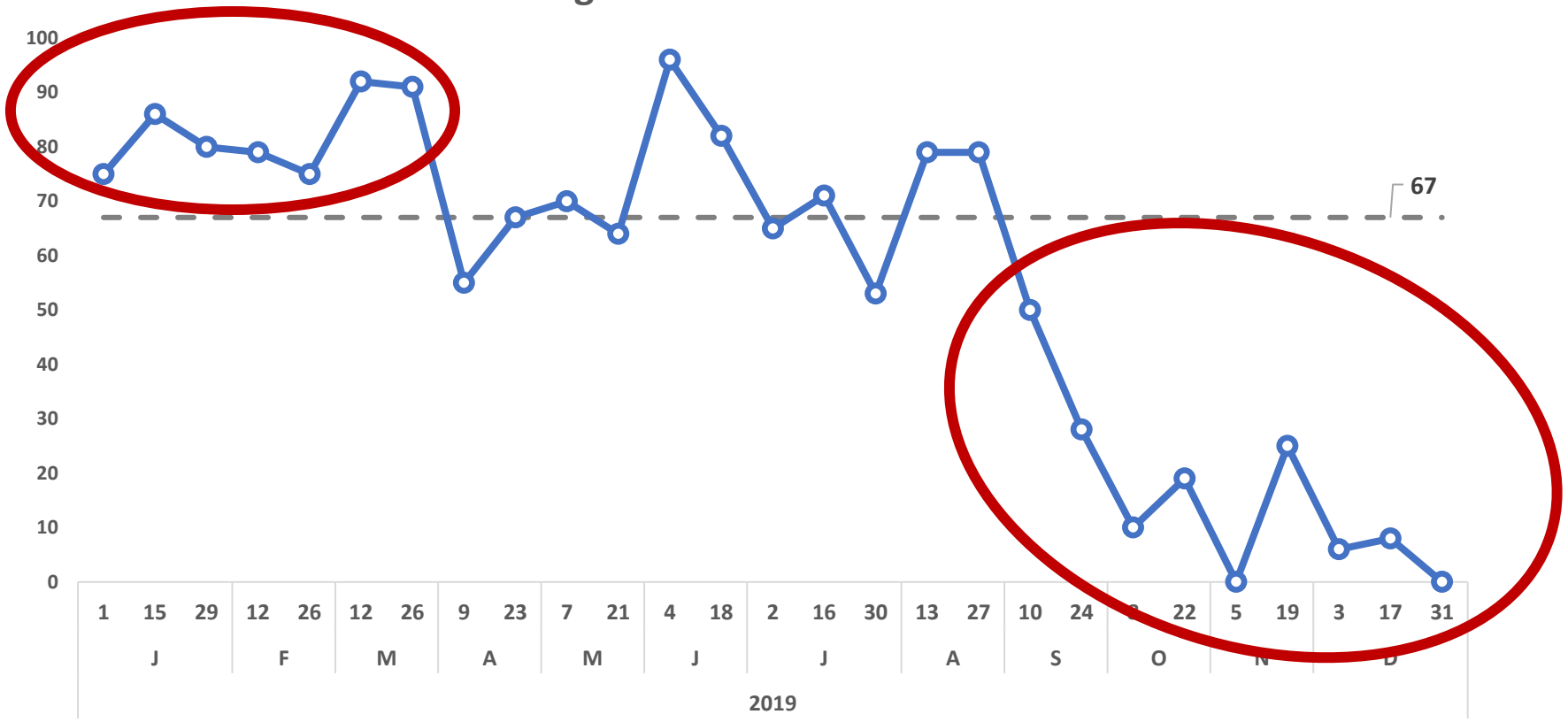
Percentage of Thiopental usage in General Anaesthesia for Lower Segment Caesarean Section



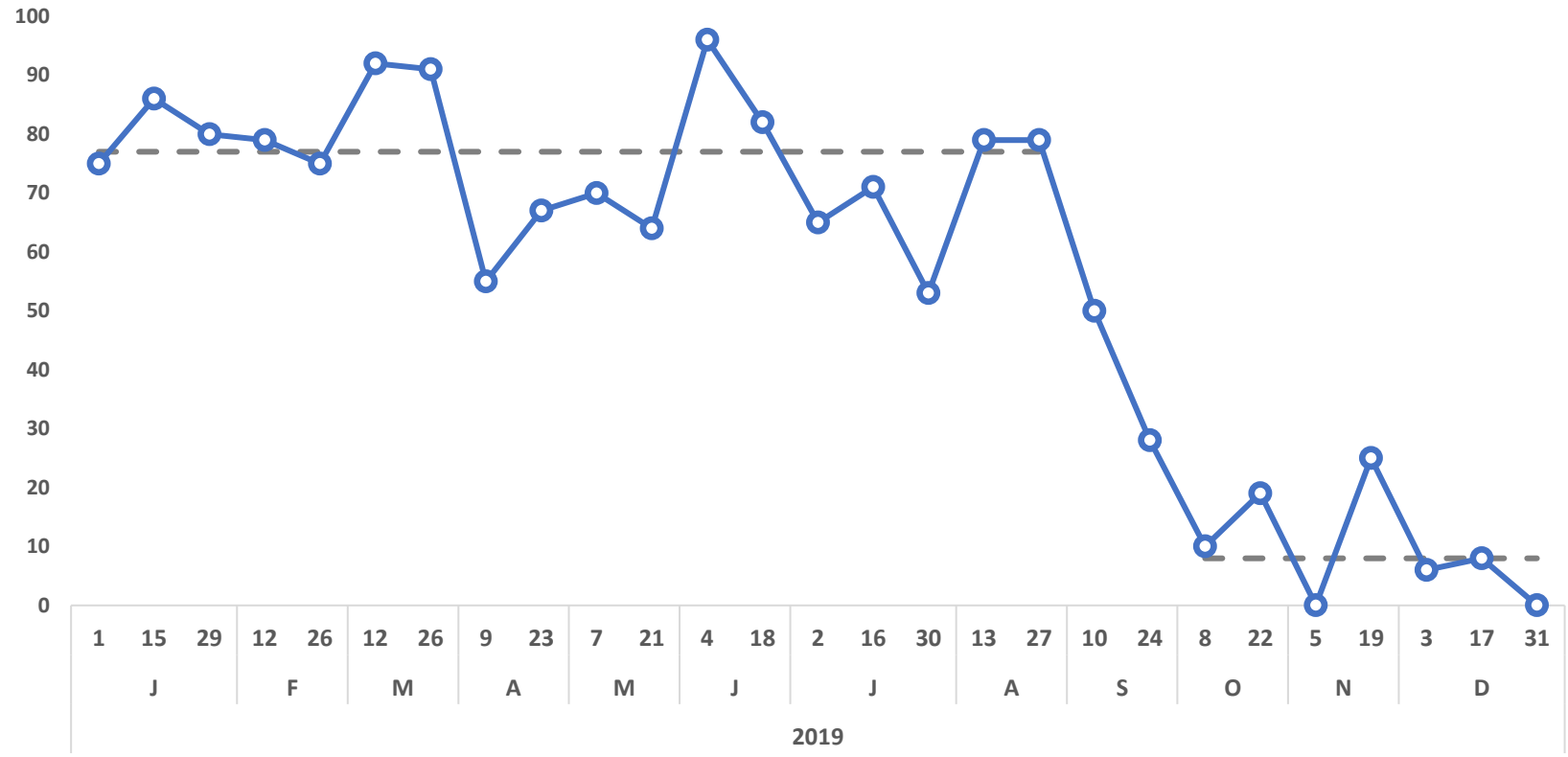
Percentage of Thiopental usage in General Anaesthesia for Lower Segment Caesarean Section



Percentage of Thiopental usage in General Anaesthesia for Lower Segment Caesarean Section



Percentage of Thiopental usage in General Anaesthesia for Lower Segment Caesarean Section



Your turn: How can the charts be improved?

Using the principles that you have learned

- Cognitive overload
- Visual perception
- Eye movement
- Unnecessary clutter

Summary

You are the expert of your data.

- Have a conversation with your audience

Before you add any element:

- Who is the audience?
- What information do they need to know?
- How could you convey most effectively

Declutter

- Get rid of chart junk

Grab attention

- Pre-attentive attributes

Useful resources

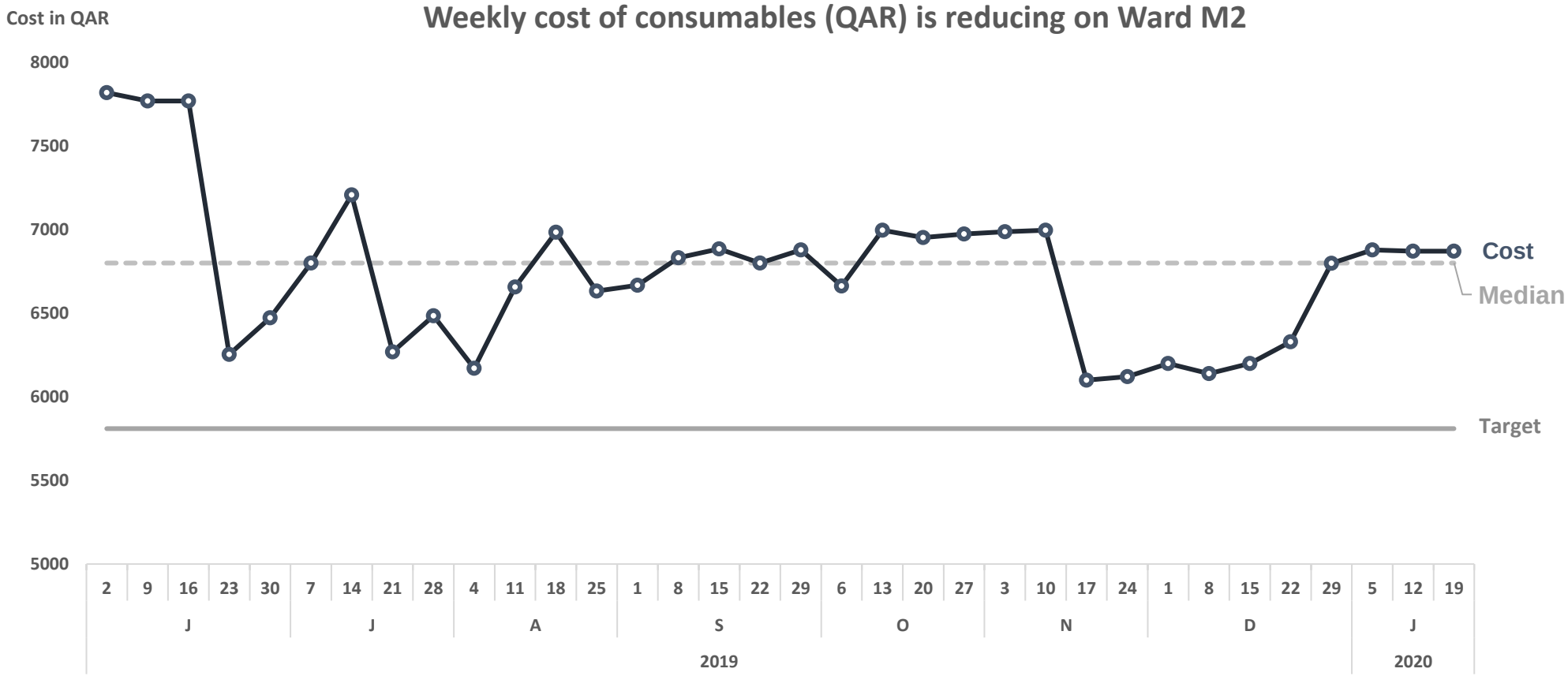
- Cole Nussbaumer-Knaflic: www.storytellingwithdata.com
- Tufte
- David McCandless: Information is Beautiful
- Chart Selection Guide - The Data Visualisation Catalogue Blog (datavizcatalogue.com)

“The least ink to present the greatest amount of information in the smallest space.”

Edward Tufte

“The end point is not the creation of the chart, it is the conversation you have with you audience”

John Boulton


Weekly cost of consumables (QAR) is reducing on Ward M2
Cost in QAR
8000
7500
7000
6500
6000
5500
5000
Cost
Median
Target
2 9 16 23 30 7 14 21 28 4 11 18 25 1 8 15 22 29 6 13 20 27 3 10 17 24 1 8 15 22 29 5 12 19
J J A S O N D J
2019 2020

PLEASE SUBMIT YOUR FEEDBACK

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#quality2022