Analytics and performance measures

Measurement for improving the patient journey

NOT measurement for judgement

The science of improvement - How do I know when a change is an improvement?

Outline

- Importance of measuring
- When to measure – having a framework
- Creating a meaningful narrative
- Useful tools
- Strategies to use when you don't know what to do

Science may be described as the art of systematic over-simplification.

Good tests kill flawed theories; we remain alive to guess again

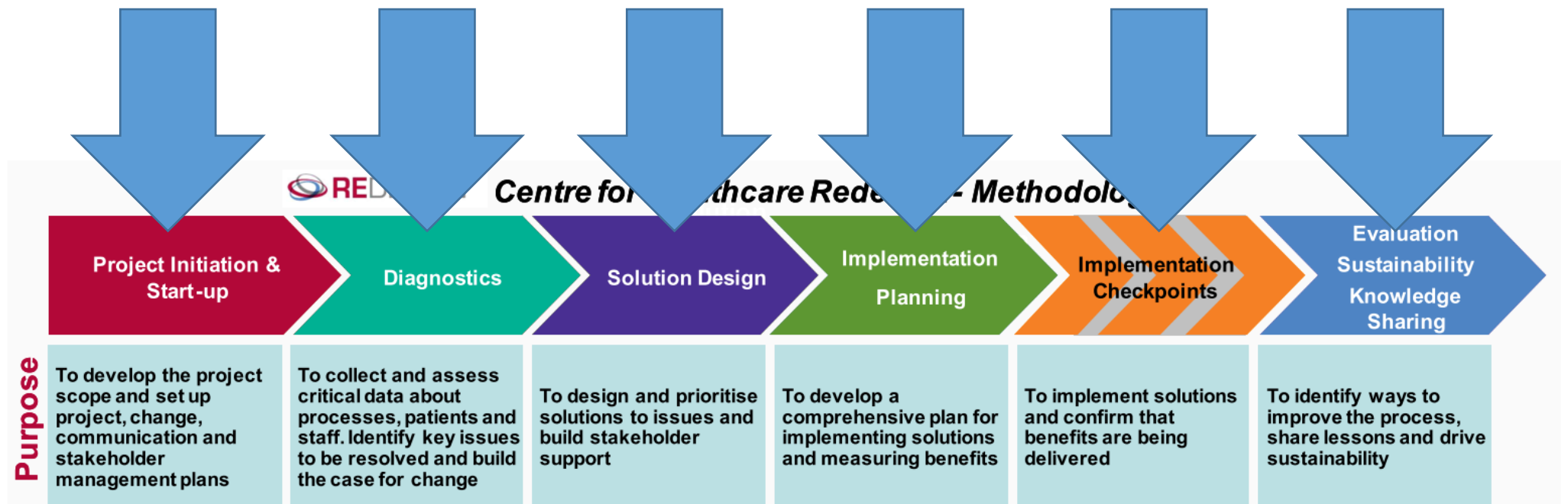*Karl Popper*

In God we trust everyone else bring data

Why is measurement so important?

- Objectivity vs subjectivity
  - **objective** perspective is one that is not influenced by emotions, opinions, or personal feelings - it is a perspective based in fact, in things quantifiable and measurable
  - **subjective** perspective is one open to greater interpretation based on personal feeling, emotion, aesthetics, etc

1. **Did I do something?**
2. **Did it make a difference?**
3. **Was it an improvement?**

1. What is the problem?
2. What are the solutions?
3. Did I do something?
4. Did it make a difference?
5. Was it an improvement?
6. Are we performing to quality

Centre for Healthcare Redesign - Methodology

Project Initiation & Start-up	Diagnostics	Solution Design	Implementation Planning	Implementation Checkpoints	Evaluation Sustainability Knowledge Sharing
Purpose To develop the project scope and set up project, change, communication and stakeholder management plans	To collect and assess critical data about processes, patients and staff. Identify key issues to be resolved and build the case for change	To design and prioritise solutions to issues and build stakeholder support	To develop a comprehensive plan for implementing solutions and measuring benefits	To implement solutions and confirm that benefits are being delivered	To identify ways to improve the process, share lessons and drive sustainability

Creating a meaningful narrative

TRADITION

Just because it has always been done that way doesn't mean it isn't stupid

Australian research - 12.5 million ED presentations & 11.6 million inpatient episodes

".highly significant (p<0.001) linear inverse relationship between eHSMR and ..NEAT"

"eHSMR declined as total and admitted NEAT…rose to about 83% and 65% respectively."

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Abstract

Objective: We explored the relationship between the National Emergency Access Target (NEAT) compliance rate, defined as the proportion of patients admitted or discharged from emergency departments (EDs) within 4 hours of presentation, and the risk-adjusted in-hospital mortality of patients admitted to hospital acutely from EDs.

Design, setting and participants: Retrospective observational study of all de-identified episodes of care involving patients who presented acutely to the EDs of 59 Australian hospitals between 1 July 2010 and 30 June 2014.
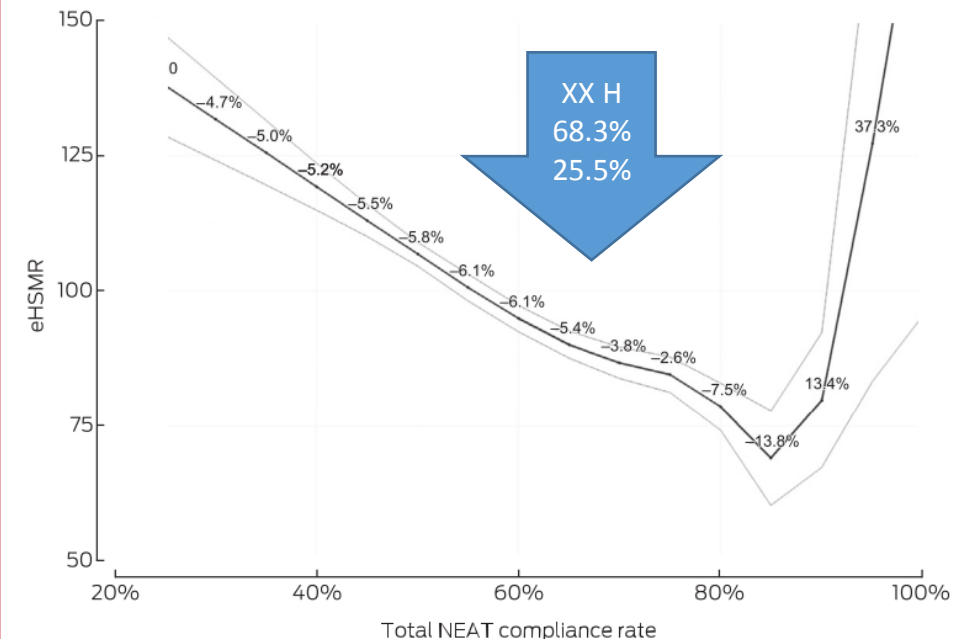
Main outcome measure: The relationship between the risk-adjusted mortality of inpatients admitted acutely from EDs (the emergency hospital standardised mortality ratio [eHSMR]: the ratio of the numbers of observed to expected deaths) and NEAT compliance rates for all presenting patients (total NEAT) and admitted patients (admitted NEAT).

Results: ED and inpatient data were aggregated for 12.5 million ED episodes of care and 11.6 million inpatient episodes of care. A highly significant (P < 0.001) linear, inverse relationship between eHSMR and each of total and admitted NEAT compliance rates was found; eHSMR declined to a nadir of 73 as total and admitted NEAT compliance rates rose to about 83% and 65% respectively. Sensitivity analyses found no confounding by the inclusion of palliative care and/or short-stay patients.

Conclusion: As NEAT compliance rates increased, in-hospital mortality of emergency admissions declined, although this direct inverse relationship is lost once total and admitted NEAT compliance rates exceed certain levels. This inverse association between NEAT compliance rates and in-hospital mortality should be considered when formulating targets for access to emergency care.

MJA 204 (9) · 16 May 2016

1 **Total National Emergency Access Targets (NEAT) compliance and hospital standardised mortality ratio for patients admitted from emergency departments (eHSMR) for 59 Australian hospitals, 1 July 2010 − 30 June 2014**

XX H
68.3%
25.5%

P < 0.001 for regression (F-test). Pale lines, 95% confidence intervals; graph labels, change in eHSMR per five percentage point change in NEAT. ◆

Patient story

- Sunday 10:12 75 yo walked in to ED with shortness of breath

- 10:23 triaged Cat 3 to acute stream - 10:47 brought into Acute bed 9 -

- 11:09 BTF Red ECG completed

- 12:02 seen by JMO and 12:27 pathology requests

- 13:20 referred to cardiology

- 13:25 decision to admit under cardiology – bed request at 13:29

- 13:35 Requested CTB – porter called 14:05, departed to CT at 14:08 – result available 1600

- Bed allocated at 16:35 – 16:45 CCU refused to accept patient as lifenet patient expected (At that time ED had 2 Bat calls – Lifenet patient and acutely psychotic patient)

- 17:10 lost the bed to life net patient – CCU had one empty bed and hot bed still available but No bed status

- 17:51 Decision made patient OK for 3N – bed manager informed - no beds

- 06:00 Commenced CPAP

- Monday 8:53 Cardiology review

- 10:12 Patient deteriorating – ICU consult

- 10:29 ICU bed allocated

- 11:45 ICU advised bed and ward ready

- 11:50 patient deteriorated – unable to transfer immediately

- 12:10 patient ready for transfer - porter called

- Monday 12:15 patient departed for ward

Chart Title

1
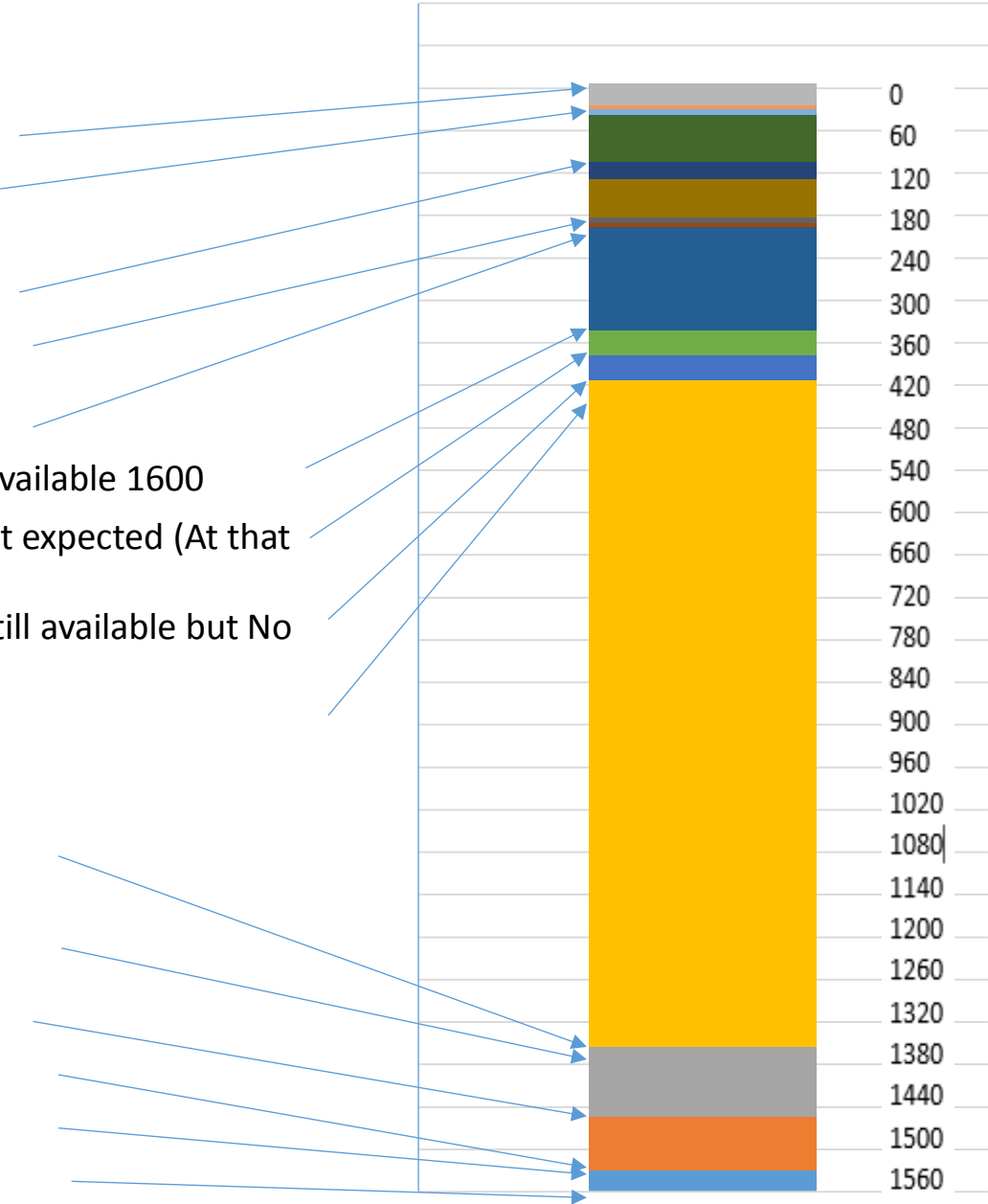
At 1700 Monday 18 patients were waiting for an inpatient bed

Occupancy in ED by disposition Sunday 4/6 and Monday 5/6
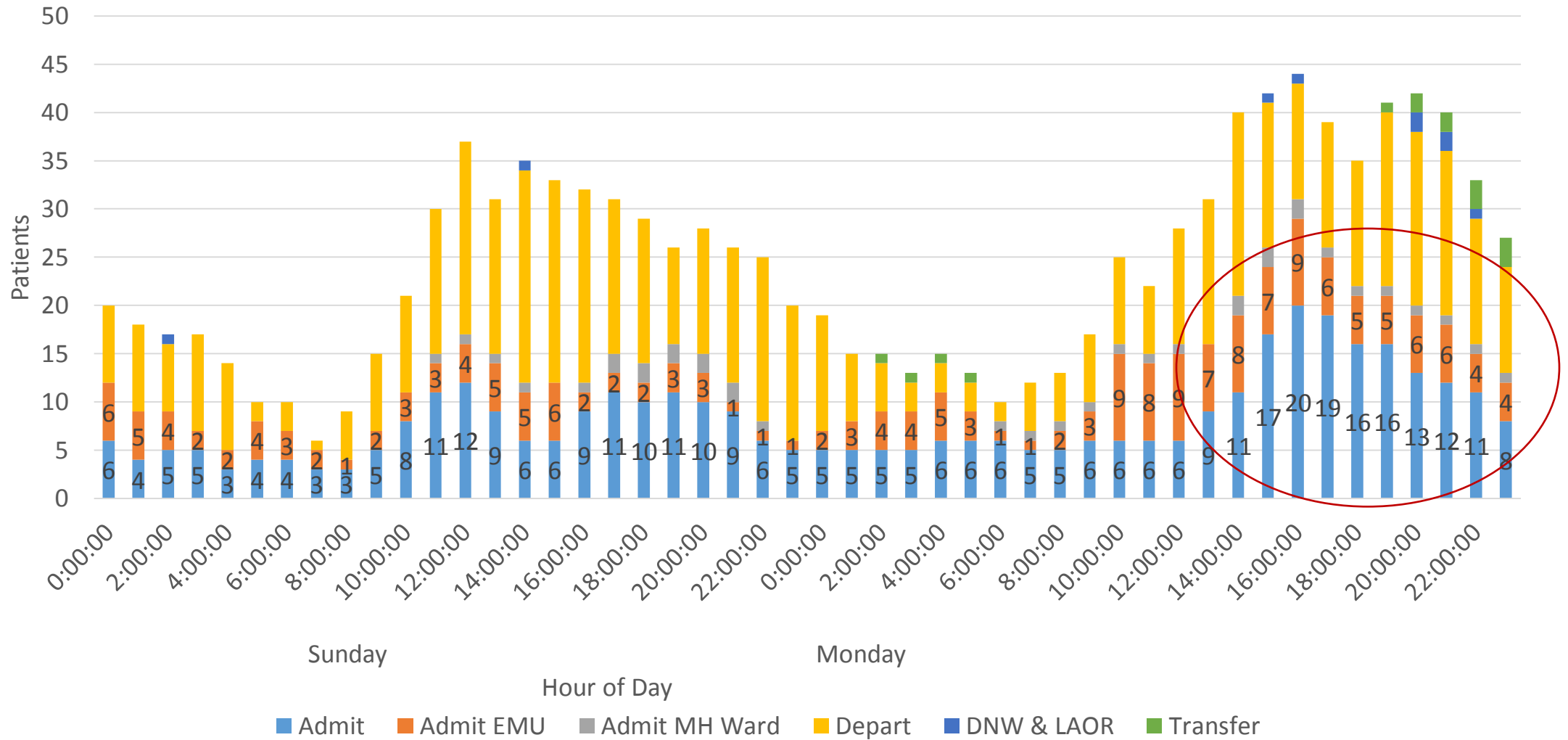
Data Source: FN005 1/3/17-5/6/17

# What is the impact of long delays for inpatient beds?

In the last 3 months the equivalent of 4 ED beds have been used 24/7 by admitted inpatients waiting for a bed (does not include patients who go to EDSSU waiting for an inpatient bed)

Admit to Inpt Ward - Average Daily ED Beds Used

Some days are much worse – 24/4/17 the equivalent to 10 beds were used 24/7 by admitted inpatients waiting for a bed

Acute/ Sick to be seen and sorted

Resusc

Data Source: FN005 1/3/17-5/6/17
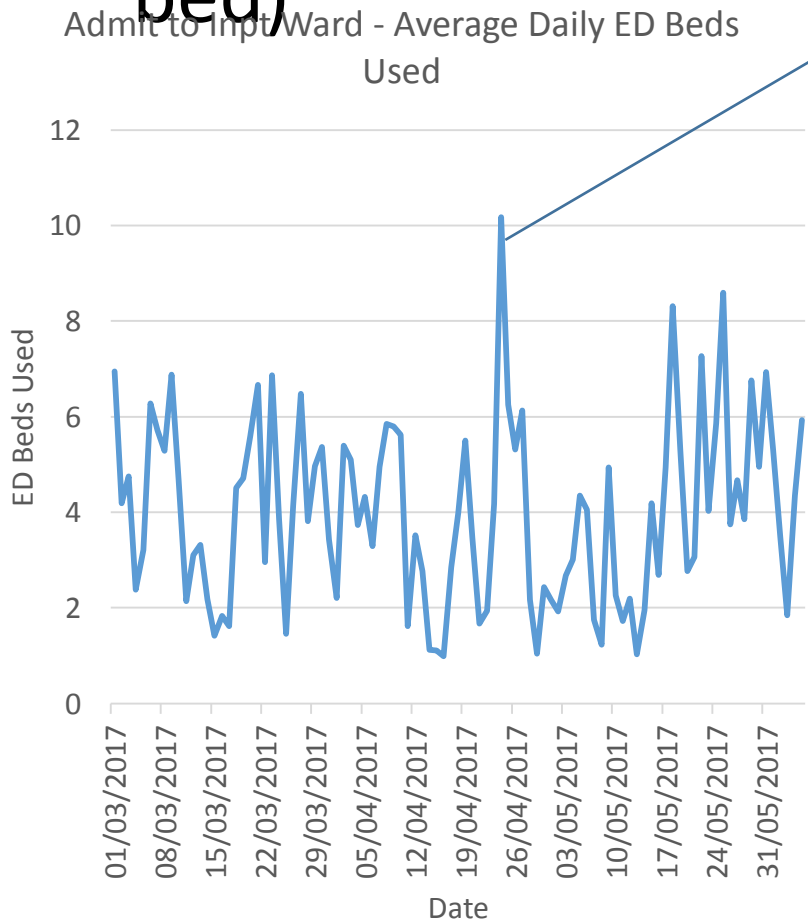
At 1700 Monday 18 patients had completed their ED journey and were waiting for an inpatient bed
At this time there are still 10 patients an hour arriving at ED for assessment and treatment/sorting
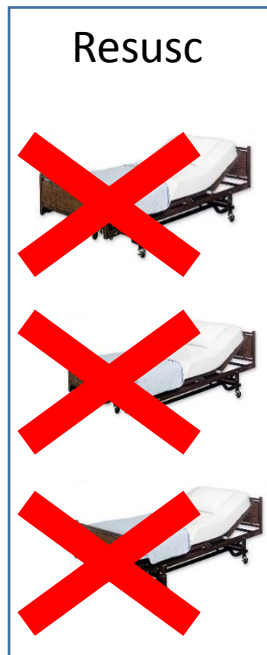
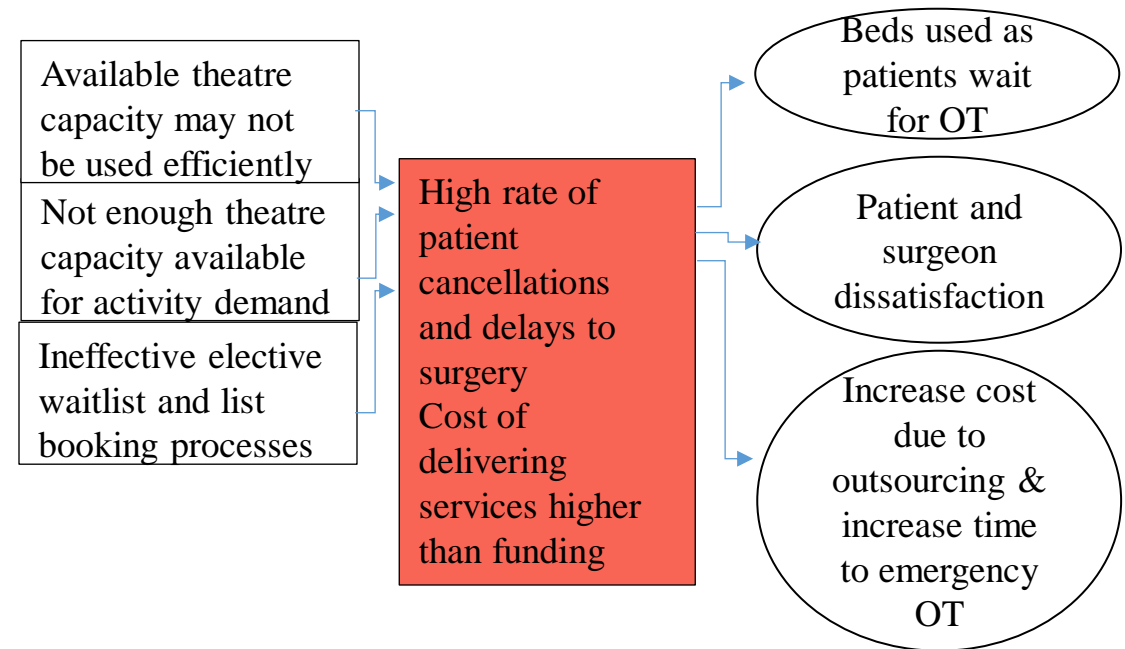- Acute surgery, psychiatry and cardiology use the most ED beds

Break down your measures to improve validity

Focus	KPI	Sub measures
Improving ED LOS for non-admitted patients	Non-admitted ETP	Time stamps in FirstNet - Arrival to triage time, triage to decision making clinician seen, clinician seen to ready to depart, ready to depart to departed Time from inpatient team referral to review, time from review to depart. Time from test request to results available - imaging and/or pathology • Request complete • Request received/recorded received by imaging • Patient sent for • Patient arrives in imaging department • Imaging commenced • Imaging completed • Interim results available • Final results available • Results reviewed by ED/inpatient team
Improving ED LOS for admitted patients	Admitted ETP	As above plus Time from inpatient team review to bed request Time from bed request to bed ready, time from bed ready to depart
Improving patient experience	Patient complaints	Patient satisfaction measures (targeted survey) Non-value adding time for patients – e.g. Time to first seen by clinician Patient stories - strengths and issues Patient incidents
Matching demand and capacity	Emergency surgery cases	Bookings and sessions by day of week and hour of day Other services – radiology and pathology Measures of Capacity – Emergency theatre sessions, Nurses (scrub, anaesthetics,recovery) radiographer, CSSD, number of instrument trays, DSU beds, recovery spaces, anaesthetists

Cause consequence – link to measures

Different types of measures:

- Process

- Impact

- Demand

- Capacity

- Outcome

| Available theatre capacity may not be used efficiently | | Beds used as patients wait for OT |
| Not enough theatre capacity available for activity demand | High rate of patient cancellations and delays to surgery Cost of delivering services higher than funding | Patient and surgeon dissatisfaction |
| Ineffective elective waitlist and list booking processes | | Increase cost due to outsourcing & increase time to emergency OT |

Problem Statement – The surgical services at XXXH has a high rate of theatre case cancellation. Elective booking processes, theatre efficiency and capacity contribute to rework, increased cost of delivering services; delays to theatre with increased length of stay.

There is patient, MoH (funder), surgeon and anaesthetist dissatisfaction with surgery service performance and failure to meet expected KPI targets.
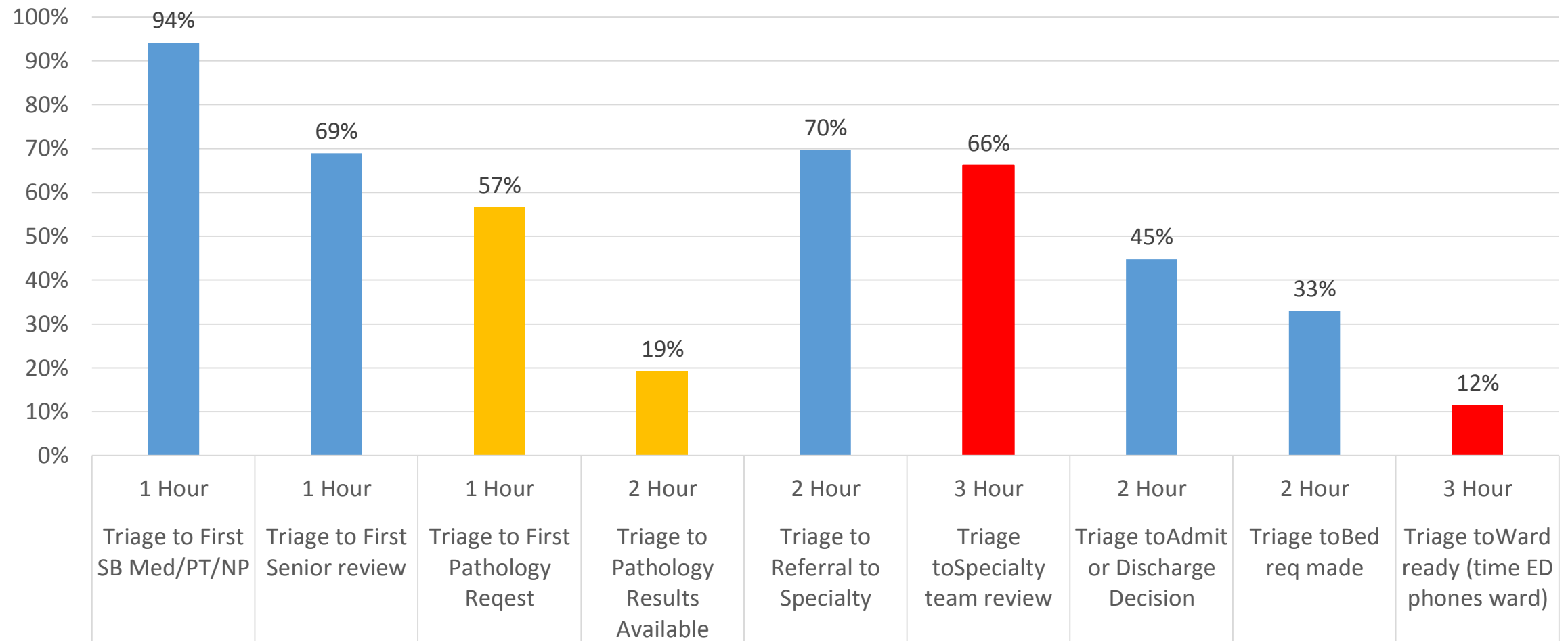
Pareto Chart

- Use to focus improvement effort on areas having the greatest impact

- It's a fancy frequency histogram – use for data you can group into categories and count

- Beware "out of scope"– make sure you are counting the right things

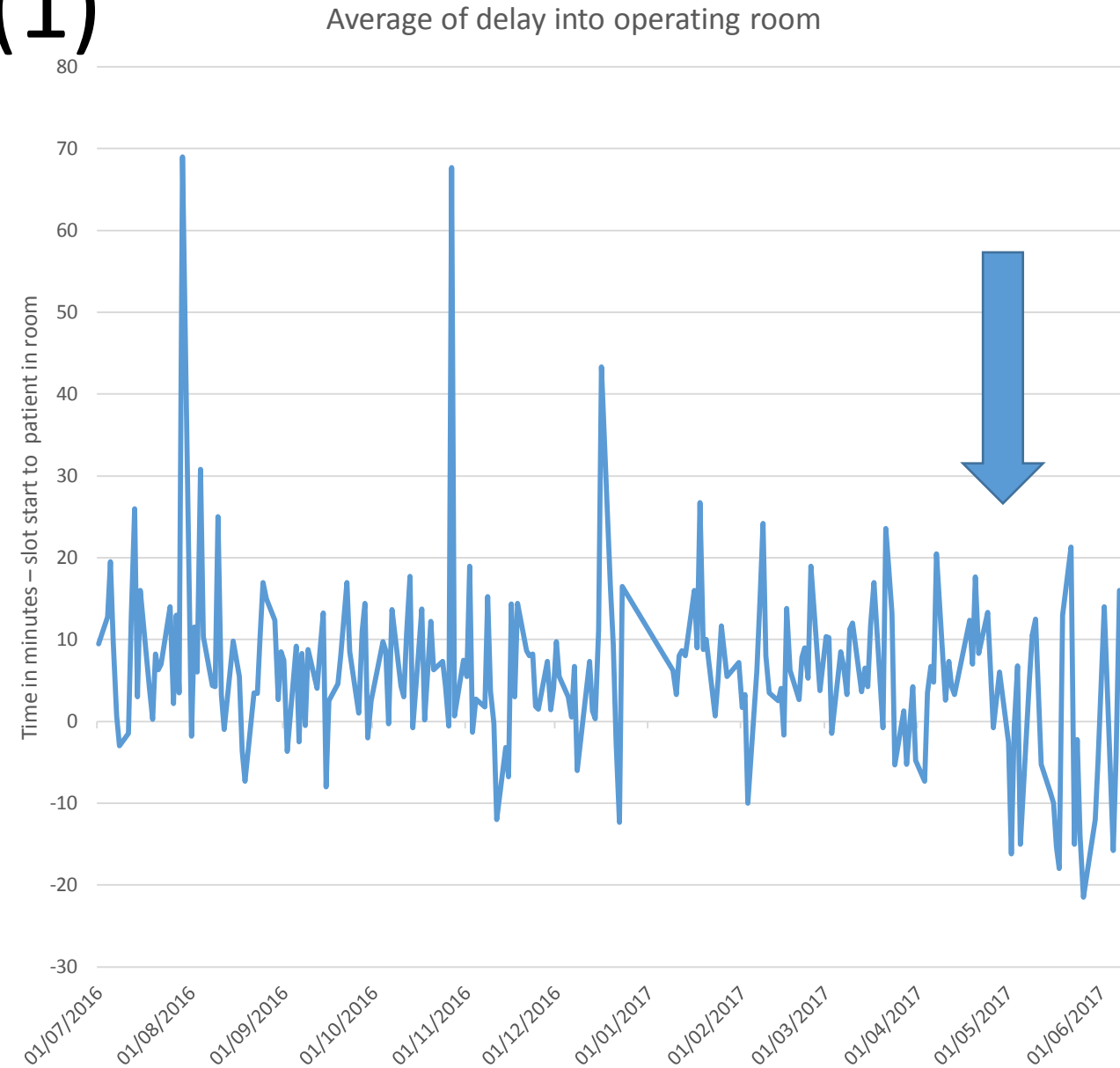| Delays	Delays	Cum %	Cum Count
Inpatient bed not ready/no bed	29	28%	29
Specialty review	25	53%	54
Referral to specialty	16	69%	70
ED MO Assessment/ decision making	9	77%	79
Access to ED Treatment space	7	84%	86
Delay to CT and radiology results	4	88%	90
Delay to MH reivew	2	90%	92
Pathology	2	92%	94
Discharge/admit decision	2	94%	96
Nursing availability	2	96%	98
Unable to contact MH bed manager	1	97%	99
Discharge Summary Delay	1	98%	100
Test requests	1	99%	101
Triage	1	100%	102

Delays as major contibutor to ED LOS > 4 hours
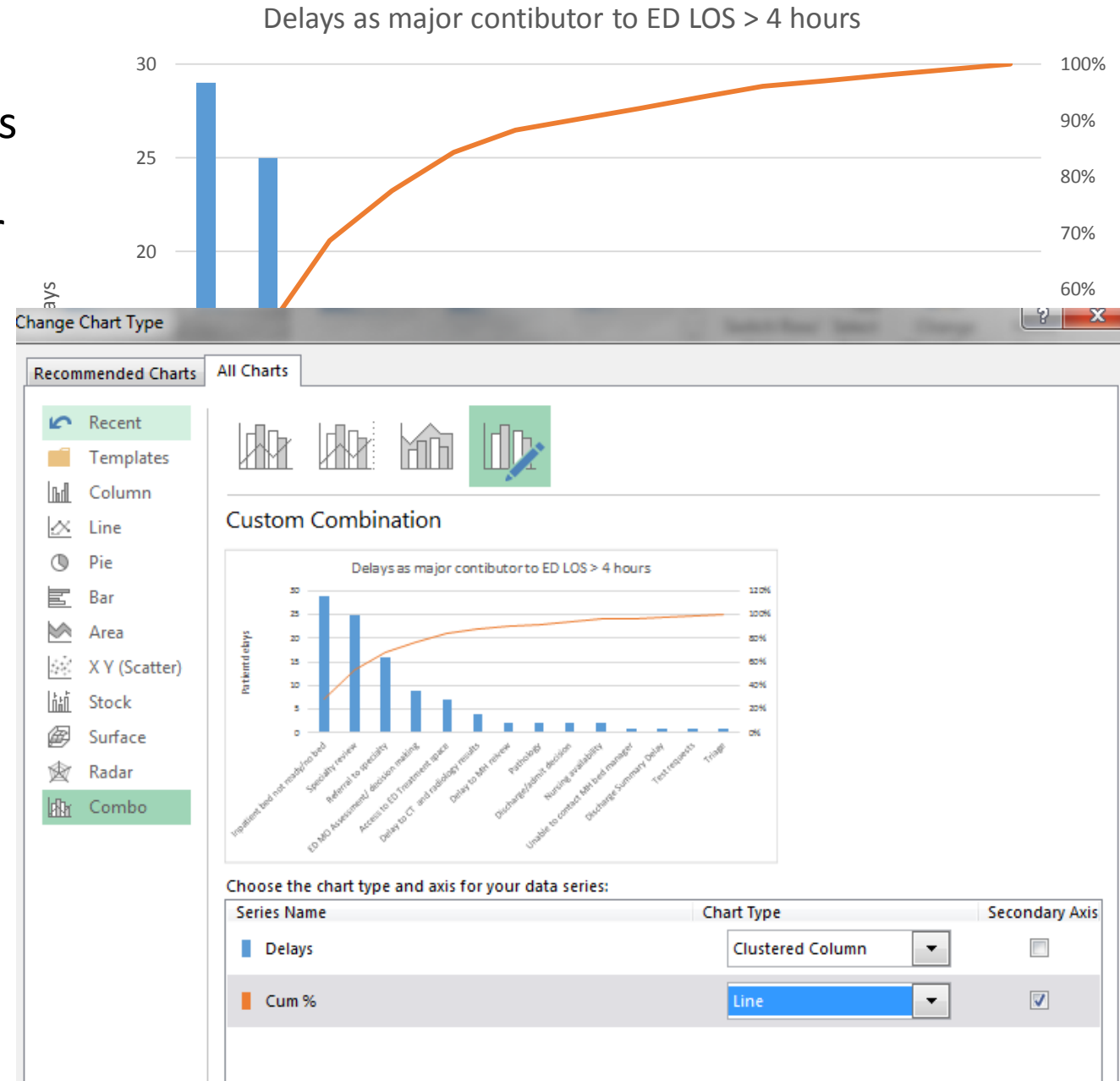
Which part of the process is least capable of meeting patient and team expectations?

% within expected timeframes

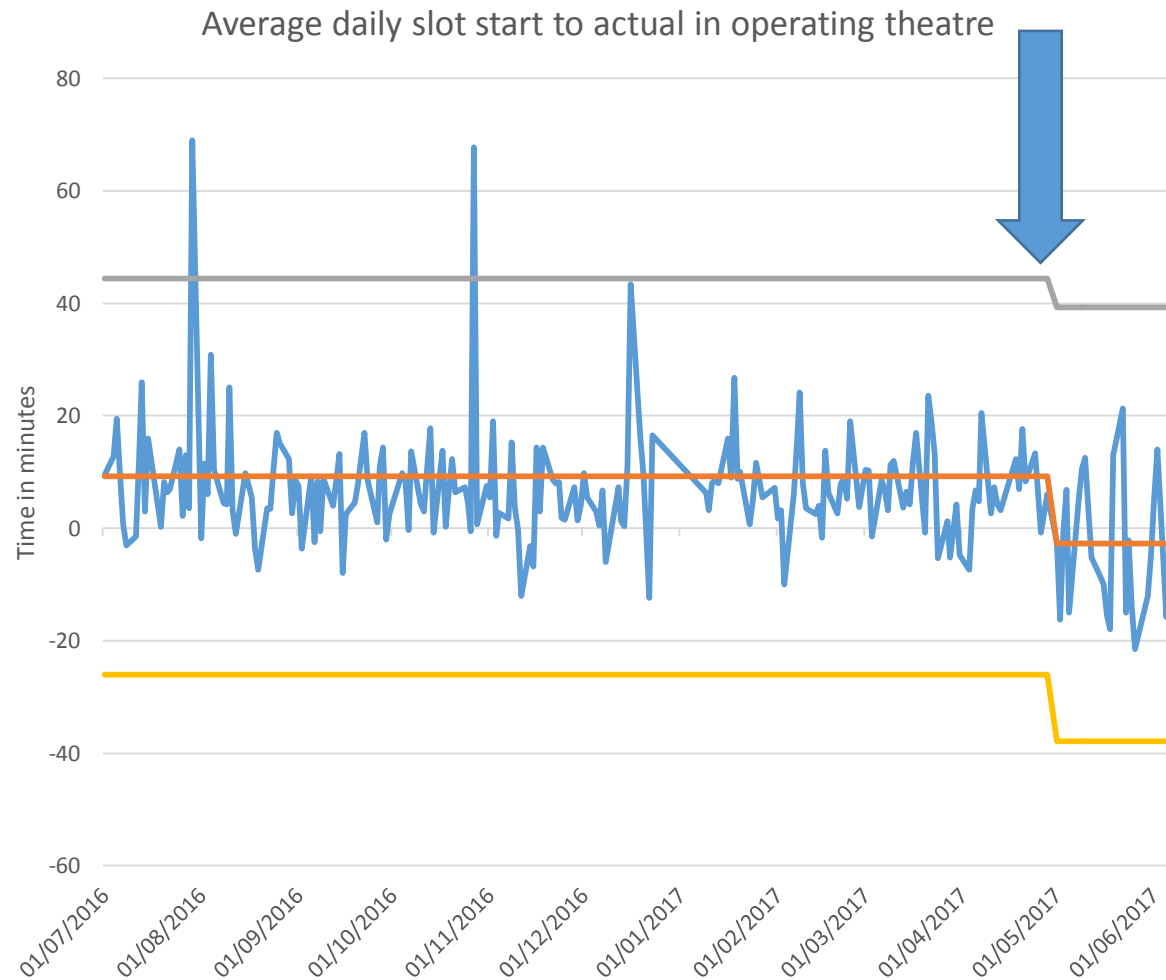|	1 Hour	1 Hour	1 Hour	2 Hour	2 Hour	3 Hour	2 Hour	2 Hour	3 Hour
	94%	69%	57%	19%	70%	66%	45%	33%	12%
	Triage to First SB Med/PT/NP	Triage to First Senior review	Triage to First Pathology Reqest	Triage to Pathology Results Available	Triage to Referral to Specialty	Triage toSpecialty team review	Triage toAdmit or Discharge Decision	Triage toBed req made	Triage toWard ready (time ED phones ward)

Process control chart (1)

- Use to monitor performance over time and determine process stability – ie how much variation there is in the process

- It's a fancy time series graph – use it for "time to…." data to see if the changes you have made are an improvement

Average of delay into operating room

Process control chart (2)

Average daily slot start to actual in operating theatre

Date	Average of Slot to in room	Mean	2+SD	2-SD		
1/07/2016	9.5	9.2	44.4	-26.0		
4/07/2016	12.8	9.2	44.4	-26.0		
5/07/2016	19.5	9.2	44.4	-26.0		
6/07/2016	9.666667	9.2	44.4	-26.0		
7/07/2016	0.75	9.2	44.4	-26.0		
8/07/2016	-3	9.2	44.4	-26.0		
11/07/2016	-1.5	9.2	44.4	-26.0		
12/07/2016	12.75	9.2	44.4	-26.0		
13/07/2016	26	9.2	44.4	-26.0		
14/07/2016	3	9.2	44.4	-26.0		
15/07/2016	16	9.2	44.4	-26.0		
18/07/2016	4.25	9.2	44.4	-26.0		
19/07/2016	0.25	9.2	44.4	-26.0		
20/07/2016	8.25	9.2	44.4	-26.0		
26/04/2017	-0.75	9.217028	44.4	44.4	-26.0	
21/07/2016	6.333333	9.2	44.4	-26.0		
28/04/2017	6	9.217028	44.4	44.4	-26.0	
22/07/2016	7	9.2	44.4	-26.0		
1/05/2017	-2.6	-2.7	39.3	-37.9		
25/07/2016	14	9.2	44.4	-26.0		
2/05/2017	-16.2	-2.7	39.27991	-37.91		
26/07/2016	2.2	9.2	44.4	-26.0		
3/05/2017	-0.75	-2.7	39.27991	-37.91		
27/07/2016	13	9.2	44.4	-26.0		
4/05/2017	6.8	-2.7	39.27991	-37.91		
28/07/2016	3.5	9.2	44.4	-26.0		
5/05/2017	-15	-2.7	39.27991	-37.91		
8/05/2017	5	-2.7	39.27991	-37.91		
9/05/2017	10.5	-2.7	39.27991	-37.91		
10/05/2017	12.5	-2.7	39.27991	-37.91		
11/05/2017	3.6	-2.7	39.27991	-37.91		
12/05/2017	-5.25	-2.7	39.27991	-37.91		
15/05/2017	-8.6	-2.7	39.27991	-37.91		

Staffing capacity and demand

Demand & Capacity ED - 1/3/17 - 5/6/17
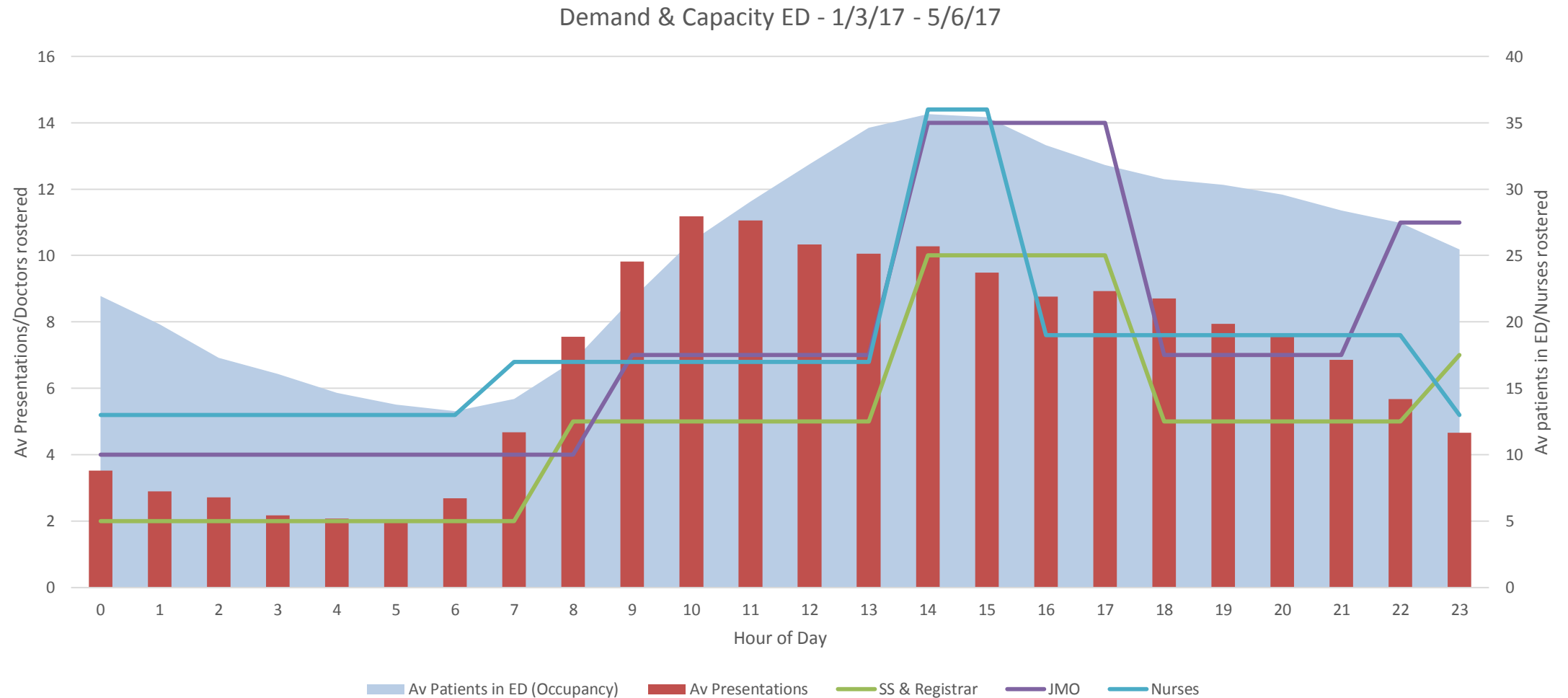
Things to think about

- Include both qualitative and quantitative measures
- Not too many! So choose wisely
  - Does it have validity
  - Doees the team think it is important
  - Does it truly represent what you want to measure
- Need to establish a baseline
- Identify links to existing measurement strategies
- Whose responsible for monitoring and reporting for each project
- Use existing reports wherever possible for monitoring project implementation and establishing Business as Usual – eg QlikView
  - Review and improve existing reports for relevance – as you learn and as the organisation matures you will change which data points you need

1. Before you show your data – check its validity
2. Play with Excel
3. Learn how to use pivot tables
4. Before you show your data – check its validity

Strategies to use when you don't know what to do

- Google
- Excel Help
- Minitab (or other statistics software help)
- Phone a friend
- Use someone else's analysis – MoH; BHI; Health Round Table
- Google
  - Blogs
  - UTube
  - Statistics blogs - http://blog.minitab.com/blog/the-statistics-of-science
- WOHP team (which includes some geeks)

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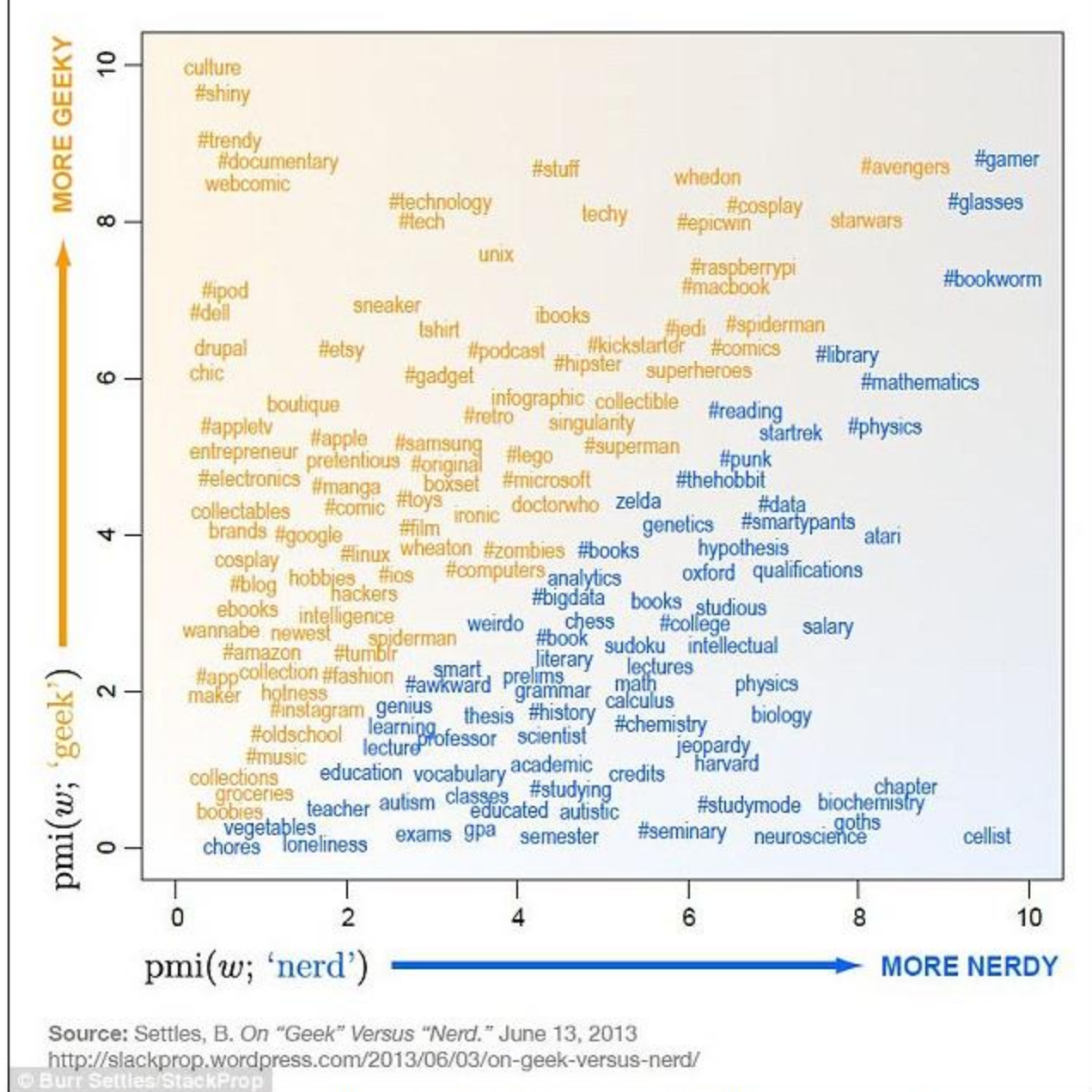
Pittsburgh engineer Burr Settles studied the language of 2.6 million tweets to discover the geekiest and nerdiest words and topics. The further along the horizontal axis, pictured, a word appeared, the more nerdy it was. The higher a word appeared on the vertical, y-axis, the more it was associated with being a geek