Taking a QI approach to tracking the COVID pandemic – data for learning and improvement

13 May 2020
WebEx Quick Reference

- Please use chat to “All Participants” for questions
- For technology issues only, please chat to “Host”
- WebEx Technical Support: 866-569-3239
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- All lines will be muted during the presentations, please chat in questions and comments to All Participants
Where to find resources from this call series?

Visit the IHI Europe Team webpage at http://www.ihi.org/regions/Europe.

Then click on ‘Resources’ listed in the left sidebar.
Thank you – for all you do everyday
Thanks to Year 4 HIAE Members and partners in Europe

http://www.ihi.org/Engage/collaboratives/Health-Improvement-Alliance-Europe/Pages/default.aspx
Institute for Healthcare Improvement

Pedro Delgado, MSc
Head of Europe and Latin America
Institute for Healthcare Improvement

Susan Hannah
Senior Director, Europe Region and Strategic Partners
Institute for Healthcare Improvement
Guest Presenters

Gareth Parry, MSc, PhD,
Senior Scientist at IHI

Lloyd Provost, MS
Statistician, Associates in Process
Improvement; Senior Fellow,
Institute for Healthcare
Improvement

Shannon M. Provost
Clinical Assistant Professor in the
McCombs School of Business at
the University of Texas at Austin
Guest Presenters

Brenda Carson, RGN
IHI Improvement Advisor
Senior Lead Nurse for Patient Safety and Quality Improvement at South Eastern Health and Social Care Trust, in Northern Ireland

Marc Neil, MEng, MSc
Assistant Director of Unscheduled Care Operations at South Eastern Health and Social Care Trust, in Northern Ireland
What are we learning?

Measurement for improvement

- Data over time
- Understand variation
- Prediction
- Improvement dialogues
- Decision making
Learning with the science of improvement during the covid-19 pandemic

May 13, 2020

Gareth Parry, Institute for Healthcare Improvement
Shannon Provost, The University of Texas at Austin
Lloyd Provost, Associates in Process Improvement
In the wake of the covid-19 pandemic, every day brings a new and seemingly meaningful story (not necessarily a whole system view).
“HAWTHORNE WORKS”—THE NEW 110 ACRE PLANT OF THE WESTERN ELECTRIC COMPANY AT HAWTHORNE, ILL.
A fundamental concept of the science of improvement is that variation in a measure has two potential origins: **common causes** and **special causes**.

**Common Causes** are inherent in the system over time, affecting everyone working in the system and all system outcomes.

**Special Causes** are not part of the regular system but arise because of particular circumstances or some “special” source of variation that can be assigned to some identifiable cause.
The **Shewhart Chart** is a statistical tool to distinguish common cause variation and special cause variation.
Shewhart called the chart limits "three-sigma" control limits and gave a general formula to calculate the limits for any statistic.

Let $S$ be the statistic to be charted:

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Control Limit (UCL)</td>
<td>$UCL = CL + 3\sigma_S$</td>
</tr>
<tr>
<td>Centerline (CL)</td>
<td>$CL = \mu_S$</td>
</tr>
<tr>
<td>Lower Control Limit (LCL)</td>
<td>$LCL = CL - 3\sigma_S$</td>
</tr>
</tbody>
</table>

$\mu_S$ = average of the statistic  
$\sigma_S$ = standard error of statistic estimating common cause variation
Shewhart charts provide a basis for taking action to improve a process or system.
Which chart should I use?

The appropriate chart choice depends on the type of data and statistic used for the measure of interest.
America Is Approaching a Deadly Tipping Point in the Coronavirus Pandemic, U.S. News Analysis Shows


"With all the talk of 'flattening the curve,' we think the approach we used and our analysis sheds light on early signals of when the increase in new deaths peaks and the curve begins to flatten," Perla and Provost say.
Applying Shewhart’s Method to the epidemic curve

Phase 1: Pre-Growth
Phase 2: Growth
Phase 3: Post-Growth
Phase 4: Stability after descent

We focused on daily reported deaths, but the method could be applied to track other measures associated with an epidemic:
- cases
- hospitalizations
- ICU admissions
- intubations
- testing
SINGAPORE is an example of a country in pre-growth (Phase 1)
PERU is an example of a country in exponential growth (Phase 2)
ITALY is an example of a country in post-growth (Phases 3 and 4)
Applying Shewhart’s Method to three phases of the epidemic curve

**SINGAPORE in Phase 1**

*Pre-growth:* Number of deaths each day are small and stable.

**ITALY in Phase 3**

**Phase 2 (Growth)** – Daily deaths are trending higher each day in various stages of exponential growth:
- <20 days or growth, still growing
- Special cause signals indicating reduction in growth
- Continued growth at lower rate
- Plateau near peak levels

**PERU in Phase 2**

**Phase 3 (Post-growth)** – Daily reported deaths are flat or dropping. Apex has been reached and growth is no longer exponential.

**Phase 4 (stability after descent)** – pattern of reported deaths is low and stable.
Tracking the covid-19 pandemic within the United Kingdom

https://coronavirus.data.gov.uk
Platforms applying our hybrid Shewhart Charts:

IHI COVID-19 Data Dashboard:  
www.ihi.org/Topics/COVID-19/Pages/COVID-19-Data-Dashboard.aspx

Informing Ecological Design application:  
iecodesign.shinyapps.io/Hybrid_Shewhart_chart_COVID/

MDMetrix COVID-19 Mission Control:  
www.mdmetrix.com/covid-19-projections
COVID 19 – Using Data in Operational Management

Marc Neil (@mneil02)
Assistant Director, Unscheduled Care Services
South Eastern HSC Trust

- Integrated health and social care Trust, circa 440k population, 3 hospitals, 1 with Level 1 ED (500 bed DGH), 2 Type 2 EDs, with inpatient medical services
- 12,500 staff
- Safety, Quality, Experience focus over past decade
  - 47% of staff receiving some level of QI training from level 1 to 3
New testing approach

What we model and what we know are not always exactly the same... So, PDSA becomes vitally important – we are learning every day...
From ward to control centre (and back)...

- From the ward – used by ward to manage the patients needs
- Feeds directly to manage the site
- Crosses all teams from patient experience, AHPs, social care, pharmacy...
- Understanding and predicting capacity of beds, staff, O2
Understanding activity, predicting demand and Responding Proactively

- How many are coming to ED? How many are admitted?
  - How many beds? LoS? Covid / non-covid? Demand on peripatetic services...
- Can we stay a week ahead of demand?
- Adapt to next challenge
  - Wellbeing of staff; fatigue; annual leave, sickness, elective surgery, outpatients...

![Graph showing UHD ED Attendances from 25/11/19 to 20/06/20]
Turning Proactive Response to Improving Flow

- Confidence in decision making
- Increased ability to respond with purpose
- Allows forecast to understand what’s coming
- Adds context to higher level modelling
- Engages the team
In Conclusion

• Think big, it’s complicated – *embrace that*
• Understand connectedness - *inside and outside “your world”*
• Be consistent in approach and energy – *relentless focus*
• Ask questions - *learn every day*
• Create a story – *build the narrative around the data*
• Engage across teams, and organisations – *what matters to staff*
• Understand the aim – *ensure all understand their part*
COVID 19 Screening and Testing

Brenda Carson
Senior Lead Nurse for Patient Safety and Quality Improvement
Number of Daily Swab Tests (All Sources)
18th March 2020 to 10th May 2020

- Independant Sector Testing
- SSE Testing
- Ward 5A & 20 Cluster Testing
- Downpatrick Trace & Test
- Ward 27 Testing
- Other Keyworker Testing

Number of Daily Swab Tests (SET Staff Only)
18th March 2020 to 10th May 2020

- SSE Testing
- Downpatrick Track & Trace
- Ward 5A & 20 Cluster Testing
- Ward 27 Testing
Number of Daily Positive Tests (All Sources)
18th March 2020 to 9th May 2020

Number of Daily Positive Tests (SET Staff Only)
18th March 2020 to 9th May 2020
Rate of Positives per 100 Staff Members Tested (SET Staff Only)
18th March 2020 to 9th May 2020

DATE

Rate of Positives per 100 Staff Members Tested (SET Staff Only)
18th March 2020 to 9th May 2020

COVID-19 SET Staff Positives · Symptoms Displayed 18 March 2020 to 21 March 2020

Dry Cough

Chest & Feels

Flu Symptoms

Temperature

Joint Throat

Short of Breath

Loss of Taste and Smell

Fatigue

Gastro Cough

Headache

Others
Total SET staff self isolating
I Chart

Moving Range

DATE
0
50
100
150
200
250
300
350
400
DATE
0
10
20
30
40
50
60
70
DATE
0
10
20
30
40
50
60
Next steps

• User feedback
• Learn from errors
• Focus on Care Homes
Discussion

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Next week’s webinar

Tuesday 19 May at 17:00 UK/18:00 CET (please note this is a different day of the week and time of day than previous calls in the series)

Leading in Crisis with:

• Jason Leitch, National Clinical Director, Scottish Government

• Kate Slemeck, Chief Executive, Royal Free Hospital