COVID-19 Data Evaluation: Dashboards and KPIs

December 2020
The ideas presented in this deck reflect the latest public health thinking and scientific evidence as of December 2020. However, the COVID-19 landscape is changing dramatically daily, and so must our recommendations over time.

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Overview

1. Context surrounding KPI and dashboard development
2. Guiding questions for dashboard development
3. Key Performance Indicators
4. Types of dashboards
5. Measuring speed across cascade: Case example linking components for a faster response
**Context surrounding KPI and dashboard development: Performance management and results**

<table>
<thead>
<tr>
<th><strong>Key question domains of Contact Tracing (CT) operations</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equity:</strong> Are we responding to all unique needs with a social justice lens, and prioritizing the most vulnerable groups?</td>
</tr>
<tr>
<td><strong>Retention:</strong> Where is loss-to-follow-up occurring at each stage in the cascade, assuming we aim to retain 90% of identified cases and contacts?</td>
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<tr>
<td><strong>Scale:</strong> Has the response built up the infrastructure to meet demand (e.g., sufficient tests, staffing capacity, social support resources)?</td>
</tr>
<tr>
<td><strong>Speed:</strong> Is the response happening quickly enough to drive the rate of infection below 1: &lt; 3 days for the full cascade?</td>
</tr>
</tbody>
</table>

**Core assumptions for KPI and Dashboard development:**

- Management of CT teams and processes requires a responsive measurement system
- CT teams need timely, accessible data in order to drive continuous learning and quality improvement
How we think about building dashboards

Three Guiding Questions:

1. What audiences will use the dashboard, and what reporting needs do different audiences require (including data privacy issues)?
   - Potential audiences for this program include: Governor’s office, fidelity partner/IDPH, LHD/CT supervisor

2. What objectives does the program aim to achieve and what Key Performance Indicators (KPIs) measure those objectives?
   - In Newark, we have a 4-part framework for our program objectives, and our dashboard is built to align to that framework.

3. Where is the data sourced from?
   - Who is inputting the data? Can it be integrated to update the dashboard automatically? Are there permissions issues?
Dashboard structure and content: tracking progress and productivity within each step of the response cascade

Key components of cascade:

CT start-up and hiring → Testing → Case Investigation → Contact Tracing → Care Coordination

Domains of inquiry:

**Equity:**
Are we responding to all unique needs with a social justice lens, and prioritizing the most vulnerable groups?

**Retention:**
Where is loss-to-follow-up occurring at each stage in the cascade, assuming we aim to retain 90% of identified cases and contacts?

**Scale:**
Has the response built up the infrastructure to meet demand (e.g., sufficient tests, staffing capacity, social support resources)?

**Speed:**
Is the response happening quickly enough to drive the rate of infection below 1: < 3 days for the full cascade?
## KPIs

KPIs measure outputs that the program wants to monitor and influence.

### Testing
- Total # of tests performed, disaggregated by testing site and by high-risk groups
- Test positivity rate
- % of positive tests performed with correct patient contact information (name and phone number) linked
- Testing turnaround time (TAT), by laboratory

### Case Investigation
- Case investigation completion rate
- Breakdown of investigations by case status: no number, no answer, declined to participate, pending or completed
- # contacts identified per case
- Case final outcomes: recoveries/deaths
- # and % positive cases admitted to hospital
- Average/median call time for completed disease investigations
- Daily # investigators on duty
- Daily time spent on investigations
- Average/median time from positive case entered in disease surveillance system to first investigation call attempted

### Contact Tracing
- Contact tracing completion rate
- Breakdown of contacts identified by status: completed, pending, declined to participate, no/wrong number, etc.
- # and % contacts reporting symptoms
- # and % contacts who test positive and become cases
- Average/median call time for completed tracing calls
- Daily # tracers on duty
- Daily time spent on tracing
- Average/median time from contact entered in tracing system to first tracing call attempted

### Care Coordination
- # and % of positive cases able to self-isolate safely
- # and % of cases linked to social support services, disaggregated by service domain
- # and % of contacts able to quarantine safely
- # and % of contacts linked to social support services, disaggregated by domain
KPIs provide guidance and benchmarks, and serve as the foundation of the visualization that goes into the dashboard

- KPI list should have indicators from each part of the Contact Tracing Cascade – Test, Trace, Care coordination
- Development of KPI’s should include clear explanation of data type or format, how / when data is compiled, and from what source the data will be extracted

<table>
<thead>
<tr>
<th>KPI Category/Metric</th>
<th>Type</th>
<th>Compiled</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact Tracing</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Tracing – Personnel &amp; Time</td>
<td></td>
<td></td>
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<tr>
<td>Disease investigators on duty</td>
<td>#</td>
<td>Daily</td>
<td>City</td>
</tr>
<tr>
<td>Hours of disease investigations completed</td>
<td>#</td>
<td>Daily</td>
<td>City</td>
</tr>
<tr>
<td>Contact tracers on duty</td>
<td>#</td>
<td>Daily</td>
<td>External vendor</td>
</tr>
<tr>
<td>Hours of tracing calls completed</td>
<td>#</td>
<td>Daily</td>
<td>External vendor</td>
</tr>
<tr>
<td>Tracing – Productivity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total investigations completed</td>
<td>#</td>
<td>Cumulative</td>
<td>City</td>
</tr>
<tr>
<td>Daily tracing completion rate</td>
<td>%</td>
<td>Daily</td>
<td>External vendor</td>
</tr>
<tr>
<td>Tracing – Timeliness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cases contacted by investigator within 2 hrs of positive test</td>
<td>#</td>
<td>Daily</td>
<td>External vendor</td>
</tr>
<tr>
<td>Contacts traced within 24 hrs. of identification</td>
<td>%</td>
<td>Daily</td>
<td>External vendor</td>
</tr>
<tr>
<td>Tracing – Follow-up</td>
<td></td>
<td></td>
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<tr>
<td>Cases called daily</td>
<td>#</td>
<td>Daily</td>
<td>External vendor</td>
</tr>
<tr>
<td>Cases still open requiring follow-up</td>
<td>#</td>
<td>Daily</td>
<td>External vendor</td>
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<tr>
<td>Isolation and social Supports (Equity)</td>
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<tr>
<td>Cases unable to safely isolate</td>
<td>#</td>
<td>Daily</td>
<td>External vendor</td>
</tr>
<tr>
<td>Cases unable to safely isolate</td>
<td>%</td>
<td>Daily</td>
<td>External vendor</td>
</tr>
<tr>
<td>Referrals made to social programs, by domain</td>
<td>#</td>
<td>Daily</td>
<td>External vendor</td>
</tr>
</tbody>
</table>

Note: Illustrative example table only
### Production dashboards: give a quick view to leadership as to how many CTs are coming online

**Audience:** Workforce Management and Leadership

<table>
<thead>
<tr>
<th>Hiring Group</th>
<th>Training Dates</th>
<th>Production Date</th>
<th>Target Addition to Workforce</th>
<th>Cumulative Target</th>
<th>Actual Addition to Production</th>
<th>Cumulative Actual in Production</th>
<th>% in Production</th>
<th>Status</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>June 9-11</td>
<td>June 12</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>80%</td>
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<td>2</td>
<td>June 12-15</td>
<td>June 16</td>
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<td>15</td>
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<td>9</td>
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<td>3</td>
<td>June 16-18</td>
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<td>18</td>
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<td>4</td>
<td>June 19-21</td>
<td>June 22</td>
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<td>5</td>
<td>June 22-24</td>
<td>June 25</td>
<td>80</td>
<td>155</td>
<td>90</td>
<td>162</td>
<td>98%</td>
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<td>6</td>
<td>June 25-27</td>
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<td>185</td>
<td>90</td>
<td>162</td>
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<td>7</td>
<td>June 28-30</td>
<td>July 1</td>
<td>12</td>
<td>197</td>
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<td>In-progress</td>
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</table>

Mock-up dashboard, all figures are illustrative
Hiring and training pipeline dashboards: highlight attrition and bottlenecks in onboarding and training

Audience: Workforce Management

- CT start-up and hiring
- Testing
- Case Investigation
- Contact Tracing
- Care Coordinating

Hiring Pipeline

<table>
<thead>
<tr>
<th>Applicants</th>
<th>8,235</th>
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</thead>
<tbody>
<tr>
<td>Offers Sent</td>
<td>200</td>
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<tr>
<td>Offers Accepted</td>
<td>172</td>
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<tr>
<td>In Production</td>
<td>130</td>
</tr>
</tbody>
</table>

Workforce Breakdown (Headcount)

- Contact Tracer
- Case Investigator
- Supervisor
- Care Resource Coordinator
- Translator

<table>
<thead>
<tr>
<th></th>
<th>June 10</th>
<th>June 11</th>
<th>June 12</th>
<th>June 13</th>
<th>June 15</th>
<th>June 16</th>
<th>June 17</th>
<th>June 18</th>
<th>June 19</th>
<th>June 20</th>
<th>June 22</th>
<th>June 23</th>
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<tbody>
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<td>CBOs</td>
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</tr>
<tr>
<td># Hired</td>
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<td>3</td>
<td>6</td>
<td>5</td>
<td>0</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>30</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>
The Timing Dashboard shows how long the entire cascade takes, with the goal of <3 days to achieve $R_0$ below 1.
Call center operations dashboard: show management quickly if targets are being hit and utilization rates

Audience: Quality and Program Management

Daily Outbound Calls Made

- June 10: 2,311
  - Cumulative: 11,134
- June 10: 1,423
  - Cumulative: 5,243
- June 10: 493
  - Cumulative: 3,281
- June 10: 283
  - Cumulative: 2,436

Daily Inbound Calls Handled

- Jun 10: 324
- Jun 11: 295
- Jun 12: 214
- Jun 13: 437
- Jun 14: 120
- Jun 15: 85

Average Speed of Answer (Seconds)

- Jun 10: 55%
  - Average: 53%
- Jun 10: 21%
  - Average: 25%
- Jun 10: 8%
  - Average: 53%

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Program management dashboards: case investigation

Audience: Program Management and State Leadership

Provides a high-level overview into the scale of case investigation, as well as retention
Program management dashboards: contact tracing

Audience: Program Management at State Leadership

**Scale:**
Has the response built up the infrastructure to meet demand (e.g., sufficient tests, staffing capacity, social support resources)?

**Retention:**
Where is loss-to-follow-up occurring at each stage in the cascade, assuming we aim to retain 90% of identified cases and contacts?

 Shows the scale and retention of contacts, as well as the rate of successful referral to testing.

**CONTACT TRACING CASCADE**
- Total Number of Contacts: 4,995
- Identified contacts in CRM (100%)

**TOTAL CONTACTS BY ZIP CODE**
- Number of Contacts: 2,302

**ATTEMPTED**
- Total: 3,284

**REACHED**
- Total: 2,302

**REFERRED TO TEST**
- Total: 802

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Program management dashboards: care resource coordination

Maps vulnerability and equity among contacts, particularly demonstrating those who need to support to quarantine.
Program management dashboards: demographics

Provides an epidemiological profile of Covid-19, as well as heavily impacted communities.

**Age Distribution**

- Cases: 47,658
  - 80+: 683
  - 70-79: 345
  - 60-69: 450
  - 50-59: 600
  - 40-49: 1,189
  - 30-39: 237
  - 20-29: 332
  - 10-19: 295
  - <10: 193

**Gender Distribution**

- Cases: 1,000
  - Female: 20%
  - Male: 35%
  - Unknown: 45%

**Language Distribution**

- Cases: 200
  - CONTACTS: 0%
  - CASES 50 to 60: 100%

**Race Distribution**

- Native Hawaiian: 5%
- American Indian: 3%
- Black African: 4%
- Asian: 6%
- Other: 2%
- White: 0%

**Hispanic Distribution**

- Cases: 50%
- Contacts: 40%
Measuring speed: how can we link all cross-pillar activities together for a faster response architecture?

**Overall Target:**

Modelling indicates that response cascade must span ≤ 3 days to drive the rate of reproduction (Rt) below 1 and control the epidemic.

![Graphs showing different isolation and contact quarantine scenarios with source citation](Source: Luca Ferretti et al. Science 2020;368:eabb6936)

<table>
<thead>
<tr>
<th>Linkage step</th>
<th>KPI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Testing to Case Investigation</strong></td>
<td>§ Average/median time from test result available to test result upload into case investigation platform</td>
</tr>
<tr>
<td></td>
<td>§ Average/median time from test result available to first investigation call attempted</td>
</tr>
<tr>
<td><strong>Case Investigation to Contact Tracing</strong></td>
<td>§ Average/median time from case investigation completion to contact(s) assigned to contact tracers</td>
</tr>
<tr>
<td><strong>Contact Tracing to Care Coordination</strong></td>
<td>§ Average/median time from case investigation to information shared with care resource coordinator</td>
</tr>
<tr>
<td></td>
<td>§ Average/median time from contact traced to information shared with care resource coordinator</td>
</tr>
</tbody>
</table>
US Public Health Accompaniment Unit

For more information please contact LearningCollab@pih.org

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