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A Tool for Pandemic Influenza Vaccination Campaign Planning

Cristina Carias, PhD
Senior Fellow/Economist, Health Economics and Modeling Unit

National Immunization Conference

5/15/2018

In collaboration with: Immunization Service Division/NCIRD

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Background: Pandemic Influenza

- **Vaccination:** the most effective way to mitigate influenza pandemic mortality
  - H1N1: ~120 million vaccine doses distributed after 5 months of planning
- Future influenza pandemics may require an even more robust and complex vaccination response than in 2009
Need for planning

- Proposed vaccination planning goal for a severe influenza pandemic: 80% two-dose pandemic vaccination coverage within 12 weeks of vaccine availability.

- Public health planners will need to use a variety of vaccine providers sites – *but, which ones?*

- To help public health planners plan for future pandemic vaccination responses, we developed an Excel-based tool.
The Pandemic Influenza Vaccine Campaign Tool – what does it do?

The spreadsheet based tool helps answer the following questions:

- Given a certain combination of provider types and participation rate, how much time will it take to vaccinate the target population?

- If you change the combination of providers engaged how will it change the speed of the vaccination campaign?

- If you consider different providers’ weekly throughputs, how will it affect the vaccination campaign?
Model for Allocation – Assumptions

- The *Pandemic Influenza Vaccine Campaign Tool* assumes that:
  - Public demand for vaccination is high
  - Two vaccine doses separated by three weeks are required for each person in the target population
  - Vaccine administration throughput by provider type or setting is the same each week
  - The total number of individuals fully vaccinated is equal to the number of doses dispensed divided by two.
The Pandemic Influenza Vaccine Campaign Tool – what does it NOT do?

- The Pandemic Influenza Planning Tool was **not designed** to:
  
  - Optimize provider allocation strategies
  
  - Assess staffing requirements for a vaccination setting
  
  - Estimate public demand for vaccination
The Pandemic Influenza Vaccine Campaign Tool – what data are required?

- The Flu Tool requires data on the vaccination campaign
- Characterization of the population
- Characterization of the vaccine provider groups
- Characterization of the vaccine allocation strategy to provider groups
The Pandemic Influenza Vaccine Campaign Tool – how does it work?

- The user inputs data concerning an hypothetical vaccination campaign into the Pandemic Influenza Vaccine Campaign Tool (Microsoft Excel)

- The tool computes results regarding:
  - The speed of the vaccination campaign (e.g. how many weeks it will take to vaccinate 80% of the population)
  - How much capacity from each provider is used
  - The total number of doses administered
### Characterization of the population

<table>
<thead>
<tr>
<th>Population targeted for pandemic vaccination (may be 100% of jurisdiction for most pandemic vaccination campaigns)</th>
<th>Target population size:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaccine coverage targeted:</td>
<td>80%</td>
</tr>
<tr>
<td>Percent of children in the population</td>
<td>25%</td>
</tr>
</tbody>
</table>
Characterization of providers

Define providers: Name, population served and number of providers

<table>
<thead>
<tr>
<th>Vaccine Provider Type or Settings (provide labels for each provider group or setting)</th>
<th>Insert: Total Number of Providers or Sites in Jurisdiction (include even providers or sites not participating in pandemic vaccination campaign)</th>
<th>Age group of population served (click blank cell for each age group served by this provider group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain Pharmacy</td>
<td>28</td>
<td>Adults, Children</td>
</tr>
<tr>
<td>Supermarket Pharmacy</td>
<td>50</td>
<td>Adults, Children</td>
</tr>
<tr>
<td>Mass Merchant Pharmacy</td>
<td>50</td>
<td>Adults, Children</td>
</tr>
<tr>
<td>Independent Pharmacy</td>
<td>50</td>
<td>Adults, Children</td>
</tr>
<tr>
<td>Hospitals</td>
<td>34</td>
<td>Adults, Children</td>
</tr>
<tr>
<td>Doctors Offices and Clinics</td>
<td>25</td>
<td>Adults, Children</td>
</tr>
<tr>
<td>Health Department</td>
<td>4</td>
<td>Adults, Children</td>
</tr>
</tbody>
</table>
Characterization of the vaccine administration strategy

<table>
<thead>
<tr>
<th>Vaccine Provider Types or Settings</th>
<th>Age Group of Patient Population</th>
<th>Total Number of Providers or Sites in Jurisdiction</th>
<th>Percent of Providers or Sites Participating in Vaccination Campaign</th>
<th>Estimated weekly average vaccine administration capacity or rate (see &quot;Help Calculating Capacity&quot; green icon)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain Pharmacy</td>
<td>All Ages</td>
<td>28</td>
<td>60%</td>
<td>470</td>
</tr>
<tr>
<td>Supermarket Pharmacy</td>
<td>All Ages</td>
<td>50</td>
<td>60%</td>
<td>378</td>
</tr>
<tr>
<td>Mass Merchant Pharmacy</td>
<td>All Ages</td>
<td>30</td>
<td>60%</td>
<td>420</td>
</tr>
<tr>
<td>Independent Pharmacy</td>
<td>All Ages</td>
<td>50</td>
<td>60%</td>
<td>331</td>
</tr>
<tr>
<td>Hospitals</td>
<td>All Ages</td>
<td>34</td>
<td>60%</td>
<td>1000</td>
</tr>
<tr>
<td>Doctors Offices and Clinics</td>
<td>All Ages</td>
<td>25</td>
<td>60%</td>
<td>400</td>
</tr>
<tr>
<td>Health Department</td>
<td>All Ages</td>
<td>4</td>
<td>60%</td>
<td>680</td>
</tr>
</tbody>
</table>
Results

Adult Vaccination Coverage at the end of each week
Example

- Jurisdiction A wants to plan their vaccination campaign

- **Question:** *What impact do pharmacies have on their ability to vaccinate the population?*

<table>
<thead>
<tr>
<th>Provider Type</th>
<th>Age of Population Served</th>
<th>Total Available Number of Providers</th>
<th>Weekly Capacity Per Each Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain Pharmacy</td>
<td>Adult</td>
<td>28</td>
<td>470</td>
</tr>
<tr>
<td>Supermarket Pharmacy</td>
<td>Adult</td>
<td>50</td>
<td>378</td>
</tr>
<tr>
<td>Mass Merchant Pharmacy</td>
<td>Adult</td>
<td>30</td>
<td>420</td>
</tr>
<tr>
<td>Independent Pharmacy</td>
<td>Adult</td>
<td>50</td>
<td>331</td>
</tr>
<tr>
<td>Hospitals</td>
<td>All Ages</td>
<td>34</td>
<td>1000</td>
</tr>
<tr>
<td>Doctors Offices and Clinics</td>
<td>All Ages</td>
<td>25</td>
<td>400</td>
</tr>
<tr>
<td>Health Department</td>
<td>All Ages</td>
<td>4</td>
<td>680</td>
</tr>
<tr>
<td>Workplace</td>
<td>Children</td>
<td>30</td>
<td>120</td>
</tr>
</tbody>
</table>
Example

- Jurisdiction A wants to plan their vaccination campaign
- Question: **What impact do pharmacies have on their ability to vaccinate the population?**
  - Option 1: Do not use pharmacies
  - Option 2: Use pharmacies

<table>
<thead>
<tr>
<th>Provider Type</th>
<th>% of adult vaccinees to be vaccinated at provider</th>
<th>% of adult vaccinees to be vaccinated at provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain Pharmacy</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Supermarket Pharmacy</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Mass Merchant Pharmacy</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Independent Pharmacy</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Hospitals</td>
<td>74%</td>
<td>18%</td>
</tr>
<tr>
<td>Doctors Offices and Clinics</td>
<td>17%</td>
<td>4%</td>
</tr>
<tr>
<td>Health Department</td>
<td>4%</td>
<td>1%</td>
</tr>
<tr>
<td>Workplace</td>
<td>5%</td>
<td>1%</td>
</tr>
</tbody>
</table>
Example

- For each option, we will consider the following scenarios:
  - Baseline: Provider participation at 60%,
  - Alternative 1: Provider participation at 70%
  - Alternative 2: Provider participation at 90%
Example: Results

Option 1: do not use pharmacies

Option 2: use pharmacies
Example: Results

Option 1: do not use pharmacies

Option 2: use pharmacies
Example: Conclusions

- Without pharmacies, jurisdiction unlikely to meet vaccination goal
- Even with pharmacies, results suggest high levels of provider participation (~90%) required to meet vaccination campaign goal
Conclusions

- Campaign planning includes understanding the effectiveness of reaching out to different types of providers.

- The Pandemic Influenza Vaccine Campaign Tool can help state policy makers plan an effective vaccination campaign.
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Background: Pandemic Preparedness & Planning

Planning Assumptions

- Pandemic disease may peak early (within 20 weeks of first US case)
- All ages may be equally susceptible to infection and severe disease
- Public demand for vaccination may be high due to severity
- Two doses separated by 21 days may be required

Preparedness Goals

- Jurisdictions should be ready to:
  - Vaccinate 80% population...
  - With two 2 pandemic influenza vaccine doses...
  - Separated by 21 days...
  - Within 12 weeks of vaccine availability
USE OF THE SAN DIEGO IMMUNIZATION REGISTRY (SDIR) TO FACILITATE MASS VACCINATION AMONG INMATES DURING A HEPATITIS A OUTBREAK IN SAN DIEGO COUNTY

2018 National Immunization Conference
May 15, 2018
Danelle Wallace, MPH
San Diego Health and Human Services Agency
Public Health Services
SAN DIEGO REGIONAL IMMUNIZATION REGISTRY (SDIR)

- ELECTRONIC IMMUNIZATION INFORMATION SYSTEM (IIS) USED TO IMPROVE IMMUNIZATION LEVELS

Database for patient medical record retention and mobility

“Vaccine due” forecast to providers (clinical decision support)

Reduces over- or under-vaccination; increases community immunization coverage rates

Confidential, secure – SDIR operates under California Health and Safety Code 120440
SDIR CAPACITY

- 2.5 million patients in SDIR
- 3.21 million people in San Diego County
- 25 million immunizations in SDIR
WHAT IS HEPATITIS?

- Hepatitis means inflammation of the liver
- Can be caused by alcohol, infection, toxins, medication or some medical conditions
- Can be temporary (acute) or long term (chronic) depending on whether it lasts more or less than 6 months
- Viral hepatitis can be caused by Hepatitis A, B, or C
HEPATITIS A OVERVIEW

- Hepatitis A can easily spread from person-to-person
  - Touching objects or eating food that someone with a Hep A infection handled
  - Close person-to-person contact with an infected person
  - Use of recreational drugs, whether injected or not
  - Sexual contact with someone who has a Hep A infection
- May cause liver disease or death
- Average incubation period for HAV is 28 days (range: 15–50 days)
- HAV can live outside the body for months, depending on the environmental conditions
- Vaccination with the full, two-dose series of HAV vaccine is the best way to prevent infection
WHAT ARE THE SYMPTOMS?

- Fever
- Fatigue
- Nausea
- Loss of Appetite
- Jaundice
- Stomach Pain
- Vomiting
- Dark Urine, Pale Stools, and Diarrhea
HEPATITIS A IN SAN DIEGO

Hepatitis A Cases, San Diego County
1994 – 2018*

*Year to date. Prepared by County of San Diego, Health & Human Services Agency, Public Health Services, Epidemiology & Immunization Services, 03/22/18
HEPATITIS A IN SAN DIEGO

- Large increase in monthly cases starting March 2017
- Cases included persons with substance use problems, homeless; few were travelers
- No common sources of infection identified
- Investigations continued
- County outreach to vulnerable populations
- Local health emergency on September 1, 2017
HEPATITIS A IN SAN DIEGO

588 confirmed or probable outbreak cases

500 confirmed outbreak cases from 11/22/16 thru 5/4/18

- 403 (69%) hospitalizations, 20 (3%) deaths
- 402 (68%) male, 186 (32%) female
- Age range 5-87 (mean/average 44)

Suspected Exposure Type

- 198 (34%) homeless and illicit drug use
- 90 (15%) homeless only
- 76 (13%) illicit drug use only
- 167 (28%) neither
- 57 (10%) unknown
Outbreak-associated Hepatitis A cases by onset week

11/1/2016 - 5/4/2018, N = 588*

*Date of specimen collection or report used if onset date unknown; dates may change as information becomes available
PREVENT HEPATITIS A FROM SPREADING

CALL TO ACTION

1. IMMUNIZATION
2. SANITATION
3. EDUCATION
IMMUNIZATION

587
Cases as of 4/4/2018

3,175
Vaccination Field Events
4/7/2017 - 4/4/2018

28,685
Field Vaccinations
3/5/2017 - 4/4/2018

137,979
Total Vaccinations Administered
3/5/2017 - 4/4/2018

Number of Hepatitis A Outbreak Associated Cases with Available Location Data by Zip Code(s)

Case Count by Zip Code:
- 1 - 4
- 5 - 11
- 12 - 18
- 19 - 29
- 30 or More
47* cases (8%) with jail/detention facility exposure reported

- George Bailey – 18 cases with onset/episode dates: 3/12-11/10
- Central Jail – 31 cases with onset/episode dates: 3/12-11/21
- Vista Detention – 4 case with onset/episode date: 4/11/17-3/2/18
- Las Colinas – 7 cases with onset/episode dates: 3/21/17-3/2/18
- East Mesa Detention – 2 cases with onset/episode date: 4/11-7/21

*Total is less that the sum of above due to cases located at more than one detention facility
Push to immunize in jails started in April 2017

- HHSA worked with the jail administrators to conduct mass vaccinations in the adult jails/detention center facilities.

Immunization initiatives

- Central Jail: Monday-Wednesday and Friday
  - Began 7/3/17 and continued through 9/29/17, paused for an all-inmate/multi-facility vaccination initiative 10/2/17-10/17/17, and resumed 10/20/17.

- Vista Detention Facility: Monday, Wednesday, and Friday began 12/6/17
Lists of inmates were electronically queried against San Diego Immunization Registry (SDIR) to assess individual vaccination status.

After an initial comparison of inmates in September 2017, lists were sent weekly to SDIR staff for update prior to immunization events.

In addition, upon inmate intake processing, immunization status was also checked in SDIR daily.
After an initial match at the end of September, lists of inmates were sent to SDIR for Hepatitis A immunization matching checks for two facilities: San Diego Central Jail and Vista Detention Facility.
Number of Hepatitis A Vaccinations Given Per Week at Jails/Detention Facilities: April 2017 - May 2018

Two week all-inmate Multi-facility vaccination initiative
RESULTS

- Of the initial 6,069 list of inmates sent to SDIR for matching in September 2017, 3,237 (53%) were found to have Hepatitis A vaccination records.
- The remaining 2,832 (47%) as well as incoming inmates were offered the vaccination.
- From April 2017 through the start of May 2018, there were 9,443 Hepatitis A vaccinations administered in the jails/detentions facilities.
- Decreased invalid vaccinations after implementation of weekly and daily lists queried against SDIR
  - San Diego Central Jail: Invalid dose rate/1000 doses administered decreased from 126 to 91 (down 28%)
  - Vista Detention Facility: Invalid dose rate/1000 doses administered decreased from 79 to 54 (down 32%)
LIMITATIONS

- Matching algorithms in SDIR cannot find individuals if names are spelled incorrectly, transposed, or if aliases were used.
- Connectivity issues in the jails made computer work challenging.
  - No cell phones allowed.
  - Daily lists as opposed to real-time query of SDIR.
CONCLUSIONS

- Immunization Information Systems (IIS) may be used in Public Health emergencies to assist with mass vaccination campaigns in targeting at-risk individuals.

- Immunization Information Systems (IIS) may be used in Public Health emergencies to prevent unnecessary vaccinations.

- SDIR can be a powerful tool in monitoring immunization status in the community.
CONCLUSIONS

- The use of SDIR during the Hepatitis A outbreak of 2017/2018 in San Diego County has shown its effectiveness in tracking vaccines.

- County planning groups have used vaccination data to target geographical areas.

- Increased monitoring and feedback to providers who give invalid doses offers QI opportunities.
THANK YOU

- Staff at jails/detention facilities
- PHN supervising nurses: Melissa Thun and Catherine Blaser
- PH Admin: Dr. Sayone Thihalolipavan
- Senior Epidemiologist: Jeff Johnson
- EISB Chief: Karen Waters-Montijo
- SDIR staff