Drive-Through Efficiency: How to Prepare for and Execute a Mass-Vaccination Event

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BACKGROUND

- The 2019 Novel Coronavirus (Covid-19) quickly became one of the most critical public health crises of this century.
- As of August 2021, the death toll was over 4.5 million people worldwide.[1]
- In January 2021, the US Center for Disease Control and Prevention (CDC) estimated that 41.1 million Covid-19 vaccine doses had been distributed across the country, but only 22.7 million vaccines had been administered.[2]
- Drive-through vaccination clinics have been successful in previous public health events, including influenza immunizations.[3]
- Covid-19 drive-through testing centers have shown to be superior to traditional models.[4,5]
- Early on, news media outlets reported length wait times and lack of clarity around eligibility and how to get a vaccine. Thus, there was some skepticism about the feasibility of an efficient drive-through mass-vaccination clinic.[6,7]

AIMS

- Design and implement a novel, real-time data collection tool to collect time study data.
- Utilize the collected data to inform the intentional analysis and process improvement strategies to design and operate an efficient Covid-19 drive-through mass-vaccination clinic in Denver, CO that is replicable in other locations worldwide.

METHODS

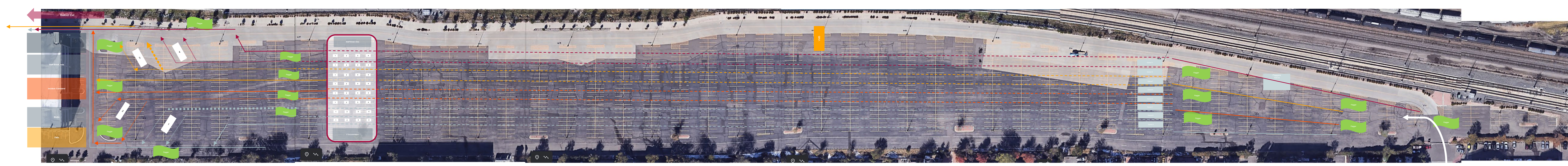
1. Assemble a Diverse Team
   - IT, Logistics, EMS, Operations, Facilities, Traffic and Parking Control
2. Finding a Suitable Location
   - Colorado Rockies Parking at Coors Field
3. Scheduling Appointments
4. Utilizing Process Improvement
   - Initial Pilot Study
   - Intentional Analysis
   - Real-Time Data Collection
5. Close Collaboration with IT Team
6. Contingency Planning
7. Instituting Incident Command System
   - FEMA's National Incident Management System's Incident Command System

PROJECT STAKEHOLDERS

State of Colorado, City and County of Denver, Colorado Department of Public Health & Environment, Denver Police Department, Colorado Rockies, UCHealth, CU Anschutz Medical Campus

INITIAL CLINIC LAYOUT

REVISED CLINIC LAYOUT



VACCINATION CLINIC OVERVIEW

- 5 Vaccine Clinics
  - 1/24 Pilot: 1,000 patients in 2 hrs.
  - 1/30, 1/31, 2/20, 2/21: 5000 patients in 6 hrs.
  - 11,000 patients fully vaccinated
- Data Collection
  - Real-Time Data Collection Tool
    - Google Sheets
  - Process
    - Sample vehicles numbered at entry
    - Observers track vehicles through checkpoints
    - Static timestamps reported in real-time
  - Intentional Experimentation
    - Number of vaccinators
    - Number of assistants
    - Concurrent registration and vaccination
    - Observation design

DATA-DRIVEN ITERATIVE DESIGN

- Intentional Experimentation
  - 53 sec. decrease in vaccination time with student + vaccinators
- Observation Area
  - Reworked observation area to reduce bottlenecks
- Communication
  - Increased message boards to direct traffic
- Registration + Vaccination
  - Queuing Theory: Combining two steps increased coefficient of variation but reduced total time spent in clinic

RESULTS

Initial Workflow	Total Time in Clinic (min)
Minimum	12.02
1st Quartile	20.90
Median	22.40
3rd Quartile	25.22
Maximum	51.05

Revised Workflow	Total Time in Clinic (min)
Minimum	6.63
1st Quartile	9.75
Median	14.37
3rd Quartile	18.15
Maximum	49.62

KEY STATISTICS

- 11,000 vaccines administered
- 834 cars/hour (1,100 cars/hour at peak)
- 22.4 minutes per car including 15-minute observation period with initial workflow
- 14.4 minutes per car including avg. 8.5-minute observation period with revised workflow (observation optional)
- Zero unused doses
- 0.9% patient No-Show Rate
- All appointments filled within 72 hours

DISCLOSURES

The authors of this poster have no conflicts of interest to disclose. IRB Exempt.

LESSONS LEARNED

- Required appointment scheduling
- Patients in the Phase 1 group arrived earlier than scheduled
- Contingency planning to discuss possible pinch points or system failures
- Continuous improvements and design iteration via real-time data collection and post-hoc analysis
- Mass vaccination clinics require heavy staffing burden

LIMITATIONS

- Vehicle tracking
- Transportation barriers
  - Partner with ride-sharing companies
- Susceptibility to inclement weather
- Cost
  - Vaccine doses ~$10/dose more at the drive-through clinic compared to brick-and-mortar clinics

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