Best Practices for Implementation of an Employee-Based COVID-19 Vaccine Clinic: A Model for Future Pandemic Preparedness

Author: **Judith Green-McKenzie, MD, MPH**
Mentors: PJ Brennan MD & Mark Anderson MD
Sponsors: Dean Larry Jameson & Dean Paul Rothman
Collaborators: Barbara Kuter PhD MPH, Kenneth Barnes MBA, Catherine Field-Flowers RN, Kimberly Peairs, MD, Frances Shofer PhD

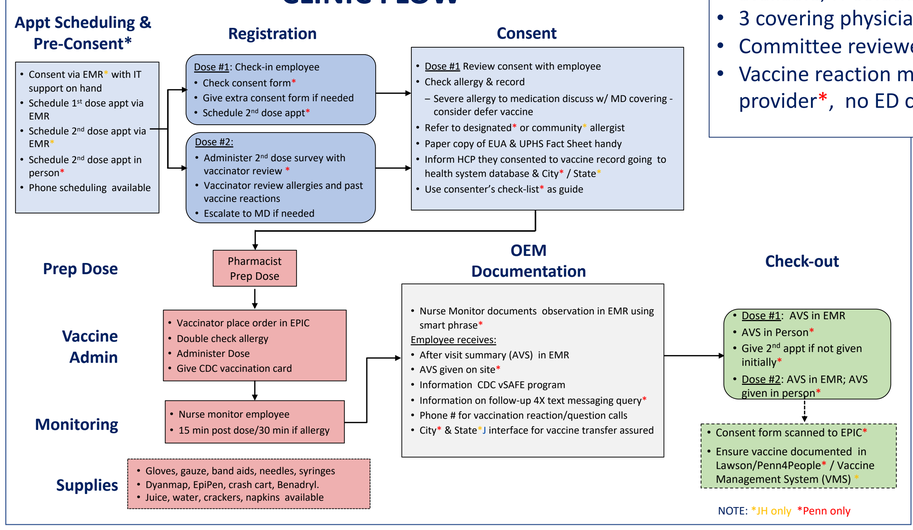
BACKGROUND

- COVID-19 illness - first new occupational disease in a decade
- Declared worldwide pandemic March 11, 2020, by WHO
- Formidable challenge to healthcare organizations with main business reliant on health care personnel (HCP).
- Forced to innovate and strategize on how best to mobilize human and financial resources to vaccinate all employees
- Needing to also maintain core business of efficient, safe, equitable quality patient care

CHALLENGES

- Rapidly establish seamless, efficient large-scale vaccination clinic
- Vaccinate as many employees as possible in short order
- Both health systems geographically dispersed
- Cold chain requirements
- Educate employees on COVID-19 vaccine safety & efficacy
- Address vaccine hesitancy & ensure informed consent
- Develop systems to assess allergic contraindications & post vaccination adverse events
- Address medical and religious exemptions/exceptions
- Equitable vaccine allocation when scarce and to all populations
- Securing adequate staffing for prolonged initiative

CLINIC FLOW



STUDY PURPOSE & APPROACH

Purpose

- Examine how the University of Pennsylvania Health System (Penn) and Johns Hopkins Health System (JH), successfully vaccinated >95% of >80,000 HCP within months
- Identify challenges faced and lessons learned
- Create financial readiness plan for future pandemic preparedness to rapidly administer a scalable module of 10,000 vaccines

Approach

- Reviewed employee vaccine clinic leadership structure & operations for both health systems

BEST PRACTICES

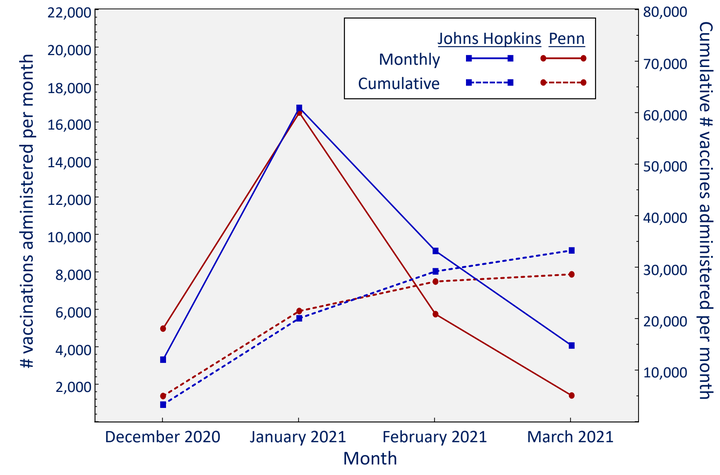
- Vaccine Advisory Committee created to plan rapid, efficient vaccine deployment ~ 1-month before vaccine arrival headed by: CMO* & VP Clinical Operations^
- Committee members were major stakeholders - occupational medicine, pharmacy, infection control, nursing, information technology, legal, human resources, equity, quality *, scarce resource group ^
- Strategic, organized system-wide unified communication & small group meetings on topics such as vaccine education & hesitancy
- Daily meetings discussing vaccine storage and allocation, staffing, medical supplies, legal/ethical issues, IT, security, equity, SOPs, CDC compliance, signage, schedules, staffing, # vaccines administered/ hour, vaccine hesitancy survey deployed 1 month ahead*
- Electronic consent ahead of time; Electronic storage of all SOPs, forms, etc.
- Implementation plan involving pharmacists (prepare dose); Flow manager (ensure forward flow); manage limited vaccine supply; wastage avoidance; EMR to consent^; EMR for scheduling - phone scheduling available; IT solution for employee attestation to data sharing; COVID-19 fund; COVID19 hotline
- 3 covering physicians: on-site */on-call^; Wipeable chairs^
- Committee reviewed allergic reactions with referral to designated allergist* or community allergist ^
- Vaccine reaction management plan: CDC V-safe; refer to PCP, refer same day appt with designated Telehealth provider*, no ED co-pay* ; text message to query symptoms post-vaccine*

RESULTS

- Both administered first dose vaccine upon availability (12/16/20)
- Advisory committees allowed for standardized execution
- Vaccinated 20,000 HCP by 4 weeks, 70% by 4 months, 95% by mandate deadline (9/1/2021*; 11/1/2021^)
- No deaths or work-disability
- Throughput: one every 5-7 minutes* or 5 minutes^

	Staffing	
Vaccinators (vax) (16)	Pharmacists (2 per 300 appts)	IT Support
Registrars (2/day)	Post-Vaccine Scheduler(1 per 3 vax)	Security
Pharmacy Lead (1/day) On Call Physician (1/day	Flow Manager	Clinical Lead (1/day)
Monitoring Nurse/EMT (1 per 6 Vax)	Environment Services Workers	Operations Lead (1/day)

Vaccines Administered to HCP/month



Financial Model to Vaccinate 10,000 HCP

ASSUMPTIONS: *No rent or facility fee; Vaccine administered by nurse or pharmacy technician at RN salary; 3) No compensation for hospital leadership & support; and 4) No additional cost for IT support or on call physician.*

# of Daily Administered Vaccines	Scenario1	Scenario2	Scenario3
Average Vaccination Throughput Time (minutes)	5	7	10
# of Daily Administered Vaccines	1344	960	672
Time required to administer 10,000 doses (in days)	8	11	15
Staffing Cost for 10,000 doses	$ 89,650	$ 123,269	$ 168,095
IT Cost (software, hardware and setup)	$ 2,660	$ 2,660	$ 2,660
Supply Cost for 10,000 doses	$ 207,195	$ 207,195	$ 207,195
Total Cost for 10,000 doses	$ 299,505	$ 333,124	$ 377,950
Total Cost per Person	$ 29.95	$ 33.31	$ 37.79

CONCLUSION/IMPACT

- Successful, safe, rapid delivery of >80,000 COVID-19 doses demonstrates process is practical and scalable in event of a surge or another pandemic
- Multidisciplinary approach with inclusive, intensive planning, standardization, efficient information dissemination, IT solutions, & continuous improvement, can lead to rapid establishment of a future vaccine clinic and should enhance the success rate
- Employee vaccine clinic used as model for patient & community clinics at Penn & JH
- Learnings go beyond COVID-19

Acknowledgments: Sebastian Minor for assistance with the financial model; Patricia Takach, MD for Allergy expertise; Denise Fu, PhD, Jerry Zhang, and Saul Sandoval Estrada, & Tammy Miller for technical support and data gathering; Eve Higginbotham, MD, Lisa Ishii, MD, Jon Links, Ph.D., Katina Williams, MBA and Edward Bernacki, MD, MPH for overall support; The Penn COVID-19 Vaccine Advisory Committee; and the Planning & Vaccine Clinic Teams at Penn and JH for the great teamwork necessary to create an efficient, scalable process.

ABSTRACT: 2022 ELAM Institutional Action Project

Project Title: Best Practices for Implementation of an Employee-based COVID-19 Vaccine Clinic – A Model for Future Pandemic Preparedness
Name: Judith Green-McKenzie, MD, MPH
Institutions: University of Pennsylvania Health System & Johns Hopkins Health System
Mentors: PJ Brennan, MD & Mark Anderson, MD
Collaborators: Barbara Kuter, PhD, MPH, Kenneth Barnes, MBA, Catherine Field-Flowers RN, Kimberly Peairs, MD
Topic Category: Administration

Background:
Coronavirus-19 (COVID-19), the first new occupational disease in a decade, and declared a worldwide pandemic on March 11, 2020, by the World Health Organization, presented a formidable challenge to healthcare organizations whose main business relies on health care personnel (HCP). They had to innovate and strategize how best to mobilize human and financial resources to vaccinate their employees, whilst continuing their core business ensuring efficient, safe, and equitable quality patient care.

Objectives:

1. Examine how the University of Pennsylvania Health System (Penn) and Johns Hopkins Health System (JH), successfully vaccinated >95% of >80,000 HCP within months.
2. Highlight challenges faced and lessons learned.
3. Create a financial readiness plan for future pandemic preparedness to rapidly administer a scalable module of 10,000 vaccines.

Approach/Best Practices:
Guiding leadership: Created a Vaccine Advisory Committee to plan rapid and efficient vaccine deployment approximately 1-month ahead led by: Chief Medical Officer (Penn); VP Clinical Operations (JH)
Committee members: Major stakeholders - occupational medicine, pharmacy, infection control, nursing, information technology, legal, human resources, equity.

- Quality (Penn); Scarce resource group (JH)

Communication: Vaccine education and hesitancy addressed through news tickers, systemwide emails, town halls, 1:1 huddles and small groups. Daily meetings discussing vaccine storage and allocation, staffing, medical supplies, legal/ethical issues, information technology (IT), security, equity, hesitancy, standard operating procedures, compliance with CDC guidelines, signage, and number of vaccines administered/ hour. Meeting frequency reduced over time.

- Vaccine hesitancy survey deployed 1 month ahead (Penn)

Implementation: Pharmacists prepared doses; Flow managers ensured forward flow; Plans created to manage limited vaccine supply during first month and avoid wasting extra doses; Vaccine scheduling through electronic medical record (EMR), phone scheduling available; Employee attestation allowing vaccine data share with employer, state (JH) and City (Penn); COVID-19 fund for operations and hotline created.

- 3 covering physicians: on-site (Penn)/on-call (JH); Wipeable chairs (JH)

Consenting:

- Via EMR with 10-question screen for eligibility, IT support (JH); On-site 1:1 in-person (Penn)

Allergy Management: Committee reviewed allergic reactions.

- Referral to designated allergist (Penn); Community allergist (JH)

Vaccine reaction management: Enroll in CDC V-safe, Refer to primary provider/emergency department.

- Designated provider same day Telehealth appointments, text message for reactions (Penn)

Outcomes:
Both health systems administered the first dose upon availability (12/16/20). Advisory committees allowed for standardized execution, vaccinating 20,000 HCP within 4 weeks, 70% within 4 months and 95% by the mandate deadline (11/1/2021-JH; 9/1/2021-Penn). With no deaths or work-disability, vaccine throughput was one every 7 minutes (Penn) or 5 minutes (JH), the latter due to consent signing through EMR prior to clinic appointment.

Financial model to vaccinate 10,000 HCP			
Minutes/Dose	**Cost**	**Cost/person**	**Days**
5	$303,06	$30.30	8
7	$338,015	$33.80	11
10	$384,619	$38.62	15

Discussion/Impact:
Successful, safe, rapid delivery of >80,000 COVID-19 doses demonstrates that these processes are practical and scalable. With inclusive, intensive planning, standardization, efficient information dissemination, IT solutions, and continuous improvement, this multidisciplinary approach can lead to rapid establishment of a future vaccine clinic and should enhance the success rate. Learnings go beyond COVID-19.