DATA-DRIVEN MOBILE MEDICAL CARE PROGRAM USING THE REPLICATING EFFECTIVE PROGRAMS FRAMEWORK

By

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A CAPSTONE PROJECT

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Abstract

Background

Access to healthcare is, in part, a geographic problem. The use of mobile medical vehicles has shown to have an impact on aspects of clinical care including immunization rates, but limited work has been done with regards to optimizing the location of these mobile clinics.

Methods

Since the beginning of 2017 the Phoenix VA has been operationalizing a mobile medical unit (MMU) to increase access to care to its veteran population. This program, known as the Phoenix VA Data-Driven Mobile Medical Care Program demonstrated a measureable impact on the amount of care given by MMUs. This data-driven care model provides a variety of clinical services including health screening, vaccinations and specialty care clinics. The operations of the MMU in this program initially compared quantity of care able to be given using optimized locations (locations based on density of veterans requiring services) versus non-optimized locations. Do to the great success of the data-driven optimized approach; continued operations have solely used this approach. Frameworks for best translating this evidence-based intervention (EBI) to community-based settings were evaluated. The Replicating Effective Programs (REP) framework developed by the U.S. CDC has been an effective systematic strategy for communicating and disseminating healthcare interventions. The purpose of this capstone is to describe the REP framework and how it can be applied to implement a data-driven mobile medical care program.

Results

The REP framework consists of four phases: pre-conditions, pre-implementation, implementation, and maintenance and evolution. Key components of this framework as applied to a data-driven mobile medical care program include a reliable data layer, care gap analysis, geo-coding of patient-centric health data, and strong leadership.

Conclusion

REP provides a framework well suited for the implementation of data-driven mobile clinical interventions. This framework maximizes fidelity, but also accommodates flexibility in transferring interventions. The importance of implementing EBIs in communities cannot be overstated and the promotion of tools to accomplish this, like the REP, need to continue to be studied and described.

Introduction

Vaccinations are one of the greatest medical achievements and the CDC has declared the use of immunizations to be on of the top 10 public health successes of the 20th century. (1) The incidence and prevalence of vaccine-preventable disease has considerably diminished ever since the availability vaccines with subsequent decreased resulting morbidity and mortality. Despite vaccine effectiveness, it is estimated that between 40,000 and 50,000 adults in the US die from vaccine-preventable diseases every year. (2) US Veterans or no exception, with immunization rates remaining low, despite best efforts. Methods of routine clinical reminders for providers, annual mailings, and standing nursing orders have had variable levels of success. (3) Amongst veterans in the Phoenix metropolitan area the vaccinations rates in January 2017 for flu, pneumococcal and tetanus were 36%, 75%, and 67%, respectively. Those unvaccinated pose a greater health care burden with more frequent acute care episodes (ED visits, hospitalization) as well as more severe disease as compared to those vaccinated. (4)

To increase access to care the Veterans Affairs healthcare system has undergone major restructuring within the last 20 years in creating Community Based Outpatient Clinics (CBOCs) to increase access to care. Barowsky, Chapko and Hedeen have all demonstrated that this community based care has provided comparable care to VA medical center clinics with improved access. (5-7) Though improved access for some, many veterans still live more than 10 miles away from any VA clinic, a distance as demonstrated by Gibson to impact on repeat care. (7) Kelly reported that the influence of travel time and travel distance on negative health outcomes could not be ruled out.

(8) In a 2-year retrospective study, Soares argued the use of GIS (geographic information systems) data can assist in health location planning and spatial accessibility of telemedicine services. (9)

Despite the knowledge that reducing the geographic distance to care and the utility of leveraging GIS data for this purpose, there is limited work to demonstrate its effectiveness in improving access to care. The work done at the Phoenix VA was the first to demonstrate that optimizing the location of Mobile Medical Unit (MMU) vehicles using patient specific geographic data had a positive significant impact on clinical care including immunization rates. This was later developed into the Phoenix VA Data-Driven Mobile Medical Care Program, and is the program that is described here. (10-13)

Overview of the Phoenix VA Data-Driven Mobile Medical Care Program:

This program was initially created as a pilot program for evaluation. The question being asked was if data analytics together with geo-mapping were effective tools to improve access to clinical care, namely immunization services. The initial setup was the creation of 6 vaccination clinic events, 3 were held at existing VA community based outpatient clinics (CBOCs), locations that are not otherwise optimized, and 3 were put at data-driven optimized locations. The location optimized approach utilized geo-mapping and data analytics to determine minimize the weighted sum distances of all targeted patients and arrive at coordinates for the most optimal location for the MMU to be placed and for the vaccination clinic to be held. Weighting was based on veteran vaccination need. Results from this pilot program demonstrated up to a 2.4 fold increase in immunization rate after location optimized vaccination clinics with the MMU

vs. location non-optimized vaccination clinics, in addition there were 4.0% more veterans attending at the optimized locations verses non-optimized. This pilot program developed into the ongoing Phoenix VA Data-Driven Mobile Medical Care Program, which continues on but solely using the location optimized approach, has expanded services beyond vaccinations to include specialty and non-specialty based mobile clinics as well. Within the initial 6 months of this program's implementation over $500,000 of funding was gained by the Phoenix VA due to this program's being able to reconnect veterans to the healthcare system. As a result of this program's success, three other VA locations across the country are looking to implement their own versions of this program.

Although this program has found much success in its first implementation, it is well known that the process for translating evidence-based interventions (EBIs) is often difficult and is generally not well documented. This is common across EBIs and across frameworks and is especially true for under-served communities. (14) An exception might be the efforts surrounding the Replicating Effective Programs (REP) framework, to tackle the problem of getting EBIs into community settings. REP was created to help the translation of healthcare programs developed in academic and research settings to be able to be offered into community-based settings through an implementation protocol, and has found some level of success. (15) As such, it seems fitting to adapt and translate the Phoenix VA Data-Driven Mobile Medical Care Program into the REP framework to inform future practice.

Purpose

The purpose of this capstone project is to describe the Phoenix VA Data-Driven Mobile Medical Care Program using the Replicating Effective Programs (REP) framework to help facilitate the transfer of these health services and the methods by which they are delivered for implementation in community-based settings.

Methods

To achieve this goal and describe this innovative approach to mobile medical care so that others could replicate this work, we evaluated several frameworks and determined that the Replicating Effective Programs Framework (REP) was the most appropriate. Other frameworks considered were the RE-AIM Framework (Reach, Effectiveness, Adoption, Implementation, and Maintenance), Precede-Proceed Model, Dynamic Sustainability Framework, PRISM (Practical, Robust Implementation and Sustainability Model), and CFIR (Consolidated Framework for Implementation Research). (16-20) Implementation frameworks differed by their domain, comprehensiveness of factors, strategies and evaluations. REP was selected since it is a framework that spans all implementation stages, is more prescriptive in nature, allows for flexibility (i.e. local customization), but also detailed on strategies and evaluations. The REP Framework developed by the U.S. CDC has been an effective systematic strategy for communicating and disseminating healthcare interventions. The purpose of this capstone is to describe the REP framework and how it can be applied to implement a data-driven mobile medical care program. Leadership was found to be a crucial aspect to a successful

implementation, as such Kotter's 8 Principles of Leadership provided beneficial guidance, and is therefore described in detail as it relates to this program. (21)

Overview of the REP Framework:

The Replicating Effective Programs (REP) framework was developed by the CDC and was first used to package and disseminate HIV interventions to be implemented in community-based settings. Since then it has been used to translate various types of interventions. (15-16) Generally, it is a systematic approach to translate evidence-based interventions, with a focus on being faithful to the core program elements but allowing for changes to maximize its fit in new organizations or populations. As illustrated in Figure 1 (Found in: TABLES, FIGURES, and APPENDICES), the four phases of the REP framework are: pre-conditions, pre-implementation, implementation, and maintenance and evolution. This is the framework that will be used to describe the Phoenix VA Data-Driven Mobile Medical Care Program.

Results

After reviewing with program staff, each component of the REP framework was outlined in detail to reflect the decision-making that occurred for the Data-Driven Mobile Medical Care Program.

1. Pre-Conditions

During this phase, the organization and program leaders must determine if gaps in outcomes or quality are present and understand the contextual setting that needs to be in place. This includes understanding the need for an intervention and the barriers to

putting an intervention into action. The program must be packaged into easily accessible tools, so they can be readily implemented.

Identify Need:

The American healthcare system with a realigned focus to care for the health needs of populations and not just episodic care has put a focus on identifying care gaps. This data-driven mobile medical care program was developed as an intervention to bridge these gaps in care. At the onset of the precondition phase and critical to the initiation of this program, an institution must identify the gaps in care of the population in which they serve. These gaps can be practice based, institutionally based, arising from outcomes data, quality data or performance measures (i.e. HEDIS, SAIL, Star Rating). At the Phoenix VA we identified that we had room for improvement with regards to our vaccination rates as seen in our VA SAIL (Strategic Analytics for Improvement and Learning Value) measures. Low vaccination rates were just one of the gaps identified in our needs assessment, with other preventative health measures identified as well as need for greater specialty care (i.e. diabetic care, PM&R services).

Data:

Capabilities to access, extract, transform and analyze data with regards to population of interest are of paramount importance and a potential barrier. This precondition involves not only the infrastructure of electronically maintained clinical and demographic patient data, but also the technical expertise of data analysts to be able to extract this data. Although the VA has maintained electronic health records for decades, this is not true of many health systems especially in underserved communities.

Even in health systems with newly implemented electronic records, often the informatics and data analytics expertise in these settings is unlikely matured, contributing further to data access and its use as a barrier. In our program we were able to resource the VHA patient database being able to extract clinical data and demographic data on our patients to identify vaccination need based on protocol criteria, age, if patient already received or refused vaccine, if living; but also have patient address data for geo-mapping functionality. The maturity of the informatics department at the VA helped overcome this potential barrier.

Geographic Distribution:

Another precondition is to determine and evaluate the geographic distribution of those members with the care gap. At the core of this program is to identify clustering of patients based on their address and who all share the same care gaps. The next step is to bring services to fill these gaps at an ideal location for patients in each cluster. To evaluate geographic distribution of care needs the data is extracted as described in the above data precondition. To geo-map patient location, an ability to map address to the latitude and longitude location is necessary. From this information a heat-map of patient density weighted for number of care gaps each patient has, provides the ability to visualize the care needs of your population. This heat map provides an ability to start planning mobile care clinic locations. Refer to Figure 2 and Table 1 in TABLES, FIGURES, and APPENDICES section for examples of heat-map generated for our program and tabular output. From this density map, areas of greatest need are identified from which you determine your target population radius by the number of patients you have the

capacity to treat at during your mobile clinic. Our program typically found to have show rates between 10 and 15 percent and a capacity to treat up to 200 patients per clinic, thus we set our target population radius to accommodate roughly 1500 patients. Our next step was to determine the most optimal location for the MMU for our clinic; this was done by taking our target population (~1500 patients) and minimizing the weighted sum distance of all patients based on the longitude-latitude of their address. The output of this calculation would give us a specific longitude-latitude spot on the map that would be the least amount of cumulative travel if all patients targeted were to come to our mobile clinic. We would then coordinate and partner with other organizations to park our MMU at the nearest parking lot to that location.

The geo-mapping visualization and data analysis could be built using data analysis programming by technical personnel within your organization, but with time and expense. To gain access to the software we developed for our intervention as described, please contact the author. There is minor integration that is needed to run the software locally consisting of database access and mapping of a few data elements, which would require security compliance review and some IT personnel engagement depending on your organizations policies.

Mobile Medical Unit Intervention:

A mobile medical unit (MMU) or other similar vehicle as the mechanism to implement your intervention is another precondition. Our MMU is a 42-foot RV (recreation vehicle) with an exam room, refrigeration units and medical supplies. The benefit to using an MMU is being able to deliver the care services in a standardized

fashion regardless of location. The MMU facilities being able to go to an optimal location within our patient clusters to minimize patient travel distance to care and optimize patient access. As a corollary, to this point, when our MMU was predisposed we were able to partner closely with non-for profit community centers and set-up a portable clinic and deliver healthcare services in that manner. These events were further from our optimal location and therefore not ideal from a logistical standpoint but we were still able to provide a similar level of access and care.

Another precondition is the operations surrounding the MMU. The VA has the positions of Facility Mobile Medical Unit Program Manager, Mobile Medical Unit Team Lead and Facilities Manager. The roles and responsibilities for these personnel are detailed in Figures 3, 4 and 5, respectively. In addition, have your organization to well support these roles is critical to program success.

Communication Strategy:

The nature of this program having a fully data-driven mobile medical care precludes the benefit of having established locations or an established schedule week after week, or month after month. As a result a comprehensive and effective communication strategy is a necessity. Our program reached out to veterans to notify them of dates, times, location, services to be provided and inform patients of care they were in need of, in several different ways. We used mailings utilizing mail-merge to be able to deliver personalized letters letting the veteran know exactly what services (i.e. vaccinations) they needed. We also used human and computerized calling to notify them of upcoming events. And lastly we used messaging via the VA patient portal, myHealtheVet, to notify

patients. The Phoenix VA has not had an established texting program with patient consent and thus this was not an option for us. As a precondition a mechanism would be needed to perform each of these functions. We had personnel able to perform mail-merge from our target population lists, with other personnel able to send out patient portal messages, and we were contracted with an automated calling system to send out over a thousand calls per day.

Program Leadership:

As the program develops, it necessitates an established governance structure. This will ensure there is a clarity regarding reporting, and necessary to effectively manage operations. Strong institutional support is necessary for guidance and for funding. It is understood that many of the services provided are reimbursed at relatively low rates and the true value these interventions provide are seen in reporting institutional level outcomes, but even more significantly was to reengage veterans who have not been seen in years. This reengagement increased VA funding for our site by over $500,000 by the number of veterans we were able to reintroduce into the healthcare system.

It is useful to use the Kotter's 8 Principles of Leadership and to incorporate this type of leadership and those who have had experience with these principles into your intervention. (21) Here we touch upon these principles and how they applied to our data-driven mobile medical care program, with much overlap with the over-arching REP framework:

1. Create Urgency: This involves extensive internal dialogue that is honest and convincing. It is useful to find the business case for change to drive the

importance of taking action. For our deployment the urgency was based on the time of year we initiated the vaccination program. We started in January, with influenza vaccine being part of the care delivery we needed to move quickly. The business case surrounded the reported quality metric data surrounding low vaccination rates amongst our population and the institutional directive to improve these rates.

2. Form a Guiding Coalition: A strong project team is needed to carry out the changes the organization wants to make. This is best carried out by employees of different departments, facilitating the role of department champion to drive change and move things forward for a project that involves a variety of healthcare service lines. Our program involved ambulatory service line, primary care, nursing administration, telehealth, pharmacy, informatics and facilities. Having a diverse team is critical for success.
3. Develop a Vision and Strategy: A clear vision is necessary to help everyone on the team to understand and be able to communicate that vision throughout the organization. This also gets each member invested in the vision. Our vision to improve the Phoenix VA vaccination rates by optimizing our use of resources to vaccinate as many veterans as we could gave the team a shared vision.
4. Communicating the Vision: This is perhaps the most important step. We achieved this by using our team members of various departments to take ownership of the vision and disseminate the importance of the vision throughout the organization.

5. Enabling Action and Removal of Obstacles: This can greatly undermine the vision and compromise the project. Barriers and obstacles should be identified as early as possible and removed or remediated in a timely fashion. We encountered resistance among clinical leadership to have nurse driven vaccination protocols that were independent of clinician orders. Gaining executive leadership, afforded by and an effective vision communication process, affords the ability to drive the needed governance steps forward to put into place the nursing vaccination protocols that were needed for this program to be successful.
6. Generating Short-Term Wins: This feeds the process, with success pushing the vision forward. Within our team we had short-term goals for our program. When we achieved those goals it was a key motivator to keep pushing the program forward and created a great platform to advertise the successes inside and outside the organization that furthered the goal of sharing the vision.
7. Hold the Gains and Build on Change: It is important to identify the non-value add steps of the process to keep looking for improvements. When the process is refined, more energy and resources can be devoted to those steps in the process that most contribute to the programs success. We faced challenges with vaccine refrigeration with the units on our vehicle, which required the vehicle generators to be running several hours before they were used. In removing this step by using portable refrigeration that can be brought into the MMU we were able to have less staffing at off hours and carry many more vaccines to our vaccination clinics.

8. Anchor Changes in the Culture: This is perhaps the most difficult step to find success, since it relies on the success of all the previous steps. This is when the vision becomes a part of the organization core. Values, standards and ultimately the culture of the organization shifts to fully embrace the vision and the changes that have taken effect. The success in both clinical outcomes of quality measures and demonstrated value for the business, allowed our program to have personnel designated in full time positions to run the program. This demonstrated significant organizational support and allows for the program to further grow.

Barriers:

There are potentially numerous barriers to implementation. Below are list of ones we had faced in the course of setting up our program:

- Cost
- Resources
- Personnel allocation
- Leadership
- Community partnership
- Recruiting personnel from other departments
- Working with department managers, to borrow employee's for events
- Data access

- Clinical alignment in having appropriate nursing protocols in place and ensuring scope of practice for providers matches the clinical services that will be provided
- Securing and operationalizing an MMU vehicle
- If not MMU secure; creating strong community partnerships to use their facilities
- Legal team, to allow for cooperative use of private land of community partners, addressing legal liability issues

Intervention Package:

Below is a list items included within the Data-Driven Mobile Medical Care Program Intervention Package. These items can be made available upon request.

- MMU Program Management Manual: This manual details the authority and policies for the health system to effectively manage the operations of the MMU fleet. This includes program purpose, background, definitions and responsibilities of personnel.
- Event Checklist: This checklist is a detailed listing of all tasks that need to be performed for preparation prior to mobile clinic event, morning of clinic event, during clinic, and at end of day after clinic event.
- Information Forms for the Events: Forms for patient to complete focused on care services provided that day.
- VIS (vaccine information statements): Stock with multiple copies for each vaccination offered.
- Sample Event Day List: This is a patient list with associated care gaps patient was contacted for.
- Patient Contact List: mailing, calling, patient portal lists
- Facility Manager Checklist: Checklist focused on MMU operations (gas, cleaning, etc.)

2. Pre-Implementation

This consists of creating a program-working group. This group refines the intervention package, and prepares the training, technical plans and materials. The intervention is piloted for feedback and further refinement. The phase involves initiating dissemination of the plan, as well as identifying organizations for partnership.

Program Working Group and Stakeholders:

Identification of the program working group and key stakeholders are an important process in the pre-implementation phase. Our project working group consists of the program manager, PACT team coordinator, vaccination clinic personnel, telehealth coordinator and informatics data analyst. Expectations need to be set for the team and each team member. Specifically, for our program, informatics expectations were to have a working dashboard to identify high needs areas and those veterans that require vaccinations and geo-mapping expertise. Tele-health expectations involve coordinating parking of the mobile medical unit with outside landowners, and ensuring technology onboard the unit is functioning properly. The PACT team ensures personnel to staff the unit during events and acquisition of vaccinations from pharmacy on day of the event.

Stakeholders are a crucial part to any program. Our key stakeholders were the project/program manager, project team with members as listed above, VA management, the veteran, PACT nurses, tele-health team members and owners of community parking lots. A stakeholder analysis is provided in Table 2. This analysis provided a strategic view of team member strengths and weaknesses in the landscape of the institution. It also helped identify interests of all stakeholders, potential program

disrupting issues/ barriers, key people of information distribution and phase focused stakeholder participation. Stakeholder engagement throughout the program is a key contributor to its success.

Team communication is also critical to program success. It must be planned and well organized to ensure program goals achieved and the pre-implementation phase is successful. Our team communication strategy is outlined in Table 3, and involved the following topics: dashboard design, MMU preparation, event date negotiations, event debrief.

Stakeholder communication is additionally important to the success of the program. We ensured with were in regular scheduled communication with our stakeholders. This included: the facility CHIO, Chief of Staff, VA Hospital Pentad, the Veteran, PACT Nurses, MMU Drivers, Data Analyst, Parking Lot Owners. Our stakeholder communication strategy is outlined in Table 4.

Refinement of Intervention Package:

In refining the intervention package of the pre-implementation phase we prepare our population data for intervention and further refine our target population for intervention. Below is further detail with regards to how we identified our population and identified care gaps.

Target Population Identification:

The population to be targeted was first identified by selecting patients that have been enrolled in the Phoenix veterans affairs (VA) health care system (HCS). This list of patients was obtained from the VA regional data warehouse, of attributed patients

assigned to the Phoenix VA facility. This list of patients was then filtered to remove patients that are deceased based entries with the same title. The list was again filtered to remove test patients based on invalid social security numbers. The list was again filtered to include patients with a primary address zip code that exists within the state of Arizona. The list was again filtered to identify those patients that are considered to be active within the Phoenix VA HCS, based on having had an appointment with health system within the past 2 years, assigned to a health care team (either PACT [patient aligned care team] or mental health team) or having a scheduled future appointment. This criterion is standard across the organization and across the VA as a whole. Thus those patients not seen within the two years, not assigned to a health care team and without a future appointment were removed from the list. The process in which your organization filters your population and normalizes the data may differ, but the above highlights a general process to consider as you refine your queries from your patient database.

Immunization Need Determination:

From this list of patients, vaccine need was determined for four vaccines: influenza vaccine, pneumococcal conjugate vaccine 13, pneumococcal polysaccharide vaccine 23, and Tetanus-diphtheria-acellular pertussis. Later a fifth, zoster vaccine was included. A criterion for need was based on inclusion criteria as per Phoenix VA nursing protocol for each of these vaccines. Protocols for vaccination administration can be found in Figures 8 and 9.

Geo-Coded Vaccination Need:

Vaccine need, based on number of vaccines due (not number of veterans), was mapped based on veteran address, creating a heat map for the state of Arizona for every patient enrolled at the Phoenix VA. Please see Figure 2 for example illustration. The heat map provided a visualization tool to identify areas across Arizona with the highest concentrations in gaps of care for our population. This was a useful to focus efforts when analyzing care gap density and to verify the results obtained from this analysis corresponded to the "hottest" areas on the map. Further data analysis, using software made available by the authors, allows for identification of optimal coordinates for mobile care clinic, increasing patient access by minimizing the travel distance for all patients in any given hot spot area.

Rank Care Gaps:

The purpose of this step is to distinguish primary and secondary care gaps. Primary care gaps are those that are of high clinical or institutional importance that warrants a certain level of resources in order to close the gap. Secondary care gaps are of lower priority, that doesn't warrant designated resources, but still need to be identified as to not miss opportunities to close these gaps when encountering the patient for other reasons. To capture gaps other than primary purpose; primary would be vaccination, secondary are depression, homeless screenings, smoking cessation. Only primary care gaps were used for weighted ranking of patients in our data analysis, not secondary care gaps.

Technical Plans and Materials:

In Figures 6 and 7(a, b) are our Work Breakdown Structure and Program Gantt Chart, respectively. These detail the tasks, task ownership and a general schedule for key program pre-implementation and implementation tasks. These plans were disseminated across our team and as needed to key stakeholders.

3. Implementation

After the intervention package is finalized, staff undergoes further training as part of the implementation phase, to carry out the program and so they can begin monitoring and evaluating the program. Feedback and evaluations are used to improve and refine the intervention, including reaching out to end-users.

Training of Program Staff:

Staff were fully trained on the technical documents as part of the intervention package as part of a 4-hour session. Training was conducted by the facility MMU Program Manager and Mobile Clinic Nurse. This ensured nothing was overlooked when preparing mobile vaccination clinic events, during events and how to close out events. This was especially important that all clinical staff knew in detail the vaccination protocols, especially in cases where questions of whether to give or not give a vaccine arose. Also, there needs to be procedures in place for when exceptions occur or if rare adverse events from vaccination occur. Many of these procedures were taken from existing policies from our CBOC clinics. Training is critical for a successful smooth running clinic.

Evaluation:

During our vaccination clinics we had feedback surveys given to our patients after we saw them. This provided an opportunity for our end-users to give us constructive feedback for what they did or did not like about their experience. We also would have event debrief meetings after each mobile clinic event, which provided an opportunity for staff to share things that worked and didn't work, which helped further refine the process. Having bottled water and the MMU tank filled with gas were feedback that was definitely appreciated. Here there is also an opportunity to evaluate location optimization strategy, and determine if there are other factors that influence patients showing to the clinic, such as time of day of clinic, what day of the week, age of patient, etc. In addition, we performed a more formal risk analysis to identify potential threats to the program as a whole. This is detailed in Table 5.

4. Maintenance and Evolution

The focus in this phase shifts to sustainability. This is done with collaboration of the working group and researchers. The intervention is adapted to contextual factors, with adjustments to financing and organizational structure to sustain the intervention. The return on investment is determined so the intervention can be used more widely. Also, further support should be considered, such as hiring and training new personnel. We were able to secure strong administrative support after the success of our program, which facilitated full time employees to be hired to run and manage the program. Scalability has been a consideration as three other VA facilities with MMUs have

approached our program adopt our practices for them to get greater use out of them and expand increase their access to care.

Discussion

The use of data analytics and geo-coding to implement a mobile clinical care facility such a mobile medical unit can greatly increase the access to care, as demonstrated by immunizations services in this program. The REP framework provided a useful construct to help package the data-driven mobile medical program for further distribution. Though likely the REP will provide a straightforward translation into other VA facilities, likely this will prove useful when adapted to non-VA mobile medical clinics that are part of healthcare institutions or have an electronic patient database. I found three notable strengths in using the REP. First, the REP helped to elucidate the several preconditions necessary to undertake the program, and potential barriers, most are data orientated and could often be a no-go to proceed if not met. Secondly, the benefit of a working group with strong communication and from varied departments that will play a key part to the success of the program. Lastly, the REP helps to reveal the importance of program evaluation and refinement, to achieve successful program that will not only be sustainable but scalable.

Limitations to the REP framework largely involve the significant amount of time and resources that are needed to implement fully, it's phased approach that may hinder its adaptability to some extent. For instance, for the data-driven mobile medical care program a potentially long and time consuming task is the creation of the database reports or connections to geo-mapping location optimization software. This process

could potentially proceed after the data pre-conditions are met, but while securing MMU personnel are still in process, so that the implementation of the entire program might not be delayed. Adaptability to more agile-like processes might be beneficial.

Conclusion

The REP framework provides a systematic process for packaging and delivering evidence based interventions into the community. It also allows for recipients to evaluate if an intervention will work at their institutions for their populations prior to investing valuable time and resources. The REP was found to be an appropriate framework for the Data-Driven Mobile Medical Care Program and I am sure it will prove beneficial as it is used for the implementation of this program at other institutions.

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TABLES, FIGURES, and APPENDICES

Figure 1: Phases of the Replicating Effective Programs (REP) Framework

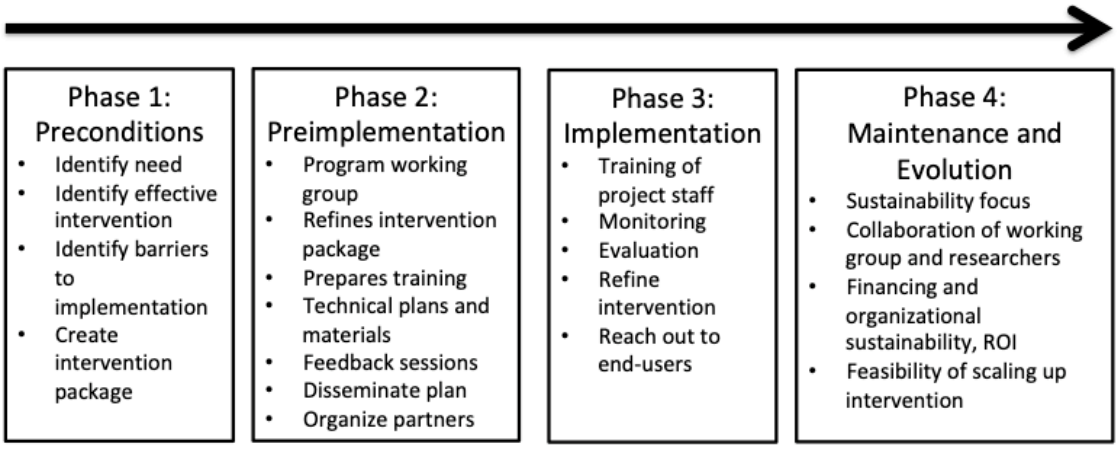

Figure 2: Heat-map of patient density and care need

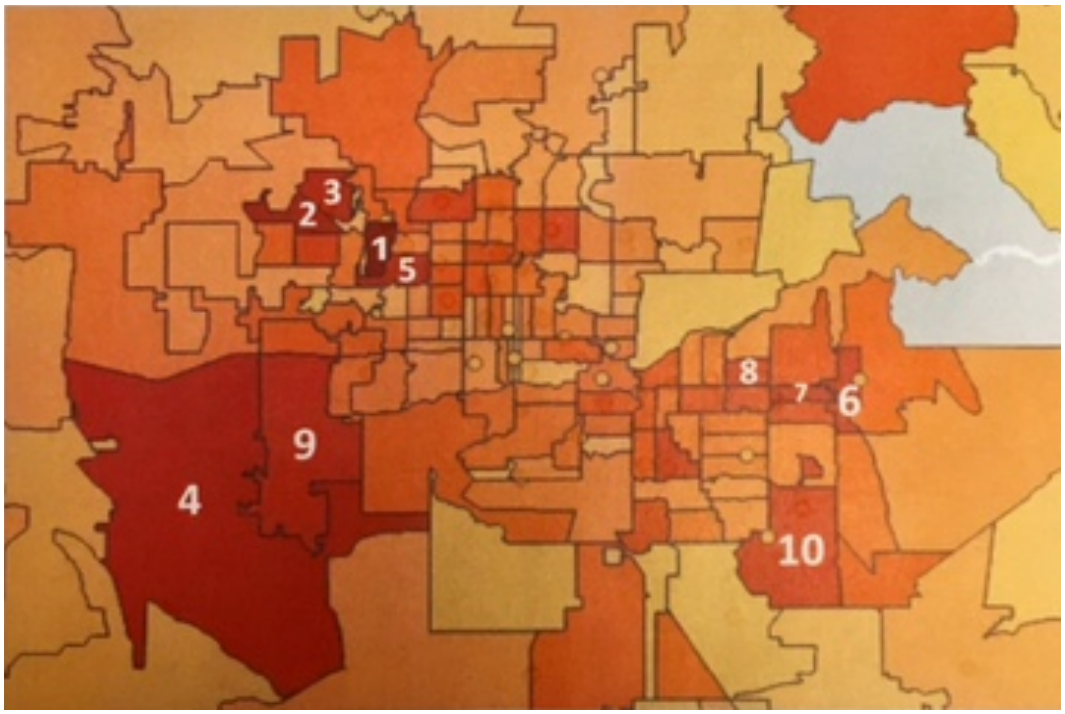

Figure 3: Facility Mobile Medical Unit Program Manager Role and Responsibility

Facility Mobile Medical Unit Program Manager. The Facility Mobile Medical Unit Program Manager, or designee, is responsible for:
(1) Ensuring that all MMU guidelines and standards established by this directive are implemented for each MMU within the facility catchment area.
(2) Ensuring that local plans to establish new MMUs and scheduled routes take into account network-wide analyses of current and projected Veteran demographics, determine relative priorities, and identify evidence-based areas of greatest need.
(3) Establishing local policy to ensure the MMU complies with all Federal, State, and local operating requirements based on the specific type of unit and service delivery area in which the unit will operate.
(4) Establishing local policy to ensure providers comply with all Federal, State, and local practice requirements for each jurisdiction of the service delivery area in which the unit will operate.
(5) Ensuring VA information security is protected during MMU healthcare services delivery.
(6) Developing a scheduled route for each MMU operated by the facility while ensuring the scheduled route accounts for maintenance.
(7) Ensuring that all appropriate permissions and permits have been secured to operate at a service location.
(8) Maintaining and publishing the scheduled route and services delivered for each MMU operated by the facility in the VAST database and on the organization's website.
(9) Ensuring the MMU has the appropriate clinic profile for each primary service category in the VA-approved scheduling application.
(10) Ensuring the MMU has the appropriate workload mapping for each primary service category in the VA-approved workload capturing system, so all clinical services provided are appropriately captured in the record.
(11) Establishing local staffing plan consistent national staffing standards for each primary service category provided by a MMU.
(12) Ensuring national requirements for MMU staff competencies are tailored to reflect state statutes and local regulations.
(13) Ensuring all staff physically serving on a MMU are trained and appropriately licensed to fulfill their assigned role on the MMU.
(14) Ensuring all clinical staff physically serving on a MMU are trained and appropriately licensed to provide clinical care on an MMU.
(15) Establishing supply inventory levels and replenishment and rotation schedules for single use and expendable medical equipment and supplies.
(16) Establishing a plan to maintain the environment of care within the MMU in accordance with VHA Directive 1608, Comprehensive Environment of Care (CEOC) Program, published February 1, 2016, or subsequent policy.
(17) Establishing a vehicle and staff safety plan in coordination with the Facility Safety and/or Security Officer(s) that conforms to the national guidance on vehicle maintenance and safety and information and physical security.
(18) Coordinating a preventive maintenance plan for the biomedical equipment on the MMU that conforms to appropriate national guidance on MMU and biomedical equipment maintenance, in coordination with the Facility Biomedical Engineer.
(19) Coordinating with the Facility Information Security Officer to ensure that the MMU is incorporated into the facility's Information Security Plan and Program.
(20) Maintaining records of all the plans, service location agreements, staff training records, and operating licensures for all MMU staff.
(21) Developing and implementing a location-specific service contingency plan.
(22) Develop and implement unit staff skills training and assessments.
(23) Monitoring and reviewing MMU performance to provide a recommendation to facility leadership on the need to suspend MMU operations, if for any reason the unit is not able to ensure the delivery of consistent, high-quality care in accordance with VA regulations, policies, and procedures.
(24) Ensuring that a MMU Team Lead is assigned to each MMU trip.

Figure 4: Mobile Medical Unit Team Lead Role and Responsibility

Mobile Medical Unit Team Lead. The MMU Team Lead is responsible for:
(1) Performing pre-deployment assessment of the unit before leaving the parent facility on a travel day.
(2) Ensuring the site-specific service area is appropriate to support the needs of the MMU as well as the services being provided.
(3) Leading the team in all activities needed to convert the MMU from travel mode to service delivery mode and from service delivery mode back to travel mode.
(4) Reporting any issue to the facility Mobile Medical Unit Program Manager while travelling and supporting delivery of mobile healthcare services.
(5) Implementing facility site specific contingency plans in the event of an unplanned development.

Figure 5: Fleet Manager Role and Responsibility

Fleet Manager. The VA medical facility Fleet Manager is responsible for:
(1) Maintaining the MMU and on-board mechanical equipment in conformance with the manufacturer's and other applicable guidance on vehicle maintenance and safety.
(2) Ensuring all drivers meet appropriate state driver's license and associated medical requirements.

Figure 6: Work Breakdown Structure

Design Mobile Medical Unit Vaccination Project

1. Create Immunization Dashboard
    a. Define population cohort parameters
    b. Obtain vaccination protocols
    c. Create SQL Queries to populate dashboard
2. Obtain List of patients enrolled in patient portal, MyHealtheVet (MHV)
3. Preparation of Mobile Medical Unit
    a. Install refrigerators
    b. Check data connection
    c. Install AED
    d. Stock with Epi-Pens
4. Contact legal department regarding permissible parking locations
5. Identify six target zip codes
6. Prepare Cohort for Event
    a. Extract data for first event
    b. Define Cohort of unimmunized patients from first target zip code for first event
    c. Create Mailing list for Cohort
    d. Create Patient Portal List for 1st Cohort
    e. Create Call List for Cohort
7. Prepare Parking Location for Event
    a. Contact owner of Event parking lot
    b. Negotiate Date for Event
    c. Obtain agreement between VA and parking lot owner
8. Messaging
    a. Create messaging for: letters, patient portal messaging, call script
    b. Get messaging approval from privacy officer
9. Contact Cohort for Event
    a. Create Mail-merge letter for Cohort
    b. Print letters for Cohort
    c. Deliver letters to mail room
    d. Create patient portal distribution list for 1st Cohort
    e. Send Messages via patient portal to Cohort
    f. Distribute Call List to callers for Cohort (call list those who don't have patient portal)
    g. Call Cohort
10. Hold Event
    a. Power to refrigerators
    b. Secure vaccination from pharmacy
    c. Drive to parking location
    d. Setup tables and signage
    e. Secure remote computer access
    f. Administer vaccinations
    g. Document vaccinations
    h. Breakdown vaccination event
    i. Drive back to VA
    j. Fill vehicle up with gas
    k. Return unused vaccinations to pharmacy

Figure 7a: Gantt Chart

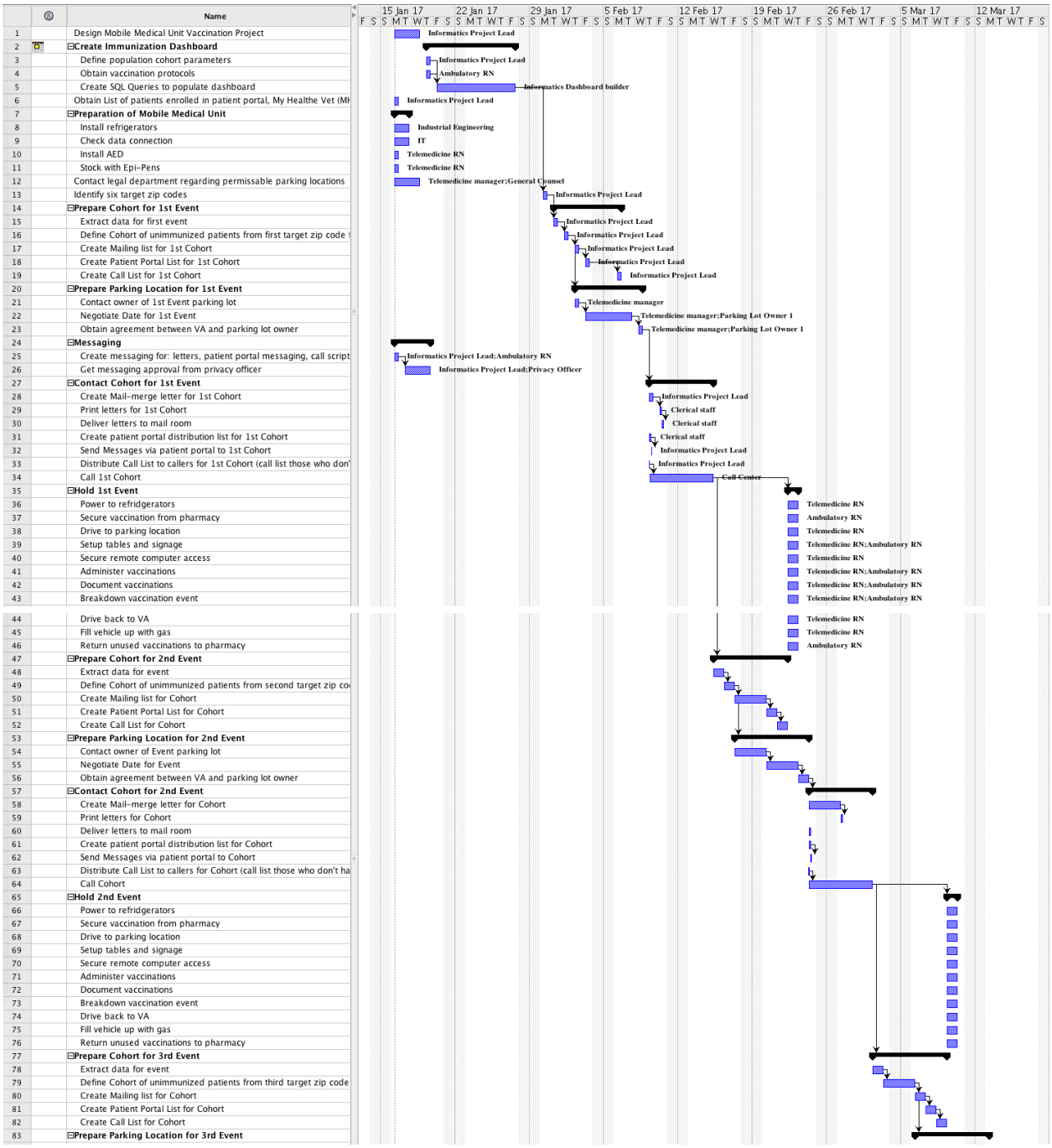

Figure 7b: Gantt Chart (Zoomed)

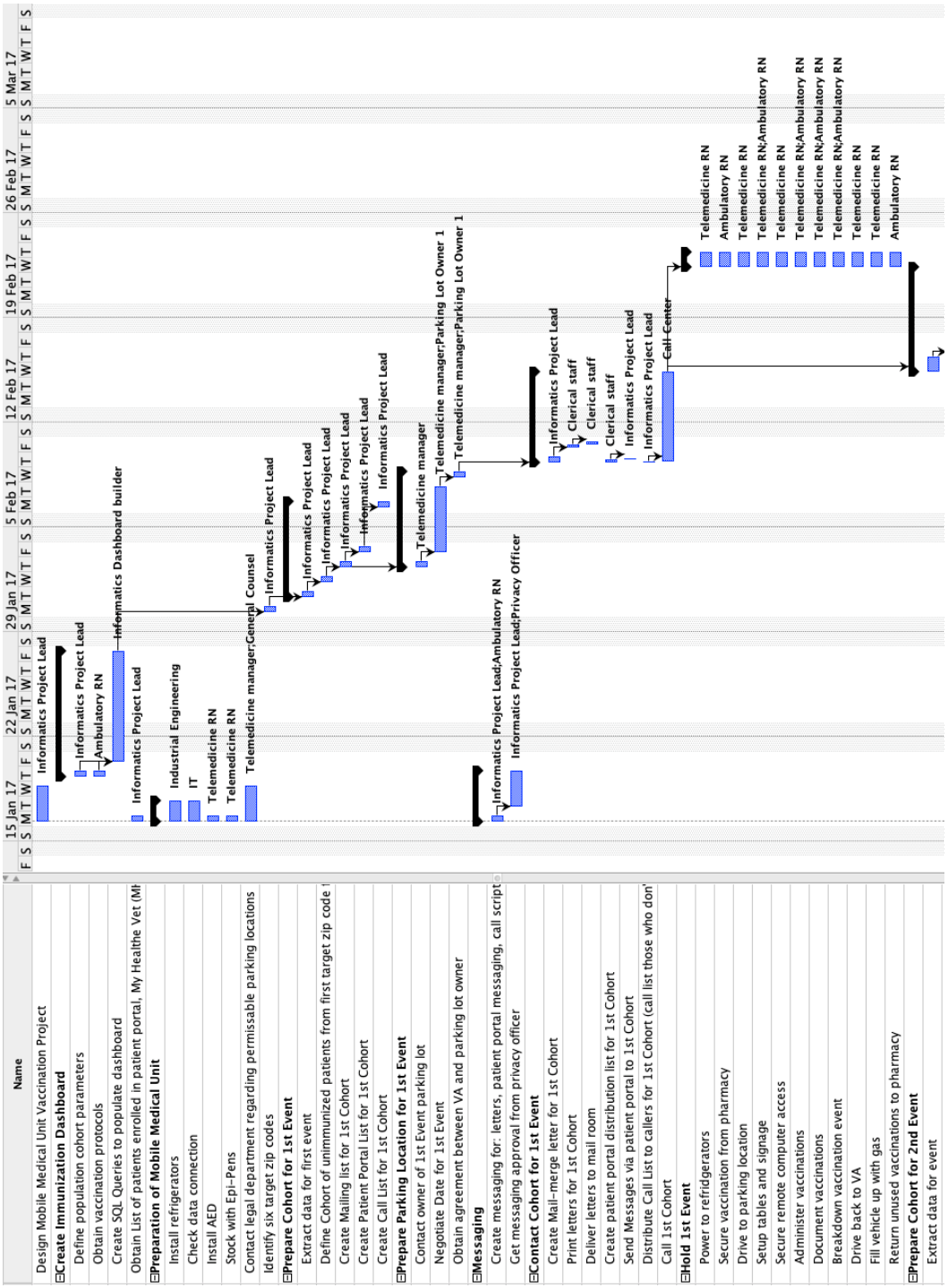

Figure 8: Nursing Vaccination Protocol for PCV13

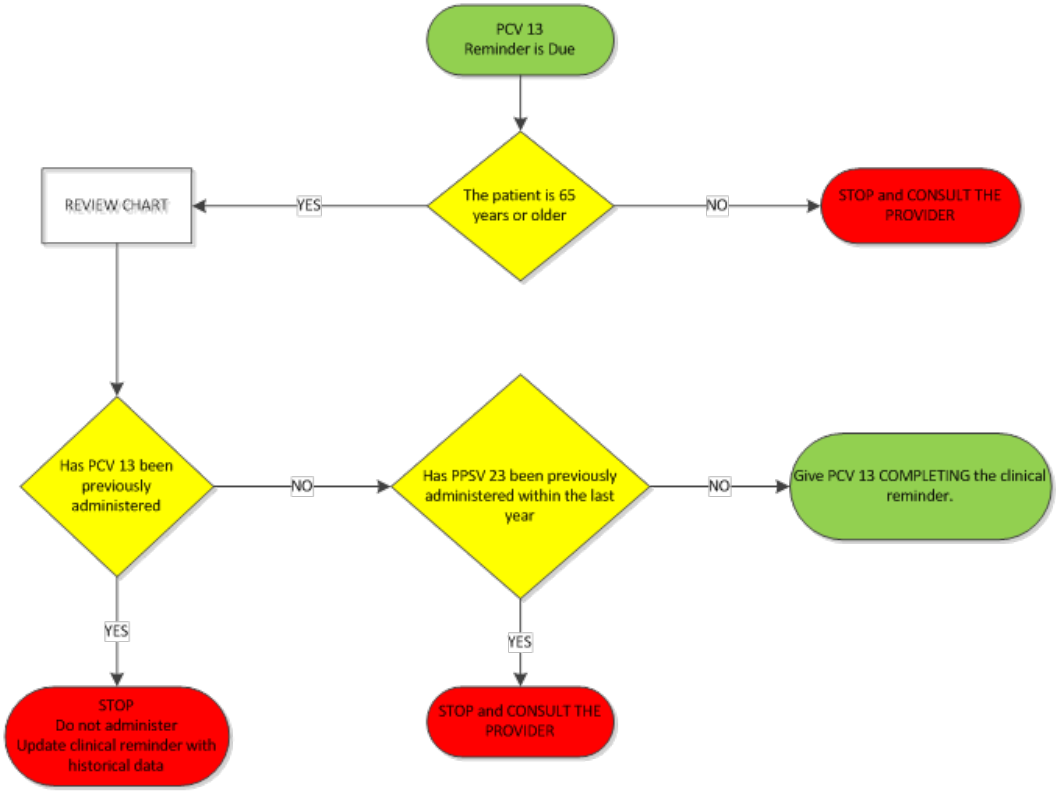

Figure 9: Nursing Vaccination Protocol for PPSV23

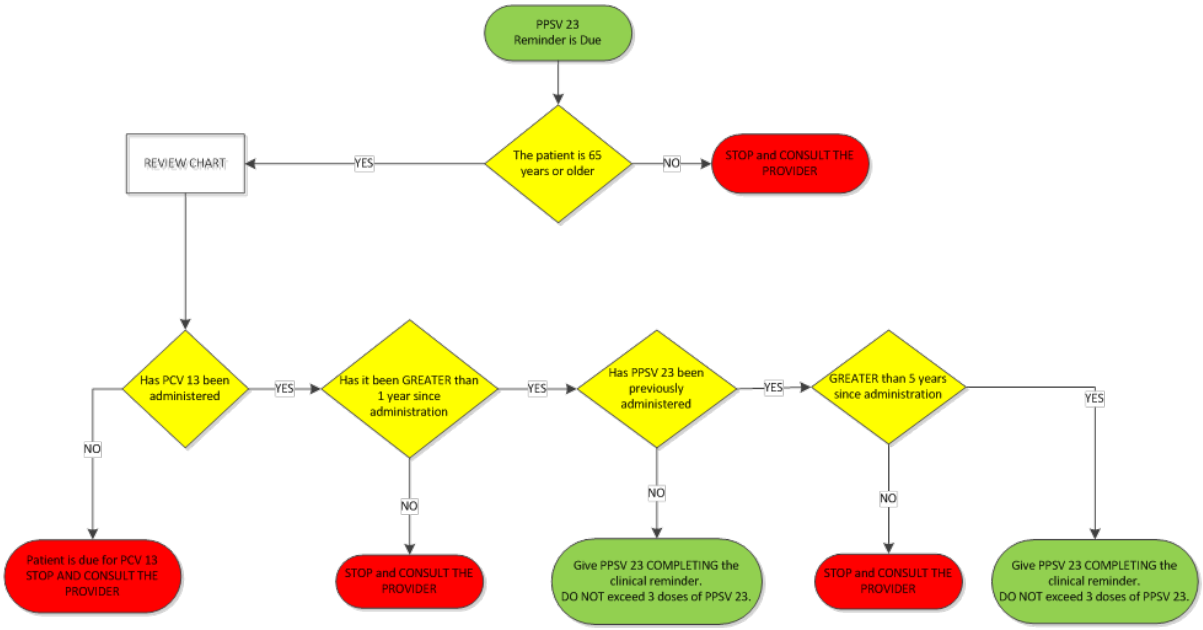

Table 1: Tabular representation of patient density

Rank	Name of City	Zip Code	Count
1	Sun City, AZ 85351	85351	1140
2	Surprise, AZ 85374	85374	966
3	Sun City West, AZ 85375	85375	899
4	Buckeye, AZ 85326	85326	886
5	Peoria, AZ 85345	85345	883
6	Apache Junction, AZ 85120	85120	875
7	Mesa, AZ 85208	85208	869
8	Mesa, AZ 85205	85205	825
9	Goodyear, AZ 85338	85338	809
10	Queen Creek, AZ 85142	85142	804

Table 2: Stakeholder Analysis

Stakeholders Analysis

Stakeholder	Identify	Expectations
Project Manager	PM	Expected to recruit team members, with team plan project and define its scope, identify stakeholders, designate responsibilities of team and stakeholders, foster a cooperative team environment, keep those involved vision clear of goal of project is to help veterans and improve veteran vaccination rates
Project Team	PACT team coordinator, vaccination clinic personnel, Tele-health coordinator, Informatics data analyst	Specifically, Informatics expectations to have a working dashboard to identify high need areas and those veterans that require vaccinations. Tele-health expectations involve coordinating parking of the mobile medical unit with outside landowners, and ensuring technology onboard the unit is functioning properly. The PACT team ensure personnel to staff the unit during events and acquisition of vaccinations from pharmacy on day of the event
Management	CHIO, chief of staff and VA hospital pentad	To ensure the investment in the mobile medical unit and the financial cost of running it would provide a greater quality of care to the veterans it serves, and improved reputation of the facility with this outreach mechanism, and thus a greater value to the customer, the veteran
The customer	The Veteran	Expected to show for these events and respond to messaging given, with willingness to receive indicated vaccinations.
Outside land owners	Owner of community parking lot	Expected to have willingness to partner with VA to help veterans, promoting them as veteran friendly business
PACT vaccination team members	PACT nurses	These nurses traditionally work at a VA facility, expected to have willingness to travel with MMU once or twice per week for several weeks
Tele-health team members	MMU driver	Expected to drive MMU to designated event locations and maintain vehicle readiness for future events, as well as help coordinate events.

Table 3: Team Communication Strategy

Team Communication

Type	Frequency	Medium
Dashboard Design	Every other day	Tele-conference
MMU Preparation	Weekly	Email
Event Date Negotiations	As needed	Email
Event Debrief	Bi-monthly after event	Meeting

Table 4: Stakeholder Communication Strategy

Stakeholder Communication

Stakeholder	Information Needs	Frequency	Medium
Chief Health Information Officer	Status Updates	Weekly	Meetings
Chief of Staff	Status Updates	Monthly	Emails
VA Hospital Pentad	Status Updates	Monthly	Meetings
The Veteran	Outreach Announcements	Prior to event	Letter, telephone call, patient portal
Parking Lot Owner	Date/ Location Negotiations	Multiple times prior to event	Telephone, email
PACT Nurses	Event schedule	Bi-monthly prior to event	Email
MMU Drivers	Event schedule	Bi-monthly prior to event	Email
Data Analyst	Ongoing dashboard adjustments	Ad-hoc	Email

Table 5: Program Risk Analysis and Evaluation

Risk Analysis

Risk Type	Risk
Quality Risk	Not providing an added value to the veteran by providing mobile vaccination clinics, not more convenient, potentially just as easy to go to a nearby VA facility or partnered pharmacy for vaccine, and ultimately not impacting quality of care by decreasing vaccination rates
Technical Risk	Failure of communication on mobile medical unit to document vaccination administration into the EMR (CPRS). Also methods of communication to notify veterans of vaccinations event could fail, automated calling system, letter processing center, patient portal secure messaging (MyHealtheVet)
Financial risk	Money expenditure with no impact in vaccination rate which would otherwise be seen, also cost of sending letters, telephone call costs, and other project costs could cause entire project to canceled if budget is overrun.
Resource risk	Parking locations could not be secured or vaccinations from pharmacy could be limited.
Organizational risk	VA reputation and veteran satisfaction, lack of proven benefit of care given in a potential more expensive care modality, could divest management and stakeholder support and also cause cancellation of project due to lack of participation.