International Journal of Studies in Nursing; Vol. 3, No. 1; 2018
ISSN 2424-9653 E-ISSN 2529-7317
Published by July Press

A University-Community Problem Based Mobile Health Unit Solution: Indirect and Direct Measures of the Impact of Rural Health in the Central Valley

Cyndi Guerra[1], Cheryl Hickey[2] & Elizabeth Villalobos[3]

[1] Assistant Professor, School of Nursing, California State University, Fresno, United States

[2] Associate Professor, Department of Physical Therapy, California State University, Fresno, United States

[3] Researcher, MA, Fresno, California, United States

Correspondence: Cyndi Guerra, Assistant Professor, School of Nursing, California State University, Fresno, United States.

Received: January 2, 2018 Accepted: January 24, 2018 Online Published: January 30, 2018

doi:10.20849/ijsn.v3i1.298 URL: https://doi.org/10.20849/ijsn.v3i1.298

Abstract

The development of a medical home is an integral component in decreasing health disparities among disenfranchised communities. Mobile health clinics contribute to increasing access to health services, promoting health education, and improving care coordination especially among low income rural patients. This problem based solution, case study describes the experience of a University-community based partnership in the development of a mobile clinic model within ambulatory Community Medical Health. In 2014, a university based, nursing program initiated, mobile health unit was created to offer basic medical care to rural health areas in the Central Valley. The following case describes how this was accomplished, what outcomes were tracked and what lessons were gleamed as a means of improving the process for future endeavors or as a model to others looking to develop a similar project. Over the past two years the mobile health unit has shown the increased need for medical services as evident by an increase of patient visits in these areas. In addition, implementation results and considerations are discussed including key process indicators, limitations and future model directions.

Keywords: problem based solutions, mobile unit, health disparities, central valley

1. Introduction and Background of Problems and Needs

1.1 Demographics and Prevalence Rates of Central Valley Underserved Population

California's Central Valley is known for its agricultural abundance. According to the Fresno County Farm Bureau (FCFB) Fresno County contains 1.88 million acres of farmland. Additionally, agriculture operations overlay just about half of the county's land base of 3.84 million acres (FCFB, 2017). Along with the benefits of living in an agricultural haven, come the realities of living in a highly rural Valley. An estimated 310,000 people reside in 525 rural Central Valley communities. Sixty-four percent of these households in San Joaquin Valley's disadvantaged rural communities are also defined as low income (Flegal, Rice, Mann, & Tran, 2013). In particular, rural populations are affected by health care provider shortages in greater numbers. Riordan and Capitman (2006) explain, many areas remain exceedingly below the national recommendations of patient to provider ratio. Indications that the trend in a shortfall of health care providers will continue, unless other interventions strategies are put in place. Furthermore, the state will suffer a primary care clinician shortfall over the next 15 years with the hardest hit areas in the Central Valley, Central Coast and Southern Border areas (Spetz, Coffman and Geyn, 2017).

Lower ratios of providers per capita is only part of the issue. Physical access to services as another major obstacle within rural health areas (Healthcare Disparities and Barriers to Healthcare, 2017). Although the Central Valley has one of the state's highest poverty rates and poor health related outcomes, the valley receives substantially less funding from the state and federal monies than other California counties with a comparable population (Capitman J.A., and M.I. Bengiamin, n.d.). Therefore, less funding potentially translates to less available services and programs.

1.2 Fresno County

In a report by the Fresno County Department of Health (2013), in comparison to the state average, Fresno County's chronic disease morbidity rates do not parallel the rest of the state. The percentages range between a 0.4% difference to as high as a 4% difference in populations suffering from chronic health conditions. Within Fresno County, 17.3% of residents have asthma compared to 13.7% statewide, 6.3% have heart disease compared to 5.9% statewide and 28.5% have high blood pressure compared to 26.2% statewide. In addition, 3.0% have had a stroke compared to 2.3% statewide, and 3.4% have been diagnosed with lung disease other than asthma compared to 2.0% statewide.

Conflicting data is also present but it is possible that it can be easily explained. For example, in Fresno County, 14.5% of residents have high cholesterol compared to 22.1% statewide, 7.6% have diabetes compared to 8.5% statewide, and 6.4% have had cancer compared to 8.7% statewide. Despite these more favorable numbers, The Fresno County Department of Health (2013) report lists additional details that reflect why Fresno County residents may be a high risk group.

Fresno County residents present differently in terms of chronic disease rates. Controlling for race, income, gender, and physical location reveals wide variations in the amount of disease within a community. Therefore, simply stated, certain less affluent populations face much poorer health outcomes than do their more affluent counterparts. It is these groups that may suggest higher more favorable percentages in some categories. The areas where Fresno County may seem better may not reflect the scattered rural areas which may actually be much worse than the population as a whole, and skewing is occurring because of the more affluent areas that are higher than the overall state numbers.

Additional research conducted, supports findings of chronic disease rates that afflict the Valley more-so than the state average. In a needs assessment by Healthier San Joaquin County Community (2016), the assessment reports on chronic disease and mortality. San Joaquin County is northern Central Valley. The report indicates that overweight and obesity are strongly related to stroke, heart disease, some cancers and type 2 diabetes. These chronic diseases represent leading causes of death nationwide, as well as among residents of San Joaquin County. Diabetes is of particular concern as San Joaquin County has one of the highest rates in California for diabetes mortality.

Further details suggest gender specific Valley resident's trends. Diabetes, heart disease, and high blood pressure are all more prevalent in males residing within Fresno County. Cancer, however, is more prevalent in females (Fresno County Department of Health, 2013).

Hughes, Mull, & Shaheen (2006) cite that one in three Fresno county residents have a diagnosis of at least one chronic diseases and it is most likely that this figure is higher in the surrounding rural setting. Moreover, cardiovascular disease is the mostly cited chronic disease, and it is known that at least 27% of the Fresno county residence have this disease.

More recent data, indicates that the most-costly medical spending based on percent of gross national product (GNP) are patients that present with three or more chronic condition classified as: hypertension, hyperlipidemia, arthritis, diabetes. Those patients who have a clustering of three or more chronic disease likely represent 62% of medical spending (Hughes, et al., 2006). Additionally, one of the most significant cluster finding is diabetes, hypertension and hyperlipidemia.

1.3 Shortage of Healthcare Providers That Care for the Central Valley Residents

The Central Valley has one of the state's lowest care provider-to-patient ratios. It is estimated that there are approximately 48 primary care physicians per 100,000 residents. This ratio is extremely low compared to the state recommended level of primary care providers (60-80) per 100,000 residents. The San Joaquin region is also not equitable to the state standards for specialist providers with approximately 80 specialists per 100,000 residents, while the state's recommendation is 85-105 per 100,000 patients (Esqueda, 2016).

Many health disparities exist in rural populations that differ from inner cities. Mainly, access to care due to a shortage of physicians and primary providers, along with transportation issues in rural communities. In addition, those living in rural areas are exposed to environmental hazards from agricultural pollution of air, water and soil. Rural populations have a higher rate of poverty, and lower educational levels. Multicultural ethnic groups with a variety of languages, often have limit access to health information and information on preventative health care.

One solution to address not only a variety of problems but also the varying magnitude that these problems create in rural communities, is broader and less conventional utilization of allied care providers. For example, the Institute of Medicine (IOM) identified nurses as being vital, to collaborating with physicians, healthcare professionals and

health agencies, in redesigning health care and reaching goals of the Affordable Care Act. In order to meet healthcare needs of the rural communities and their complex needs, all levels of nursing practice will need to play a role, including baccalaureate trained and advanced practice nurses (IOM, 2010).

2. Increased Utilization Tied to Decrease Risk

The Centers for Disease Control and Prevention (CDC) reports chronic disease, such as health disease, diabetes and cancers are responsible to 7 of every 10 deaths among Americans each year and accounts for 75% of the nation's health spending. These chronic diseases can be largely preventable through close partnerships with your healthcare team, or can be detected through appropriate screenings, when treatment works best. Eating healthy, exercising regularly and receiving preventive services are examples of ways Americans can stay healthy, avoid or delay the onset of disease, keep disease that they already have from becoming worse or debilitating, lead productive lives, and reduce medical costs (CDC, 2017). In short, preventing disease before it starts is critical to helping people live longer, healthier lives and keeping healthcare costs down. Preventive services can also help those with early stages of disease keep from rapid more costly progression. Increase utilization of available services rather it be screens, education or preventative treatment all lead to better health outcomes.

In response to both the prevalence and chronic disease rates, the risk factors associated with the underserved population of the Central Valley, and due to the stark shortage of healthcare providers, the mobile unit was proposed as a problem based solution by the nursing faculty at a university within the Central Valley. Nursing faculty at the Central Valley University were motivated to proceed with this initiative in response to statements made by the profession. In the face of the shortage of healthcare professionals, the IOM reiterates its support to build on the capacity of skilled nurses. Specifically it is emphasized that rural areas and underserved areas will require far more outpatient care centers with specialized nurse practitioners (IOM, 2010). This pattern is accentuated by the fact that there are far fewer licensed physicians in rural areas such Central Valley. In an article from St. George University, medical expert and former Dean of the University of California Riverside's School of medicine, Dr. G. Richard Olds details the doctor shortage epidemic, "the state will need 8,243 additional primary care physicians by 2030" (2017, para. 6) Also noting that the Central Valley and inland Southern California are "underserved areas" (2017, para. 15).

In response to assertions of this nature, the mobile unit was seen as both an economically feasible and attainable, real solution, to address underserved population health disparities.

2.1 Steps to Developing the Mobile Unit as a Problem-Based Solution

According to Hughes, et al., (2006) research indicates that there are common barriers noted across underserved population. Studies also suggest there is support for Mobile Unit strategies to address these barriers. Building on current research that identifies barriers and suggests how the mobile unit addresses these barriers, the mobile unit initiative elaborated on these points relevant to the Central Valley population (Table 1).

Table 1. Barriers to health services in low-income rural communities and methods used by the mobile clinics to address them

Barriers Present in Underserved Population	**Mobile Unit as a Problem Based Strategy to Address Identified Barriers**
Lack of access to personal and public transportation	Mobile unit is based at the community
Increased travel time/distance to access a care setting	Location is usually walking distance
Lack of providers equals lack of appointments	Patients are seen without an appointment
Established insurance required	No insurance is necessary
Office visit fee or co-payment	Pro bono services / Free medical services
Language barriers create poor communication between the provider and the patient	Multilingual providers decrease stigma in seeing a medical provider
Language barrier create less effective cultural competency	Nurse/NP student providers are bilingual furthermore they are potentially seen as cultural brokers because they predominantly residents of the Central Valley

Source: Hughes, et al., (2006)

The following mission statement was developed considering both barriers and Mobile unit strengths to address the barriers. The mission statement indicates, Given the nature of the rural population, lack of healthcare providers, risk factors for certain health incidence and the need to educate healthcare professionals, the mobile unit initiative is a prime strategy for residence of the rural Central Valley communities. Associated with this mission statement, four key areas were identified as needing development: grant development, stakeholder development and Procedural Setup of Clinical Flow and Protocols.

Step 1: Grant

The initial step for developing a mobile unit was securing funding support. The Mobile unit was proposed as a problem based solution for addressing complex needs of the Central Valley's rural communities. Following research into funding sources, it was determined that the Song-Brown base funding was a unique fit for this project.

The Song-Brown grant was a State of California sponsored grant aimed at addressing specifically, rural health care needs. What made this grant a perfect fit for this problem based solution were several factors. The context of the problem with underserved health needs was well suited to the grant, first, by establishing compelling need: The Central Valley has the highest proportion rural communities with under-addressed health care needs in the state. Second, by addressing a specified manner for alleviating access issues in the population: the ability of the mobile unit to access the patient versus the patient going to the service. Third, by showing the likelihood of successful outcomes: increase utilization over time with respect to basic health needs including such as screening and education. Finally, this problem based solution fit the grant by showing integration of next generation nursing providers as a long-term solution: the proposal teamed university faculty, interdisciplinary professions and nursing student from the baccalaureate and graduate levels.

Step 2: Stakeholders

Determination of identified stakeholders in the mobile unit process was based on elements designated to be covered in the mobile unit experience. These elements included; research, policy (organization, and financing of healthcare), ethics, professional role development, theoretical foundations of nursing practice, human diversity and social issues, health promotion and disease prevention. Based on these parameter stakeholders ultimately included were: interdisciplinary professors, students from multiple educational levels across several disciplines, rural communities, perspective patients and, indirectly, the university institution and professions (for curricular enhancement). The mobile health units provided services in rural areas while offering unique clinical/practicum experience for students of all health disciples at the university. This project included didactic, online and clinical experiences to facilitate student understanding of rural health issues and their ability to respond to them. Standards for these curricular components were guided by the Essentials of Master's Education in Nursing, developed by the American Association of Colleges of Nursing (AACN).

Step 3: Procedural setup of clinical flow and protocols

A streamlined process was developed to track the volume of patients (which ranged from approximately 30-50 patients per outing) over a 4 to 5 hour period each time. Staffing included approximately ten Bachelors of Nursing (BSN) nursing students, 2-4 Masters of Nurse or Nurse Practitioner (NP) students and 1-2 nursing faculty with Doctorate of Nurse practitioner (DNP) terminal degrees. An off-site physician was also employed by the grant and was available at every outing by phone.

The physical clinic was set up by three to four key stations: 1) consent and information, 2) vital signs screening, 3) Laboratory testing and physical exam, and 4) when supplies permitted, a preventative care station disseminating flu shots. As the unit became established other healthcare providers were added with additional stations that included: physical therapy for balance screening, dietetics students for dietary education, psychology students for mental health screening, kinesiology students for education on the benefits of exercise and parks and recreational student for education or leisure opportunities for improved quality of life. Only station three took place in the mobile unit which contained two examination rooms. Stations one and two took place outside in the proximity of the unit. Stations one through three were executed by the BSN nursing students and at station for physical assessments and Laboratory results were interpreted by the NP students under the supervision of a faculty. If a problem with laboratory or on assessment was noted NP student would follow-up with education and/or referral when needed. At the conclusion of the visit, patients were given a copy of their laboratory values and summary to share with their primary care provider or in cases of significant concerns. These concerns were quantified as: anything quantifiable as needing emergent care. Examples most often noted included, glucose level indicating emergency action and blood pressures in extreme elevated ranges putting the patient at risk for an immediate possible cardiac event. Common non-emergent care situation included elevated cholesterol levels; confirmed and

borderline anemia incidences; and elevated Glycosylated Hemoglobin testing indicating confirmed uncontrolled diabetes.

2.2 Outcomes Associated with a Mobile Unit Problem-Based Solution

2.2.1 Direct Outcome: Improved Access

Data collected from the composite and long-term time lapses showed increase utilization over time with episodic spikes related to key community events (Figure 1). Outcomes were tracked with respect to basic health needs including screening for confirmed hypertension, diabetes and cholesterol level or risk prevalence for any of these chronic conditions, were tracked for a 2 year period. The abnormal levels were tallied by percentages during each semester for three semesters. The outcomes from each semester showed abnormal lab values on patients screened ranged from 29% to 47%. It was noted that in numerous patients their results yielded two existing abnormal values, which indicates probable co-morbidities (Figure 2).

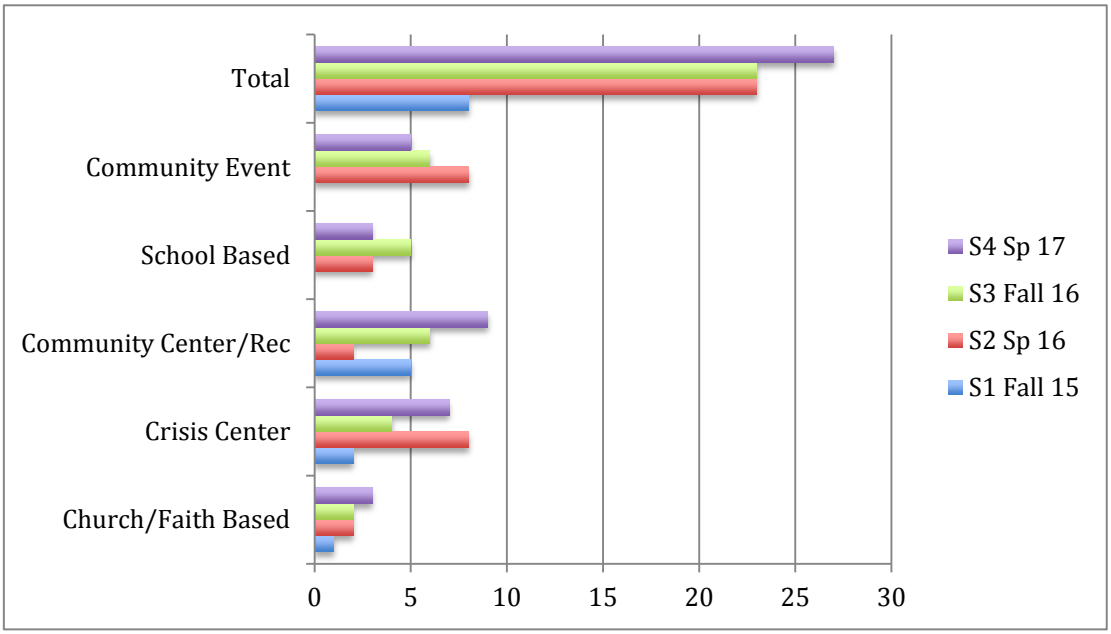

Figure 1. Stakeholder: serves recipients increase of a two-year period

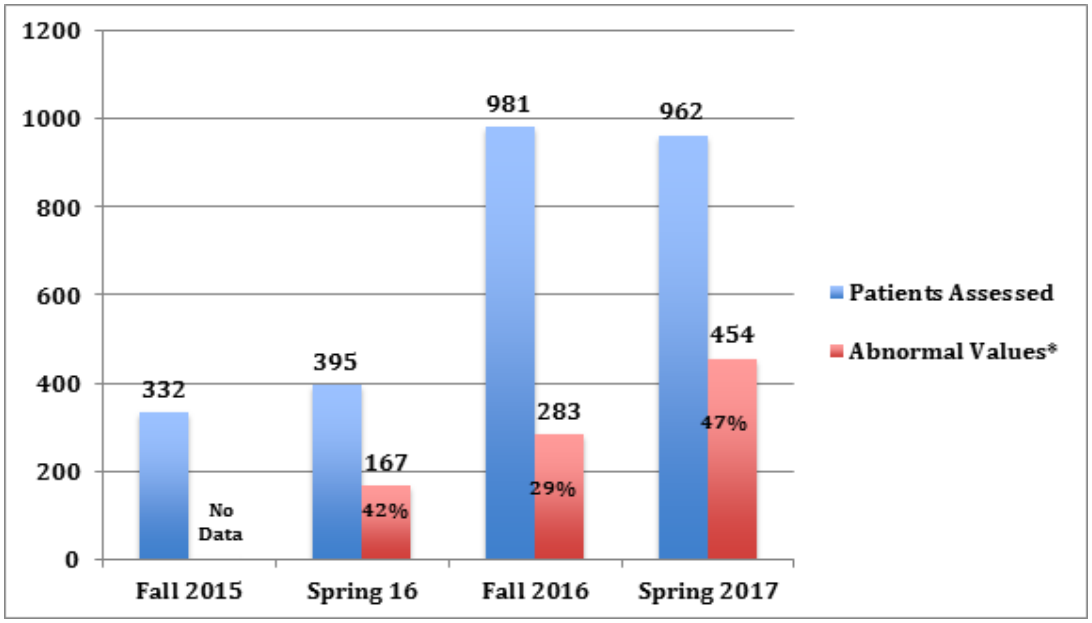

Figure 2. Increase in abnormal findings in total population of patients seen over a two year period

Data indicates an increased in patient visits over the past two years is documented for each semester's data. The increase of patients' visits showed a steady, and significant increase over a four semester's data collection period (Figure 3).

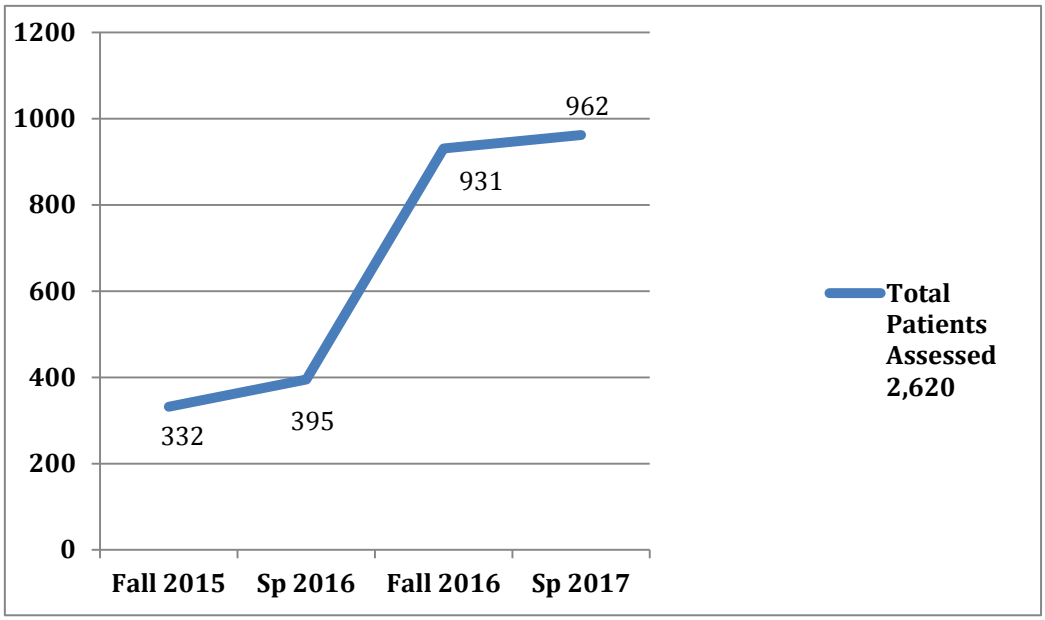

Figure 3. The increase of patients' visits over a four semester's data collection period

2.2.2 Indirect Outcomes

An indirect outcome, examining community support and stakeholder participation was monitored. Over time, there was a clear pattern of increase in both areas. After it initial start that proved successful, the mobile unit garnered supporting contributions from a major local hospital in the valley. Its financial support exceeded the monetary amount awarded by the original grant. Other indirect measures of community support and stakeholder participation that were monitored where in the form of return calls by sites that were served. Every site includes an initial semester's outings had a return call to reschedule another visit by the mobile unit in subsequent semesters. And finally, there was a total overall trend of not only returns but an increase in total site locations over time. These

sites included the following types of locations: community center/recreational centers; church based organizations; school based, health fair; community crisis center- homeless pregnancy, drug addiction; farming and industrialized work places and migrant camps. (refer to Figure 1)

The initial intent was to seek three sites that were either rural churches and/or small city public health community centers. The following semester, without recruitment efforts, the mobile unit was asked come back to the original sites and in addition crisis center such as West Fresno Food Drives and Spirit of Women- a women's shelter, Madera Hope House, the Poverello House. Next semester expansion included Community Health Fair at the community high schools and other school based events as well as farming workplace sites and migrant camps located in rural Central Valley. The program is now serving so many various sites that it is unable to keep up with unsolicited request for visits. One possible strategy is to add additional days during the week to continue to keep up with the demand for the mobile health unit services.

2.2.3 Inter-professional Interest

The grant was sought and obtained by nursing faculty. How once the mobile unit evolved it was a goal to add inter-professional collaboration. From the same university, 7 total disciplines from two different colleges came together to provide services on the mobile unit. Figure 1 indicates the evolution of disciplines over the course of a two year span. In all the following providers ultimately participated in mobile unit health service delivery, they included: nursing, public health, physical therapy, dietetics, pharmacy, kinesiology/exercise science and recreation and leisure studies.

The original grant award was for $104,000 and was obtained by nursing faculty within the sponsoring university for two years. Based on this initial award additional discipline within the sponsoring university became part of the services offered by the mobile unit. Three additional grant have been secured to both continue services and add additional aspect. The interdisciplinary groups connected with the mobile unit have both remained consistent in representation and grown in numbers.

Multi-level Nursing Student Curricular Enhancement: Alignment with CCNE standards for cultural competency; interdisciplinary collaboration; and practice setting shifts

2.2.4 Cultural Competency

The educational framework that the mobile unit presents maybe, one of the strongest for enhancing the facilitation of cultural competence among next generation Master of nursing and Bachelor of nursing providers. It is particularly strong at giving the student a true paradigm from which to view and address the special needs and a plethora of differences that patients' present based on preferences, values and needs (IOM, 2003). Under curricular guidelines for cultural competency, provided by the American Association of Colleges of Nursing, it is assumed, that to increase cultural competence there is a need to provide students with hands on learning relative to a diverse population. It is reported that hands on experiences, similar to the experiences provided by the mobile unit, will result in improved measurable outcomes with respect to nursing education in the area of cultural competency (AACN, 2008).

2.2.5 Interdisciplinary Collaboration

Interdisciplinary Collaboration is imperative to meet the many health care needs of those living in rural communities. As mentioned previously, many health disparities exist in rural populations primarily, a shortage of physicians and primary providers, along with lack of transportation to access care. Often due to lack of geographical availability, a mobile health unit equipped with intra professionals is a powerful learning experience, both for students and faculty involved. Both professional groups work as a team to decrease healthcare disparities and increase culturally competent programs and services (AACN, 2008).

2.2.6 Shift in Care Settings

The goal to provide quality health care is important for promoting, maintaining, preventing and managing chronic diseases and establishing health equality among patients. The Office of Disease Prevention and Health Promotion (ODPHP) discusses improving healthcare in Healthy People 2020. The guidelines for Healthy People 2020 address three components to improving healthcare which include: health insurance coverage, access to health services and the availability/timeliness of healthcare services (ODPHP, 2014). All three components of the 2020 guidelines address specific barriers that are within each sub- category. Some of these barriers such as access, preventative care and timely assistance, among others are well met by the mobile health unit, particularly, in rural health areas.

2.2.7 Conclusions

The mobile unit as a problem-based solution continues to receive grant funding and outside donations by the community and it continue to be an effective means to address a multidimensional problem that includes providing healthcare to one of the largest underserved population within the Central Valley. This population has some of the highest rates of chronic preventable diseases and is located in some of the most rural areas with limited transportation and access to services that is exacerbated by one of the largest shortages of health providers. Over a two year period the unit is estimated to have treated 2,620 underserved Central Valley patients. It incorporated as many as six disciplines to provide interdisciplinary health care and visited over eighty community underserved rural health sites.

These results obtained by this university based mobile unit are supported by data reviewed on the outcomes of other mobile units. Mobile clinics are an excellent solution and play a very novel role in bring services to the underserved populations in our society. Mobile units are able to provide care to at-risk population, including medically complex patients who may rely on emergency departments for their care because they cannot access a provider and populations like the homeless and uninsured, as well as rural resident with physical barrier to care.

Mobile clinics bring the care to the patient and therefore, they are often perfect strategies for locations where the mainstream health care system has not provided a point of access. As policymakers look for effective ways to control healthcare spending while increasing access to care, the use of mobile units is a strategy that should get considerable support. The mobile clinic solution is an underutilized resource that can help diminish health disparities, improving care and health and decrease healthcare costs. To this end, and with support from the Office of Minority Health, the Collaborative Research Network of Mobile Clinics reports in Mobile Health Clinics in the United States (2013) that mobile health clinics have been launched. With the successful development of the mobile clinics, many target areas will be greatly impacted.

This mobile unit however, was more of a unique success because it added an additional layer that has not been examined or proposed in the research. This mobile unit utilized both licensed practitioners and future practitioners in the midst of their training. This added a revolutionary element in curricular enhancement, mentoring opportunities, service learning and intra-professional collaboration.

The mobile unit enhanced nursing curriculum in at least two direct way as cited by CCN which includes cultural competency and inter-professional collaboration. As testimony to its success, the mobile unit health program, which is full operation to this day, continues to receive state grant funding and local funding. As the community continues to embrace the mobile health unit the support allows much needed services for the rural health areas of the Central Valley's medically underserved citizens.

3. Future Implications and Lessons Learned for a Mobile Unit Model

The literature suggests that increased access, in most cases, infers better health outcomes. Therefore, it is necessary to focus on increasing access to the mobile unit and removing barriers that interfere with that. An individual designated as a long-term coordinator who is solely responsible for access coordination issues and is separated from those who provide services within the mobile unit would be a key step in addressing obstacles in this area. This coordinator role would assist by providing a plan for increasing services access in the communities and assuring points of access with the highest volume of exposure and utilization. In an effort to address this, a current coordinator has been brought on.

It is clear, that direct curricular content was enhanced. However, in many ways, indirect unanticipated curricular enhancement occurred. For example, several informal and mentoring relationships emerged. In some cases it was explicitly stated by BSN student that they now wanted to pursue NP level training based their exposure to working alongside current NP students and seeing the scope of their knowledge and autonomy. With this in mind, a more formalized policy and procedure system that include an explicit mentoring focus will need to be developed. For example, formalized process regarding student-student and faculty-to-faculty mentoring is needed. The faculty-faculty mentoring is crucial to maintain the integrity and continuity of service provide by the mobile unit. For example, if faculty involved in the unit retire or leave the department a clear mechanism to pass off operation of the mobile unit needs to occur to assure that the mobile unit maintains a viable role of providing services to the rural community.

The addition of other data tracking including formal patient and student satisfaction surveys, direct health measures changes in clients seen by the unit needs to be tracked long-term. Developing a more comprehensive policy manual to govern the mobile is also required to coordinate an expanded interdisciplinary approach to providing care. Finally, as a long-term goal that includes seeking a permanent funding base that is not grant driven

would be beneficial to guarantee the future of the mobile unit. This may incorporate insurance reimbursement when patients are able, and/or using a more formative business model which could include collaboration with students from the University's business majors.

Acknowlegements

A special thanks to Dr. Miguel Perez and Dr. Helda Perez for their guidance and support.

A special thanks to Dr. Kathleen Rindahl and Dr. Gurdaver S. Dhaliwal, M.D. for all of their hard work contributed to the mobile unit.

References

American Association of Colleges of Nursing (AACN). (2008). *The Essentials of Baccalaureate Education for Professional Nursing Practice.* Washington, DC: Author.

Capitman, J.A., & Bengiamin, M.I. (2016). *Operational and Statutory Capacity of Local Health Departments in the San Joaquin valley.* Central Valley Health Policy Institute: California State University, Fresno. Retrieved from https://www.fresnostate.edu/chhs/cvhpi/documents/Operational%20and%20Statutory%20Capacity.pdf

Community Transformation Grant (Rep.). (2013). Fresno County Department of Public Health. Retrieved October 10, 2017, from https://www.naccho.org/uploads/downloadable-resources/FCDPH-ASI-Documentation-for-1-1-2-CHA-Phase-One.pdf

Esqueda, H. (2016). *Center for Health Journalism*. Retrieved from https://www.centerforhealthjournalism.org/2016/02/29/california%E2%80%99s-rural-central-valley-access-care-growing-challenge

Flegal, C., Rice, S., Mann, J., & Tran, J. (2013). *California Unincorporated: Mapping Disadvantaged Communities*. PolicyLink. Retrieved from http://www.policylink.org/sites/default/files/CA%20UNINCORPORATED_FINAL.pdf

Fresno County Farm Bureau. (2017). Retrieved from http://fcfb.org/Fresno-Ag/Fresno-Ag.php

Gateway to Health Communication & Social Marketing Practice. (2017, September 15). The Center for Disease Control and Prevention. Retrieved from https://www.cdc.gov/healthcommunication/toolstemplates/entertainmented/tips/PreventiveHealth.html

Healthcare Disparities and Barriers to Healthcare. (2017). Stanford Medicine eCampus Rural Health. Retrieved November 1, 2017, from http://ruralhealth.stanford.edu/health-pros/factsheets/downloads/rural_fact_sheet_5.pdf

Healthy People 2020. (2014). The Office of Disease Prevention and Health Promotion. Retrieved from https://www.healthypeople.gov/2020/topics-objectives/topic/access-to-health-services

Hughes-Cromwick, P., Mull, H., & Shaheen, M. (2006, May 31). The Burden of Chronic Disease in Fresno (Rep. No. WP06-2). Altarum.org. Retrieved September 10, 2017, from https://altarum.org/sites/default/files/uploaded-publication-files/06_project_report_hsd_healthy_fresno.pdf

Institute of Medicine (IOM). (2003). *Health Professions Education: A Bridge to Quality.* Washington, DC: National Academies Press.

IOM (Institute of Medicine). (2011). *The Future of Nursing: Leading Change, Advancing Health.* Washington, DC: The National Academies Press. Retrieved from https://www.nap.edu/read/12956/chapter/1#ii

Mobile Health Clinics in the United States (Rep.). (2013, March 15). Mobile Health Map. Retrieved July 10, 2017, from https://www.mobilehealthmap.org/sites/default/files/Mobile_Health_Clinics_in_the_United_States_March_2013.pdf

Olds, Richard G. (2015). *Doctor Shortage is California's Primary Public Health Problem.* San Francisco Chronicle. Retrieved September 15, 2015, from http://www.sfchronicle.com/opinion/openforum/article/Doctor-shortage-is-California-s-primary-public-12202035.php

Riordan, D.G., & Capitman, J.A. (2006). *Health Professional Shortages in the Central Valley: The impact on federally qualified health clinics.* Fresno, CA: Central Valley Health Policy Institute. Retrieved from https://www.fresnostate.edu/chhs/ccchhs/documents/hps-report.pdf

San Joaquin County 2016 Community Health Needs Assessment. (2016). Healthier San Joaquin. Retrieved September 9, 2017, from http://healthiersanjoaquin.org/pdfs/2016/report%20narrative.pdf

Spetz, J., Coffman, J., & Geyn, I. (2017). *California's Primary Care Workforce: Forecasted Supply, Demand, and Pipeline of Trainees, 2016-2030.* Healthforce Center at UCSF. Retrieved from https://healthforce.ucsf.edu/sites/healthforce.ucsf.edu/files/publication-pdf/UCSF%20PCP%20Workforce%20Study_Rpt%202%20-%20Final_081517.pdf