Need for a New Mobile Medical Clinic: A Proposal

Tara Allison

Writer's Comment: Whilst following my passion for preventative health, I developed the project concept for a mobile, pediatric clinic for at-risk adolescents and teens. Professor Oliver's course provided me an opportunity to write a grant in order to fund this project. In order to proceed, it became necessary to evaluate the societal healthcare needs of Sacramento county regarding the upsetting mental health phenomenon, Adverse Childhood Events (ACEs). This proposal encompasses an in-depth analysis that illuminates the biological basis of ACEs and their undeniable connection to chronic health conditions in adulthood. This proposal further analyzes several Community Needs Assessments to ascertain that existing healthcare institutions do not *in fact provide the proper focus or volume of mental health and ACE-related treatment needed for Sacramento County. The multidisciplinary nature of this paper connects scientific data that suggests a widespread health problem to an effective solution that UC Davis can adopt as a university. Founding of a mobile, pediatric student-run clinic challenges the existing medical culture of Sacramento by introducing ACE awareness and the expansive versatility of a mobile vehicle.*

Instructor's Comment: Students in my 102B Writing in the Biological Sciences class complete a literature review that leads to a grant proposal. For their grant proposal, they must identify an actual grant. To complete this assignment, Tara reviewed published research and explained how that research could address a demonstrated need for an under-served community. She then made a strong case for funding to support her proposed solution. Her work illustrates the ability to comprehend complex material and to use that material to identify a current, real-world problem and to propose a solution to that problem. A quick scan of Tara's 17 sources reveals a wide range of

material from community assessments to clinical research. Each section of her work is thoughtfully and meticulously supported by that research. She goes beyond listing the work of others. She synthesizes the research around the problem and seamlessly integrates her own insight. Tara combines a passion to serve an under-represented community with solid academic research and communication skills.

—Matt Oliver, University Writing Program

Need for a New Mobile Medical Clinic to Provide Adverse Childhood Events-Related Care to Underserved Pediatric Populations in Sacramento County

University of California, Davis

Starting Date	June 2020
Dates of Proposed Period of Support	June 2020-June 2022
Costs Required for Initial Budget Period	$450,000.00
Submission Date	April 1, 2020
Principal Collaborators	Tara Allison Faculty Member

1. Abstract

Despite the widespread notion that children are classically healthy patients in the medical world, a groundbreaking study by Felitti, the Center for Disease Control (CDC), and Kaiser Permanente demonstrates otherwise. The study illuminates a connection between early childhood trauma and stress to later chronic disease and premature mortality during adulthood [18]. Surgeon General Nadine Burke Harris provides an applicable biological analogy for this phenomenon. Our bodies are equipped with flight-or-fight response machinery to release

stress hormones such as adrenaline and cortisol during a bear attack, a practical and fantastic survival mechanism. However, the real problem is when the bear comes home with you every night [19]. The term Adverse Childhood Events, coined by Felitti et al., describes when constant stress and trauma have damaging biological impacts on young, developing children. Consistent exposure to stressful environments or traumatic events leads to biochemical malfunctioning of cells by way of truncating telomeres and adversely impacting processes such as genetic transcription and translation of proteins. This manifests itself later in life as heart disease, cancer, and depression, among an extensive list of other health complications. A healthcare movement is underway to address Adverse Childhood Events through various models such as Trauma Informed Care and Cognitive Behavioral Therapy. Our non-profit organization, Recognizing Illnesses Very Early and Responding (R.I.V.E.R.), is developing a new, pediatric clinic to provide Trauma Informed Care in addition to primary care services. However, our approach differs from most. We intend to operate through a versatile, mobile medical vehicle built to serve as a fully functioning clinician office directly at school locations. Furthermore, all of our services will be provided at no cost to uninsured or partially insured patients. These alterations should overcome financial and location barriers commonly experienced by underserved and impoverished communities.

2. Introduction

The non-profit organization Recognizing Illnesses Very Early and Responding (R.I.V.E.R.) at the University of California Davis is requesting $450,000.00 from the Department of Health and Human Services, Office of the Assistant Secretary for Health to develop a new mobile, pediatric clinic for underserved communities in Sacramento county. Specifically, our mission is to provide Adverse Childhood Events-related care, along with primary care services. Our goal is to utilize research-based methods such as Trauma Informed Care (TIC) to alleviate the effects of Adverse Childhood Events (ACEs) and improve the health status of diverse underserved communities. A significantly higher proportion of children in Sacramento suffer from poverty compared to California's holistic average [1]. Furthermore, the Northwest region of Sacramento county specifically lacks services to address ACEs [1]. This

data indicates a strong need for intervention.

Trauma Informed Care (TIC) is a promising model of treatment to address Adverse Childhood Events. TIC is a system of healthcare that emphasizes a child's physical and psychological safety, focuses on the recovery of the child and family, and routinely screens for symptoms of trauma exposure. It also provides tools to strengthen the resilience of children and families impacted by trauma. Furthermore, continuity of care and collaboration between child-service systems is emphasized. It also maintains an environment for staff that addresses and reduces secondary traumatic stress. TIC addresses the intersections of trauma with culture, history, race, gender, location, and language and acknowledges the compounding impact of structural inequity. The National Child Traumatic Stress Network (NCTSN) provides free training materials for clinicians and non-clinicians to become well-versed in Trauma Informed Care and how to effectively provide it [21]. This nationally accredited method was developed at UCLA and Duke University.

We plan to implement Trauma Informed Care within our clinic structure to address Adverse Childhood Events. Specifically, we intend to provide Trauma Focused Cognitive Behavioral Therapy, an evidence-based treatment effective for children ages 3-18 affected by ACEs [21]. In order to improve on this model, we intend to implement this care through the versatility of a mobile medical vehicle as a free service to patients of underserved communities. This enhanced model will allow our clinic to serve a variety of populations across Sacramento, while simultaneously removing financial barriers that can hinder patients' access to healthcare insurance coverage. We hope that this model guarantees improved access to previously unmet healthcare needs.

For the remainder of the proposal, we will demonstrate the importance of Adverse Childhood Events treatment, support our claim that the Northwest region of Sacramento County is particularly in need of our services, outline our detailed project plan, identify key personnel and describe our operations structure, and layout a budget with justification.

3. Background

In this section, we will first outline the connection between ACEs and serious health problems in adulthood, then illuminate the healthcare needs of the Northwest region of Sacramento county.

3a. Correlation Between Adverse Childhood Events and Chronic Mental, Behavioral, and Physical Health Issues

The significance of Adverse Childhood Events (ACEs), and why they are worth addressing, may be unclear. This section of the background will elaborate on the importance of ACEs by demonstrating the correlation between ACEs and serious health issues in adulthood. The Center for Disease Control and Prevention defines Adverse Childhood Events (ACEs) as mentally and emotionally traumatic experiences that affect adolescents before the age of 18. These traumatic experiences can exist in many forms. Some examples include: growing up in a household with family members who abuse substances, have mental health problems, are incarcerated, or divorced. Such experiences can undermine the child's sense of stability and safety while simultaneously interfering with his or her ability to bond with family or friends [3]. Many years of seminal research in this topic demonstrate a myriad of connections between ACEs and chronic health conditions, unsafe health behaviors, and premature death. This discussion will utilize research older than two years but remains current and is foundational to these health correlations.

Chronic Health Issues

Chronic health conditions such as autoimmune disease, cancer, chronic obstructive pulmonary disease, frequent headaches, ischemic heart disease, and liver disease have been proven to result from individuals plagued by ACE-related trauma. [4], [5], [6], [7], [8], [9], [10], [11]. Dube et al. demonstrate that traumatic events during adolescence correlate to an increased probability of autoimmune disease hospitalization during adulthood [4]. Not only this, but Ports et al. establish a strong correlation between ACEs and exposure to modifiable cancer risks such as alcohol, chronic inflammation, obesity, UV radiation, and environmental carcinogens among others. Additionally, this study suggests that addressing ACEs may support early cancer prevention [5]. Cunningham et al. study the correlation between COPD and ACEs such as verbal and sexual abuse, parental separation or divorce, observation of substance-abusing family members, and domestic violence. Their results indicated a higher chance of developing COPD if one or more of these ACEs were experienced in women specifically [6]. Anda et al. studied the relationship between the prevalence of headaches and migraines and the presence of ACEs. The results indicated that, in adulthood, there was a

higher frequency of headaches or migraines if the subject had a higher ACE risk score. Subjects with lower or nonexistent ACE risk scores experienced far fewer headaches [7]. Additionally, a study completed by Dong et al. illuminates the connection between several types of ACEs and development of IHD. Their results demonstrate a 1.3- to 1.7-fold increase in the chance of developing IHD for patients experiencing more ACEs in comparison to those with a low ACE risk score [8]. In a different study, Dong et al. examine correlation of ACEs to risky behaviors that manifest later in life as liver disease. ACEs increased the likelihood of liver disease development by 1.2 to 1.6 times [9]. Beyond chronic health issues, ACEs have been shown to relate to other problems in adulthood such as unsafe health behaviors.

Unsafe Health Behaviors

Unsafe health behaviors such as alcohol abuse, drug use, obesity, sexual risk behavior, and smoking are health outcomes of ACEs as well [10, 11, 12, 13, 14]. Strine et al. establish direct correlations between alcohol abuse and ACE-related experiences such as sexual abuse, childhood neglect and emotional abuse, family drug abuse or mental illnesses, and parental divorce. They claim that psychological distress associated with ACEs results in alcohol abuse later in life [10]. Furthermore, Anda et al. discovered a 40 percent increase in prescription drug usage in patients with non-zero ACE scores and a positive correlation between a higher ACE risk score and prescriptions across all age groups (18-44, 45-64, and 65-89 years of age) [11]. In another study, Williamson et al. identified a correlation between physical and verbal abuse and increased body weight and obesity measurements. Participants that experienced "being hit" were 4.0 kg heavier on average than participants that did not report physical abuse [12]. Additionally, Hillis et al. evaluated the connection between sexual risk behavior and ACE events and discovered a positive correlation between the two [13]. Strine et al., in a different study, observed increased risk of smoking habits in women when ACE risk scores are present as well [14]. ACEs have also been shown to relate to reduced lifespans.

Premature Death

ACEs correlate with suicide and depression in adulthood, leading to premature death [15, 16]. According to Dube et al., suicide rates increased two- to five-fold in adulthood due to connections regarding

ACEs. Factors such as alcoholism and illicit drug use had close ties to the presence of ACEs and path to suicide attempt [15]. Additionally, Chapman et al. established a connection between a higher number of ACE-related events and the chance of developing a depressive disorder. The study also suggests that early recognition of childhood trauma may prevent future depression diagnosis [16]. This extensive, yet not exhaustive, collection of studies indicates that ACEs have a very real impact on pediatric mental health and adult health status later in life. Ultimately, ACEs can lead to almost any serious condition that plagues our adult population in the United States. In order to approach this issue from a preventative standpoint, the focus turns to children. If ACEs can be treated early-on, the likelihood of carrying these to adulthood reduces significantly.

3b. Target Population in Sacramento County: What Patients Need

The 2019 Community Health Needs Assessment of Sacramento County outlines several significant health needs in the left-hand column (Figure 1). These healthcare needs are unique to the Northwest region of Sacramento county. The primary concerns that this proposal will address are: healthcare services to address Adverse Childhood Events and primary care needs, improved healthcare access to mitigate location and public transportation barriers, and access to medical care regardless of insurance status. Mental/ behavioral/substance-abuse services can be interpreted as ACE-related care in the context of this proposal.

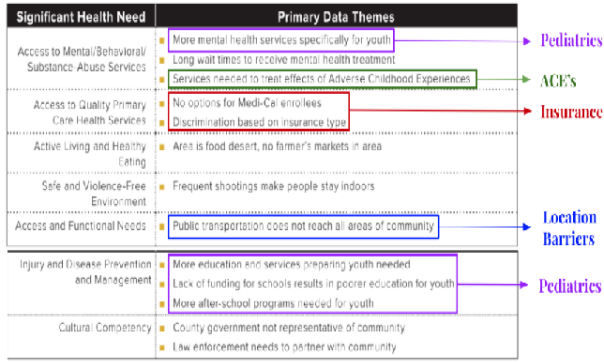

Figure 1. Themes from Primary Data Collection, Northwest Region.

Within the Northwest region, there are five specific regions that the 2019 Community Health Needs Assessment of Sacramento County classifies as "significantly in need" of specific healthcare service improvements. These five regions are labeled "communities of concern": North Highlands, North Sacramento, Del Paso Heights, Arden Arcade, and Foothill Farms (Figures 2 and 3).

North Sacramento and Del Paso Heights demonstrate higher proportions of Hispanic, Black, and Asian populations in relation to White, mixed, and other ethnic groups (Figure 4). However, North Highlands, Arden Arcade, and Foothill Farms contain a higher proportion of white residents compared to Hispanic, Black, and Asian ethnicities. Regardless of distribution, Hispanic, Black, and White communities are consistently present in each region at varying levels. It can be said that, as a whole, these communities of concern are diverse in ethnic composition and that services to these areas would benefit a variety of racial groups [20].

Beyond healthcare status, it is important to emphasize that Sacramento as a whole is impoverished and has more dangerous and lower quality living conditions than the average city in California. The 2019 Community Health Needs Assessment of Sacramento County finds a higher rate of children in poverty and children with single parents than the average value in California (Figure 5). The median household income is comparatively lower, and there is a higher rate of violent crimes and homicides in Sacramento than California's average as well [1].

The 2019 Community Health Needs Assessment of Sacramento County demonstrates varying amounts of clinical care providers in Sacramento County compared to the California average; at least one region of Sacramento is in a Health Professional Shortage Area (HPSA) for Primary Care and considered medically underserved (Figure 6). However, the number of mental health providers, psychiatry providers, and primary care physicians is above the average for California overall. This suggests that available clinician staff are aggregated in certain areas of the county, creating shortages elsewhere, supporting the notion that the Northwest Sacramento region lacks adequate mental health and primary care provision [1].

ZIP Code	Community/Area	Population
95660	North Highlands	34,303
95815	North Sacramento	25,206
95838	Del Paso Heights	37,286
95841	Arden Arcade, North Highlands	19,890
95842	Arden Arcade, North Highlands, Foothill Farms	32,184
Total Population in Communities of Concern		148,869
Total Population in Northwest Region		324,288
Percentage of Northwest Region		45.9%

Figure 2. Identified Communities of Concern for the Northwest Region.

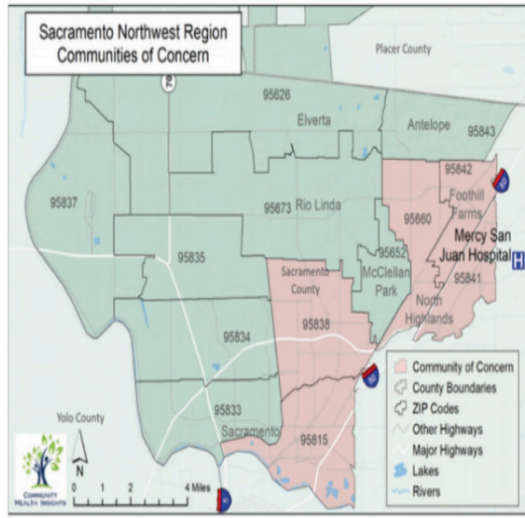

Figure 3. Communities of Concern for the Northwest Region.

Location	Hispanic	Black	Asian	White	Mixed	Other
North Highlands	25.2%	12.5%	6.9%	49.9%	4.7%	0.8%
North Sacramento	30.9%	21.5%	13.5%	27.5%	4.8%	1.7%
Del Paso Heights	38.0%	24.1%	17.5%	14.1%	5.4%	4.0%
Arden Arcade	18.1%	9.8%	6.6%	59.9%	4.6%	0.9%
Foothill Farms	23.5%	8.4%	5.7%	53.7%	7.0%	1.8%

Figure 4. Racial composition by region.

Indicators	Description	Sacramento	California
Homicides	Deaths per 100,000	6.1	5.0
Violent Crimes	Reported violent crime offenses per 100,000	523.2	407.0
Motor Vehicle Crash Deaths	Deaths per 100,000	9.2	8.5
Some College	Percentage aged 25-44 with some postsecondary education	66.2	63.5
High School Graduation	Percentage of ninth-grade cohort graduating high school in 4 years	80.6	82.3
Unemployed	Percentage of population 16 and older unemployed but seeking work	5.4	5.4
Children with Single Parents	Percentage of children living in a household headed by a single parent	35.6	31.8
Social Associations	Membership associations per 100,000	7.2	5.8
Free and Reduced Lunch	Percentage of children in public schools eligible for free or reduced-price lunch	58.9	58.9
Children in Poverty	Percentage of children under age 18 in poverty	23.1	19.9
Median Household Income	Median household income	$59,728	$67,715
Uninsured	Percentage of population under age 65 without health insurance	7.2	9.7

Figure 5. Social and economic or demographic factor indicators compared to state benchmarks.

Indicators	Description	Sacramento	California
Health Care Costs	Amount of price-adjusted Medicare reimbursements per enrollee	$8,073	$9,100
HPSA Dental Health	Reports if a portion of the county falls within a Health Professional Shortage Area	No	
HPSA Mental Health	Reports if a portion of the county falls within a Health Professional Shortage Area	No	
HPSA Primary Care	Reports if a portion of the county falls within a Health Professional Shortage Area	Yes	
HPSA Medically Underserved Area	Reports if a portion of the county falls within a Medically Underserved Area	Yes	
Mammography Screening	Percentage of female Medicare enrollees aged 67-69 that receive mammography screening	60.3	59.7
Dentists	Number per 100,000	75.8	82.3
Mental Health Providers	Number per 100,000	339.5	308.2
Psychiatry Providers	Number per 100,000	14.3	13.4
Specialty Care Providers	Number per 100,000	214.1	183.2
Primary Care Physicians	Number per 100,000	81.5	78.0
Preventable Hosp. Stays	Number of hospital stays for ambulatory-care-sensitive conditions per 1,000 Medicare enrollees	37.1	36.2

Figure 6. Clinical care indicators compared to state benchmarks.

What Exists Currently

Interestingly, although Sacramento does not lack healthcare professionals for mental health services compared to the average California benchmark, quality of life indicates that Sacramento residents experience poor mental and physical health more commonly than the state average [1]. This finding suggests that the distribution of such healthcare professionals may not be adequate to provide care to different regions. Not only are healthcare professionals inadequately distributed geographically in Sacramento, but the types of services are noticeably lower in quantity and less widespread than one might expect.

The 2019 Community Health Needs Assessment of Sacramento County provides data describing the services provided by existing health organizations in Sacramento. In analyzing the information provided, it is apparent that a surprisingly low quantity of healthcare organizations provide primary care, mental health, and healthy eating / active living services. Sacramento County contains a grand total of 281 existing healthcare organizations that provide a variety of services. Out of those

281 organizations, only 96 institutions or 34% of them provide access to mental behavioral or substance abuse services. Only 73/281 institutions or 26% provide access to quality primary care services. And only 81/281 institutions or 29% provide access to active living and healthy eating resources [1]. This data indicates that Sacramento may not be well-equipped to address its various medical needs across the county. And, although existing organizations are present in Sacramento to provide these services, they are not equitably distributed across the county.

Areas with established institutions that provide mental health/behavioral and substance abuse services remain indicated as regions in significant need of those services. Within the zip code 95823, 8 institutions provide mental health services of the total 21 healthcare institutions in that area. However, the zip code 95823 resides in a region that continues to lack adequate mental health services [1]. Despite that almost half of the healthcare organizations within 95823 provide mental health services, that service is still needed in higher volume. This data further demonstrates that existing healthcare organizations are not meeting patient needs.

What Is Lacking

To summarize, there are three primary issues that the Northwest region of Sacramento is experiencing: lack of both primary care access and Adverse Childhood Events-related care, healthcare insurance denial from current providers, and location and public transportation barriers to attain proper healthcare access. The following section will elaborate on the mobile, pediatric clinic solution by which Recognizing Illnesses Very Early and Responding (R.I.V.E.R.) proposes to tackle these issues.

4. Project Description

In order to address the issues discussed, Recognizing Illnesses Very Early and Responding (R.I.V.E.R.) at UC Davis is planning to implement a new mobile, pediatric clinic for underserved communities in Sacramento county. To address insurance barriers, the new clinic will provide free services to all patients regardless of insurance status. To address location and public transit challenges, the clinic will function in a large mobile vehicle equipped for medical care providers. Not only can new patient locations be reached, but multiple regions can be served.

And finally, to address the primary care and ACE-related care needs, the mobile clinic will provide Trauma Informed Care (TIC) along with primary care services to address both of these issues. This description will include explanations of the ACE Treatment Approach and the primary care services that the clinic will provide, along with support for the success of the mobile clinic model.

4a. Primary Care Services & ACE Treatment through Trauma Informed Care

Our clinic plans to provide primary care services in addition to ACE-related care through TIC. Our primary care services will include: comprehensive treatment including pediatric immunizations and flu-shots, complete physical exams, acute illness and injury care, pregnancy tests, pelvic exams, sexually transmitted disease testing and treatment, family planning, HIV counseling and testing, health education, referrals to community partners and agencies, substance abuse counseling, risk behavior reduction counseling, and nutrition counseling. Our Trauma Informed Care will involve training a variety of staff with material obtained from the National Child Traumatic Stress Network. Specific staff, such as clinicians, psychiatrists, and graduate students will be trained in Trauma-Focused Cognitive Behavioral Therapy, while undergraduates will be given less intensive NCTSN training intended for non-clinicians and volunteers. In this way, all of our staff will be trained to provide ACE-related care through TIC at some level.

4b. Mobile Clinic Success and Versatility

To reiterate, residents in the Northwest region of Sacramento have location and public transportation barriers that prevent access to proper healthcare. The clinic will serve patients in a 26-foot vehicle equipped with 2 medical examination rooms and ample supplies. With this mobility option, the clinic can access a variety of regions in Sacramento with ease and flexibility. In this way, residents can access medical care despite any location or public transportation challenges. Furthermore, we intend to function as a school-based healthcare organization so we can directly interact with large pediatric populations on a consistent basis.

Existing mobile medical vehicles provide similar services in other cities and provide excellent examples on which to base this proposal. One particularly successful case is the Stanford Teen Van, a mobile medical

Figure 7.

clinic that primarily serves youth in the Bay Area. The 2019 Stanford Community Health Needs Assessment indicates that this clinic provides ACE-related care in the form of mental health services in addition to primary care (Figure 7). Furthermore, this establishment has successfully provided improved access for 2,892 individuals that otherwise would experience location-based barriers [17]. The Stanford Teen Van also provides its services and medications for free, thus eliminating any insurance-based discrimination. They also maintain a consistent schedule of frequent visitation between multiple locations (including schools), rotating between each location at equal intervals. This model is exemplary because it provides identical services to a similarly underserved population in the Bay Area.

5. Conclusion

This proposal discussed the potential benefits of developing a new mobile pediatric medical clinic that would serve the Northwest region of Sacramento County. First, this proposal established context for ACE-care needs and examined the correlation between Adverse Childhood Events (ACEs) and future chronic health issues. Second, this proposal demonstrated extensive evidence of the community health needs in Sacramento. And finally, it outlined a solution following successful existing mobile clinic models. When considering the data holistically, it is clear that a new pediatric mobile clinic would significantly benefit patients in Sacramento.

6. References

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7. Key Personnel and Operations Structure

The clinic will be staffed by a variety of personnel: medical professionals (M.D., D.O, P.A., and N.P.), healthcare professional students (M.D., D.O, P.A., and N.P.), and undergraduate students. Each personnel type will have a different role and purpose in running the clinic. The undergraduate students will primarily participate in an administrative function. Occupations such as front desk reception, basic vital-taking, scribing, translation, and reduced-scope ACE-related care will encompass the full scope of undergraduate contribution. Healthcare professional students will have a significantly more involved role. They will perform the initial examination of the patient, then present their findings to the medical profession on staff that day. These students can also be trained in higher level ACE-related care. Finally, the medical professionals' role will be to check the healthcare professional students' evaluation and determine if any changes need to be made before treating the patient. Clinicians and staff such as child psychiatrists can provide professional ACE-related care as well. Existing student-run clinics at UC Davis already follow this effective structure which allows both undergraduate and healthcare professional students to learn and medical professionals to teach and nurture future generations of healthcare professionals.

8. Budget Justification

Recognizing Illnesses Very Early and Responding (R.I.V.E.R.) at UC Davis is requesting $450,000.00. This amount will cover our initial development and will also ensure our expansion and future functioning for years to come. Primarily, the funds will be utilized to purchase necessary equipment and supplies for initial development and future growth. Secondarily, it will provide training material for our staff to provide ACE-related care. Regarding equipment, our mobile medical unit comprises a large majority of this cost at $130,000.00. Furthermore,

roughly $135,000.00 is dedicated to an extensive list of equipment and supplies listed in the project budget in the following section. Regarding personnel, we require funding to purchase training courses and materials for our staff. This equates to about $42,000.00. The total amount of $450,000.00 would allow our clinic to function at a low annual cost. Finally, the annual expenditures we anticipate regarding vehicular insurance and maintenance are calculated to reflect five additional years of future functioning. Our proposal to develop this clinic has the potential to maximize the funding ceiling and intelligently distribute funds to last over an extended period of time. Our full proposed budget can be reviewed in the following section.

Project Budget

Materials	
Magnum Mobile Medical Vehicle	$130,000.00
Malpractice Insurance (5 years)	$100,00.00
Vehicle Insurance (5 years)	$35,000.00
Vehicle Maintenance (5 years)	$7,000.00
Vehicle Licensing (One-time cost)	$1,000.00
Follet Medical-Grade Refrigerator (Vaccine Storage) (2 units)	$6,420.00
Scale and Height Measurement Tool (Health o Meter)	$186.00
Phillips HeartStart Onsite AED Value Package	$1,325.00
Pediatric Immunizations (1000 doses)	$52,000.00
General Daily-Use Supplies (5 years)	$50,000.00
Over the Counter Medication	$25,069.00
Personnel	
NCTSN Trauma Focused Cognitive Behavioral Therapy Training (5 people)	$42,000.00
Total	**$450,000.00**