West Virginia Oral Health Technology Initiative

Executive Summary

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Executive Summary: West Virginia Oral Health Technology Initiative

Introduction

The West Virginia Oral Health Coalition (WV-OHC), the Institute for Technology in Healthcare (ITHC), Avēsis, LLC, and Harmony Health (HH) have implemented an innovative pilot program aimed at improving oral health outcomes in underserved communities throughout West Virginia. This program utilizes cutting-edge, general wellness technologies, including point-of-care salivary testing and mHealth (smartphone) applications, to promote general wellness. The primary objective is to empower both patients and healthcare providers by offering real-time health insights that guide preventive actions, ultimately enhancing overall wellness in rural and underserved populations.

This summary highlights the key results and implications from the pilot program, which involved 79 adults from three different sites: a Health Department, a Community Health Center, and a Free Mobile Dental Clinic.

Technology and Methodology Overview

The cornerstone of this pilot program is the integration of a multiple assays, point-of-care salivary testing device with a wellness-oriented mHealth app. The salivary testing device is designed to be a general wellness tool, collecting non-invasive biomarker data such as glucose, pH, MMP-8, and nitric oxide levels. These biomarkers offer wellness insights into both oral and systemic health, providing actionable information for patients and providers.

The mHealth app serves as both a patient-facing and provider-facing interface. In the pilot, the app was primarily used by providers to access wellness reports during chairside visits. These reports were generated based on both biomarker data and risk assessments, including the American Dental Association (ADA) Risk Assessment and the American Diabetes Association (ADA) Diabetes Risk Assessment. The combined insights allowed providers to guide patients in making lifestyle adjustments to improve health, with all diagnostic and clinical decisions made by licensed healthcare professionals.

Key Findings

- **Access and Care Delivery:** The integration of the salivary testing device and mHealthapp significantly improved access to preventive care. The ability to conduct real-time wellness assessments and offer remote consultations reduced the need for travel, which is a critical barrier for rural populations. By providing point-of-care testing, these technologies enabled providers to deliver personalized care plans based on immediate health insights.

Flowchart of the Salivary Testing Process

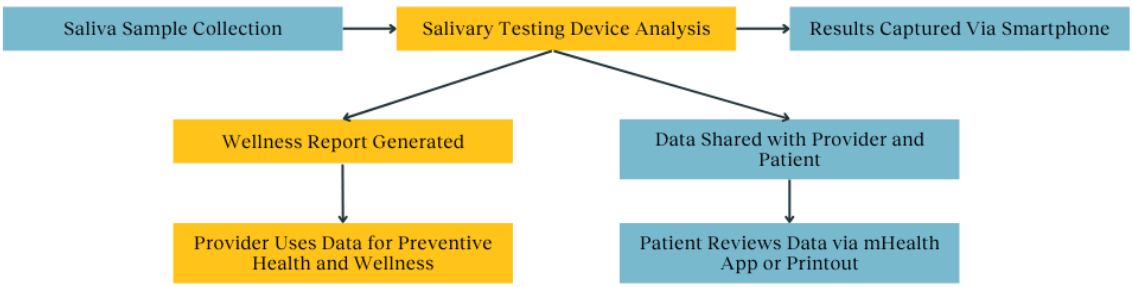

Figure 1: Flowchart of the Salivary Testing Process

- **Biomarker Insights:** The analysis of biomarkers across the three sites revealed important wellness trends. For example:
  - **pH levels:** The average pH levels had an average range from 6.8 to 7.2 across the sites, with lower values indicating potential risk for caries.
  - **Glucose Screening:** Instead of relying on specific glucose levels, the ADA Diabetes Risk Assessment Survey was used as a valuable screening tool in this pilot. The survey helped identify individuals who may be at higher risk for diabetes, particularly in sites integrated with or co-located near primary care providers. The integration of this survey with salivary biomarkers allowed providers to make informed recommendations on lifestyle adjustments aimed at improving overall health and wellness, while ensuring that all clinical diagnoses were made by licensed healthcare professional.
  - **MMP-8:** This inflammatory biomarker was notably higher in the Community Health Center, suggesting higher trends of potential periodontal disease, while the Free Mobile Clinic had the lowest MMP-8 levels), correlating with lower chance for oral inflammation.
  - **P. gingivalis:** Elevated levels of the P. gingivalis bacterium, associated with periodontal disease, were observed in a subset of patients. These elevated levels were particularly present in the Health Department site, indicating negative periodontal wellness trends, which supported the need for personalized preventive care interventions.

Biomarker Analysis and Average Wellness Scores

Site	Mean Glucose (mg/dL)	Mean Buffering Capacity (PPM)	Mean pH	Mean Nitric Oxide (μM)	Mean P. gingivalis (CFU/mL)	Mean MMP-8 (ng/mL)	Mean Wellness Score
Site 1 Health Department	2.3 Normal	190 Moderate	7.8 Normal to Basic	220 Optimal	150,000 Normal	50 Optimal	4.2
Site 2 Community Health Center	4.5 High	85 Poor	6.4 Acidic	100 Poor	800,000 Poor to Extremely Poor	220 Poor	7.5
Site 3 Mobile Free Clinic	3.1 Normal	175 Moderate	7.2 Normal to Acidic	210 Optimal	400,000 Poor	150 Poor	5.3

Figure 2: Biomarker Analysis and Average Wellness Scores

- **Projected Cost Savings:** The pilot program indicated significant projected cost savings resulting from early wellness interventions of $118,000. By emphasizing prevention and encouraging proactive health management and monitoring, the need for more expensive treatments was potentially reduced. These savings are projections derived from previously published literature, and further details can be sourced and referenced in the full report. The estimated savings include:
  - **Caries Prevention:** Projected savings of $500 per patient annually, reflecting the cost reduction associated with preventing caries progression through early interventions.
  - **Periodontal Disease Prevention:** Estimated savings of $1,200 per patient annually, highlighting the financial benefits of preventing advanced periodontal disease with early wellness insights.
  - **Diabetes Risk Management:** Projections suggest savings of $9,000 per patient annually, resulting from preventive measures that help manage diabetes risk before complications arise.

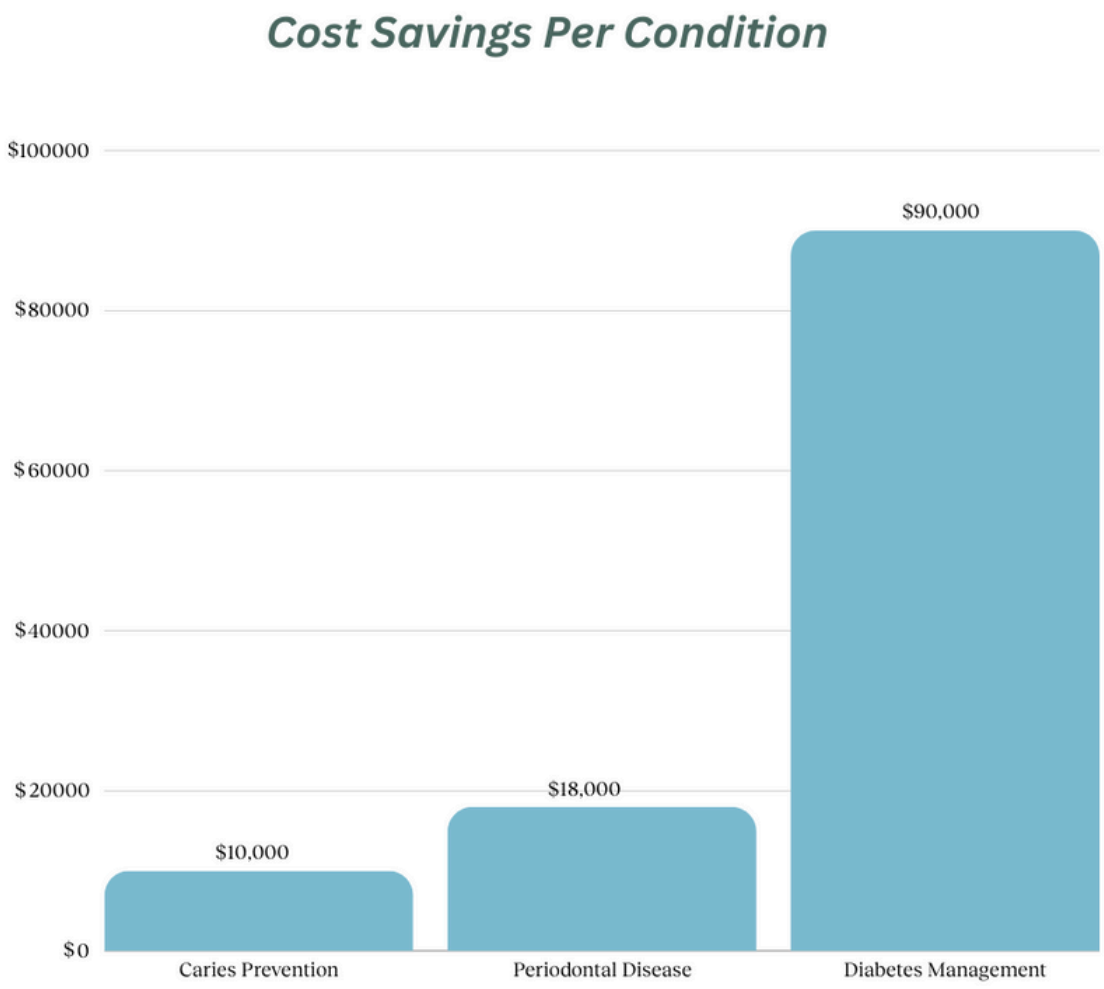

Figure 3: Cost Savings Per Condition

- **Usability and Provider Feedback:** Surveys conducted with healthcare providers at the end of the pilot revealed high satisfaction with the mHealth app. The mHealth App Usability Questionnaire (MAUQ) indicated that the app scored an average of 5.5 across all sites for ease of use. Providers appreciated the app's ability to provide real-time wellness insights that supported their preventive care strategies. Additionally, the Physician Satisfaction Survey showed an overall satisfaction score of 4.1, reflecting the app's ease of implementation into daily operation.

Combined Usability and Satisfaction Survey Results

Survey Tool	Site 1	Site 2	Site 3	Overall Average
MAUQ AVERAGE MEAN SCORE	4.5	6.2	5.8	**5.5**
PHYSICIAN SATISFACTION SURVEY	3.8	4.2	4.2	4.1

Figure 4: Combined Usability and Satisfaction Survey Results

Challenges and Limitations

While the pilot demonstrated significant benefits, there were also challenges, including the need for improved navigation features in the mHealth app and better integration of the wellness data across multiple healthcare systems. Additionally, while the technology provided valuable wellness insights, it is essential to emphasize that all diagnoses and clinical decisions were made by licensed healthcare professionals.

Next Steps

Given the success of the pilot, the next steps involve expanding the program to more rural and underserved communities. The technologies will be further refined based on feedback from providers and patients, with a particular focus on enhancing app navigation and integrating it with broader health information systems. The scalability and sustainability of the program will be assessed, with a goal to integrate these tools into routine care delivery in low-resource areas.

Limitations, Compliance, and Further Methodology

For a comprehensive analysis of the program's limitations, compliance with healthcare standards, and detailed analytical methodologies, refer to the appendices in the full report.