PENDA HEALTH

BP Sawa

BP Sawa Final Report

ARIADNE LABS

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Thank You

The project team would like to express our heartfelt gratitude to all those who contributed to the success of this project.

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SECTION 1: Adressing the Growing Burden of NCDs in Low and Middle-Income Countries

Increasing Burden of Hypertension

Noncommunicable diseases (NCDs) such as cardiovascular disease, diabetes, cancer, chronic respiratory disease, etc. are responsible for 41 million deaths each year, accounting for 74% of deaths globally.[1] Of these deaths, cardiovascular diseases account for the majority, killing 17.9 million people annually.[1] Hypertension is a leading risk factor for cardiovascular disease. The increase in the burden of hypertension (and NCDs overall) has been larger in low- and middle-income countries compared to high-income countries in the past three decades.[2] Over three quarters of deaths from NCDs and 86% of premature deaths from NCDs occur in low- and middle-income countries.[1] Despite the increased prevalence of hypertension, data show that only one in three people with high blood pressure are aware of their condition, and only 8% have achieved control of their blood pressure, signaling a critical need for increased patient education and improved clinical management of hypertension.[3] A continued rise in uncontrolled hypertension will lead to a wider inequality gap, increased economic hardships for both patients and their caretakers, and an increased cost to the health system as a whole.[3]

Paradigm Shift from Reactive to Proactive Care

The urgent need to improve access to high-quality NCD care is challenging to implement given existing health system challenges across the globe, such as low physician to patients ratios, lack of access to medicines and a high cost of care. While attention toward NCD management is increasing, continuing to provide care in siloed, vertical, single disease-focused programs is unlikely to lead to improvement of NCD care globally. In order to optimally prevent, detect, and control NCDs, a paradigm shift in healthcare provision must occur from a reactive, transactional system of healthcare delivery to a more proactive, population health management-based approach that prioritizes continuity and people-centered care. Conventional models of clinic-based care delivery often fail to provide high-quality care across patient populations, focusing most on those who present onsite with a specific symptom or complaint, thus promoting crisis-oriented care.[4] Systems designed primarily for reactive, acute care are predominant in low- and middle-income countries. The resulting lack of follow-up care, preventive care, and systematic patient engagement/education disrupts continuity of care for most chronic conditions and undermines the development of long-term, trusting relationships with providers.

Meanwhile, there continues to be a large emphasis on providing longitudinal care for specific communicable conditions (i.e. HIV/AIDS, tuberculosis, malaria, etc.). While the similar need to provide wrap-around, longitudinal care for NCDs exists, clinics are rarely equipped to provide similar care for NCDs with less training and familiarity with NCD diagnosis and management, less patient education and

1. World Health Organization. Noncommunicable Diseases. World Health Organization. September 16, 2023. Accessed August 28, 2024. https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases#:~:text=Noncommunicable%20diseases%20(NCDs)%20kill%2041,%2D%20and%20middle%2Dincome%20countries.

2. Ranzani OT, Kalra A, Di Girolamo C, et al. Urban-rural differences in hypertension prevalence in low-income and middle-income countries, 1990-2020: A systematic review and meta-analysis. PLoS Med. 2022;19(8):e1004079. doi:10.1371/journal.pmed.1004079

3. Schutte AE, Srinivasapura Venkateshmurthy N, Mohan S, Prabhakaran D. Hypertension in Low- and Middle-Income Countries. Circ Res. 2021;128(7):808-826. doi:10.1161/CIRCRESAHA.120.318729

4. Lobach DF, Kawamoto K, Anstrom KJ, et al. Proactive population health management in the context of a regional health information exchange using standards-based decision support. AMIA Annu Symp Proc. October 11, 2007:473-477.

engagement, and decreased patient and provider buy-in to the importance of early disease identification and control. Additionally, limited international aid is available to support NCD care models in contrast to communicable diseases.

Developing strategies to build pathways for patient engagement is essential to the long-term management of conditions like hypertension. One example includes population-oriented models of care which are leveraging information technology and automated messaging to facilitate interactions with patients who typically may not present to a clinic unless they develop an acute need. Additionally, technology-enabled strategies to survey the disease control of larger populations and quickly identify patients who are most at risk can be impactful. These strategies, among others, can help promote the shift from reactive to proactive care delivery, leading to improvements in mortality, morbidity, and decreased overall costs for patients and health systems.

The Know-Do Gap

The dramatic rise in NCDs has happened alongside an ongoing burden of communicable diseases, leading to what is known as a dual burden of disease in low- and middle-income countries. However, far less attention has been paid to how to develop health systems that achieve disease control for NCDs. It is well known that NCDs must be controlled to prevent disease complications, but in urban low-income settings, there is a lack of clear guidance on how to pivot clinics and systems previously focused on acute, episodic care toward long-term, iterative care. In Kenya, a lack of resources, data infrastructure, provider education, facility readiness, and patient education/awareness are among some of the key barriers to effectively diagnosing and managing NCDs. Unfortunately these barriers have led to poor hypertension control in Kenya. As of 2022, only 22% of individuals already diagnosed with hypertension were on appropriate treatment, and only 51.7% of those had achieved blood pressure control.[5] Lack of blood pressure control leads to secondary cardiovascular consequences, such as heart attack, stroke, kidney disease, and other diseases. Programs focused on hypertension must target high-risk individuals, decentralize treatment away from large hospitals, improve follow up and retention for patients, and improve longitudinal data management.[5]

Penda Health, founded in 2012, is in a position to address these necessities. Penda is a private, fee-for-service health system operating out of Nairobi, Kenya that aims to deliver high-quality, person-centered healthcare to Kenyan families. With nationwide telemedicine and 16 outpatient medical centers in Kenya, and rapidly growing, Penda offers a variety of medical, laboratory, and pharmacy services and is actively pursuing the shift towards more proactive care. This push stems from having treated nearly 2 million patients in their 12 years of operation, where avoidable outcomes across Penda's patient population remain high. As patients continue to present at Penda with cervical cancer, stroke, heart attack, or other preventable diseases, Penda is motivated to do the upstream work needed to educate patients

5. Mbau L, Harrison R, Kizito W, et al. Case identification, retention and blood pressure control in Kenya. Public Health Action. 2022;12(2):58-63. doi:10.5588/pha.21.0051

and engage them longitudinally in care. Hypertension care management has emerged as a key focus area for Penda, as about 25% of patients over the age of 30 are either hypertensive or pre-hypertensive. Of this 25%, less than 3% are on active management for their condition, signaling a critical need to improve hypertension care on a population level at Penda.

Project Objectives

The Ariadne | Penda partnership designed and piloted BP Sawa, a chronic care management program for Penda patients with hypertension with the goal to develop and implement a hypertension clinical pathway for clinicians and patients to improve hypertension outcomes. This partnership hopes to leverage key learnings from the pilot to iterate on the hypertension clinical pathway and eventually expand the program to all Penda Health clinics and develop new pathways for other chronic conditions. From March to August 2024, the project team executed five key activities:

1. Map the journeys of hypertensive and pre-hypertensive patient archetypes using human-centered design principles during intensive half-day workshops with Penda staff and through key informant interviews.

2. Develop a logic model to illustrate the relationship between key inputs and activities and their expected results, outcomes and impact.

3. Design an intervention for hypertension management that is designed to meet patients' needs while also being tailored to Penda's clinical context and resources.

4. Develop a pilot strategy using implementation science approaches which support structured, rapid and iterative learning and adaptation.

5. Support ongoing coaching for staff at pilot centers (both clinical and non-clinical) on new hypertension protocols to support practice transformation.

The project team anchored on the logic model mentioned above to provide a working summary of the BP Sawa program at Penda Health and leveraged the model to contextualize various components of the pilot design and implementation process within a theory of change.

SECTION 2: Care Model: The "BP Sawa" Design Process

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A phased approach was used to design the BP Sawa program to allow for continual learning. Starting with a series of two journey mapping workshops — the first to understand the existing Penda patient experience of hypertension care and the second to build a new clinical services pathway for delivering hypertension care — which were supplemented with key informant interviews. Learnings from the workshops and interviews were then leveraged during clinical design meetings to prepare for a pilot of the newly designed BP Sawa clinical pathway and practice guidelines.

Understanding the Current State of Hypertension Care

The Ariadne | Penda design team sought to understand the current processes and challenges that both patients and clinical team members experience when undergoing and providing treatment for hypertension. Penda Health recognized that despite seeing hypertension patients often, there was no streamlined process for managing their care. Patient journey mapping and key informant interviews were used to make sense of the ad hoc management of patients at-risk of or diagnosed with hypertension in the current state.

Patient Journey Mapping

Patient journey mapping is a process that visualizes a patient's experience by tracing their steps, emotions, and challenges of their healthcare journey, from the patient's initial symptom or entry into the healthcare system to follow-up treatment. Journey mapping serves as both a strategic tool and a collaborative exercise that brings together multiple stakeholders to delineate each moment across a service or process

(See Box 1). It includes articulating key elements (see Figure 1) like activities, stakeholders, and patient touch points, as well as challenges and opportunities for improvement at each step of the experience.

Figure 1: Key Elements of a Journey Map

	PHASES & KEY MOMENTS	What are the defining phases of the journey?	Clinical Pathway
	TASKS	What is the clinical team doing?	
		What is the patient doing?	
	CHALLENGES	What are the barriers, challenges, or unmet needs the patient experiences?	
	EMOTIONS	What is the patient thinking or feeling?	
	ROLES	Who does the patient interact with?	
	RESOURCES	What technology, clinical protocols, or resources support these actions?	
	OPPORTUNITIES FOR IMPROVEMENT	What ideas or solutions could help address challenges and improve the patient experience?	

Box 1: Why use Journey Mapping?

It provides significant value as a reflective exercise for diverse stakeholders (e.g. providers, staff, administrators, patients) to understand the experience of a clinical pathway from multiple perspectives.

- The exercise facilitates understanding and empathy towards end users (clinicians or patients)
- It helps identify gaps between what care is now (the current state) and what we want care to be (the future state).
- Visualizing each step helps teams collectively analyze challenges, brainstorm solutions, and develop strategies to improve.

Approach to Understand the Current State: Journey Mapping

In April 2024, Ariadne Labs facilitated a current state journey mapping workshop along with 49 qualitative semi-structured interviews with Penda Health staff, providers, and patients. Both provided valuable data that informed the mapping of the current patient experience and uncovered key moments in care, challenges, and opportunities for improvement. Both staff and patient perspectives were considered. Workshop participants consisted of a mix of Penda providers, the Patient Voice Team, the Marketing Team, the Clinical Innovation and Quality Team, and Penda leadership.

During the workshop, Ariadne Labs facilitated an overview of the journey mapping approach and led exercises to identify key stakeholders, develop patient and provider profiles, and outline what each step of hypertension care process looked like in the current state, based on a specific example patient profile. By mapping out the journey with input from diverse stakeholders from Penda, the team built alignment around the current state patient journey. Once current processes and steps were understood, the team could identify specific barriers to care for patients, staff challenges, and operational difficulties with hypertension care.

Approach to Understand the Current State: Key Informant Interviews

Ariadne Labs collected rich qualitative data from 49 Penda Health staff, providers, and patients to inform an understanding of the current state of Penda Health's hypertension care. The interviews explored several critical areas, including diagnosis, medication adherence, knowledge of hypertension, frequency of blood pressure monitoring, patient education, lifestyle factors, and financial barriers, as well as spiritual and cultural beliefs related to hypertension management.

Current State Learnings and Opportunities

Drawing from workshops and interviews, key learnings and critical insights into opportunities for improvement in patient-centered hypertension care management emerged. However, while the workshop was effective for efficiently gathering thoughtful input from a range of roles, there were operational challenges in coordinating staff availability. Participants provided feedback requesting more time for discussion and the inclusion of additional provider and staff perspectives in future workshops.

Current Patient Experience

Currently, most patients experience one of two hypertension experiences, or journeys, based on whether they have been diagnosed with hypertension. The first archetype is the Undiagnosed Patient, who visits the clinic for unrelated concerns and has not been previously diagnosed or monitored for hypertension. Their initial encounter at the medical center often plays a key role in their follow-up decisions around pursuing care for high blood pressure. The second archetype is the Monitored or Diagnosed Patient, who was previously

"It's really hard when a patient presents for something else and then you try to talk to them about their high blood pressure. There is so much [health care] scamming, the patient thinks you are exploiting them to come back."

diagnosed and may or may not be receiving hypertension treatment. Experiences for patients in this group differ based on factors such as medication adherence and blood pressure monitoring habits.

Patient and Provider Strengths, Challenges, and Opportunities

Penda's staff and providers are committed to patient education, and patients cite strong relationships with Penda staff as a primary driver for their continued patronage of Penda Health. However, patients still face significant challenges which hinder effective treatment and control of their hypertension. These challenges range from financial barriers, to accessing care and medication, to lack of consistent messaging around follow-up and blood pressure monitoring. These challenges impact patients' abilities to adhere to treatment and their overall experience with care. For more details on the challenges identified, see Appendix 1: Current State Patient Journey 1 & 2. Through the process of mapping the two patient archetypes, we identified several themes that summarize opportunities for improvement in hypertension care (see Table 1).

Table 1: Summary of Opportunities for Improvement Themes

THEME	SUMMARY
Patient Resistance to Diagnosis	Patients frequently exhibit resistance to accepting their diagnosis, often due to disbelief about the severity of their condition or skepticism towards the healthcare system. This can hinder their engagement with recommended treatment plans and overall management of their health.
Lack of Continuous Follow-Up and Monitoring	Patients often do not follow up on their blood pressure monitoring and do not schedule clinic visits for long- term follow-up.
Lack of Patient Medication Adherence	Many factors lead to lack of medication adherence for hypertension patients including financial costs, which include fees for consultations, laboratory tests, and prescription costs.
Variation in Provider Practice	There is a wide variety in what providers know and how they diagnose, treat, and educate patients with hypertension.

Creating Penda Health's Current State Journey Map

By analyzing the outputs from the first workshop and the qualitative data, we developed a current state journey map and identified key themes, patterns, and areas for improvement (see Appendix 1.1 and 1.2). From both providers and patients, we heard about their experience, challenges and barriers to care, and their unique needs and behaviors. Within the two journeys, we identified many different patient groups, and their unique needs, behaviors, and experiences varied greatly.

Designing BP Sawa

Developing an understanding of the current state of hypertension care at Penda made clear the need for a completely new clinical pathway to outline hypertension diagnosis and management from both the patient and provider perspective.

Drafting a Potential Future State Clinical Pathway

Clearly and simply illustrating the cyclical nature of chronic disease management over time that is required for hypertension and other NCDs is not an easy task. Penda Health did not have an existing hypertension pathway so the project team was designing something completely new. This required leveraging both Ariadne Labs and Penda clinical expertise along with Ariadne design and implementation teams. Design priorities anchored directly on the learnings from the current state journey mapping as the development of a potential future state hypertension clinical pathway sought to address the gaps and challenges identified in the current state mapping exercise. Given the complex array of patient and provider experiences presented in the current state mapping, the future state aims to establish a new streamlined clinical pathway to significantly improve the hypertension patient journey and create a standardized approach at Penda for treating hypertension.

In order to define a clinical pathway that showed the complexity of hypertension care in a clear and intuitive way, the team defined two primary components of the clinical pathway: clinic visits and

the intervals between those visits (see Box 2). This structure helped connect the BP Sawa high level pathway (see Diagram 1) with detailed care team and patient tasks as well as the newly developed BP Sawa Clinical Practice Guidelines (see next section and Image 1).

Box 2: Clinical Pathway Core Components

Clinical Pathway Core Components

1. **Clinic Visit:** Definition of several hypertension clinic visits with specific steps to diagnose, treat, and manage patients.

2. **Intervals:** Definition of what happens between visits where technology and Penda outreach is leveraged to monitor hypertension as well sas provide patient education and support.

Image 1: BP Sawa Clinical Practice Guidelines
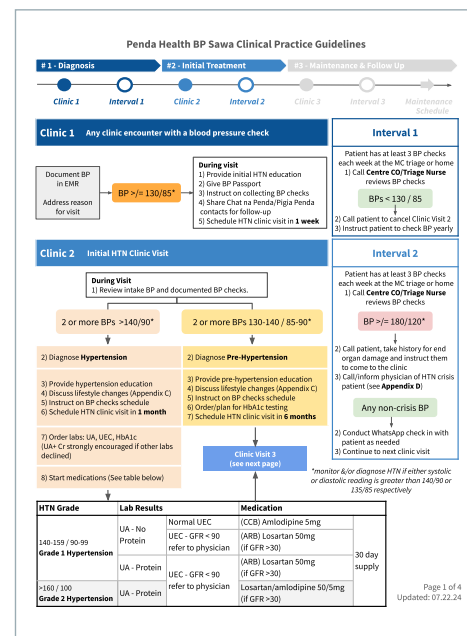
Diagram 1: BP Sawa High-level Clinical Pathway

Phases	# 1 - Diagnosis		#2 - Initial Treatment		#3 - Maintenance & Follow Up		
Key Moments	Clinic 1	Interval 1	Clinic 2	Interval 2	Clinic 3	Interval 3	Maintenance Schedule
	Encounter with a new ↑BP	Exploratory (1 week)	Initial HTN clinic visit	Assessment (1 month)	Treatment HTN clinic visit	Maintenance (1, 3, or 6 months ongoing)	Maintenance HTN follow up clinic visits
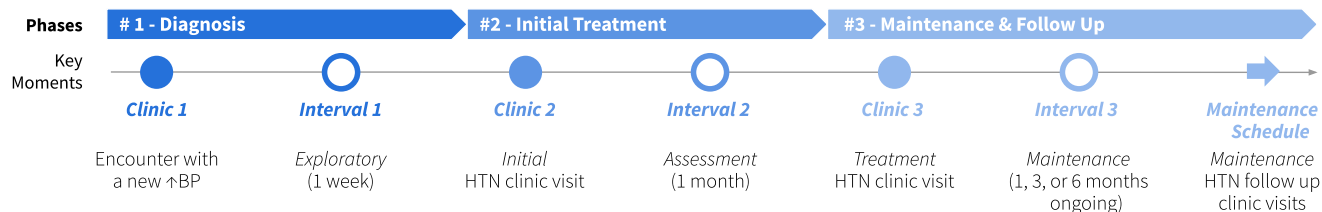
Journey Mapping Workshop 2: Future State

In April 2024, Ariadne and Penda reconvened for the second patient journey mapping workshop where the potential future state clinical pathway was presented to a multidisciplinary group of Penda staff (see Box 3). This was a pivotal moment in which Penda staff engaged deeply with each key moment in the pathway, reflecting on emotions and pain points experienced by patients and providers when identifying, diagnosing, and managing hypertension. Staff also shared what resources would be needed to support the pathway as well as opportunities for improving Penda's delivery model.

Box 3: Journey Mapping Workshop 2 Participant Roles

Journey Mapping Workshop 2 Participant Roles

- Frontline Clinicians: Clinical Officers and Nurses
- Lab Technicians
- Pharmacy Technicians
- Clinical Quality Team
- Branch Managers
- Customer Service
- Digital Marketing
- Call Centre Agents
- IT Team
- Data Analysts

Leveraging Workshop Results

The learnings from the second workshop were synthesized into a preliminary comprehensive clinical pathway that include patient journey elements to showcase likely challenges and emotions as well as types of patients who may struggle with moments in the pathway. The synthesis also identified a list of clinical and operational tools that may be used to support the pathway (see Appendix 2: BP Sawa Pilot - Summary of Resources) and anticipated challenges and opportunities across several key themes: patient education & support, provider education & support, financial burden, and clinic operations & efficiency (see Appendix 3: Workshop 2 Synthesis of Challenges and Opportunities).

Workshop results served as the key design input for a prototype BP Sawa Clinical Pathway, which served to optimize Penda's ability to test and improve the hypertension screening and treatment clinical pathway's feasibility in the short timeframe of the pilot. We also identified two critical tools in the clinical pathway: clinical practice guidelines (see Appendix 4: BP Sawa Clinical Practice Guidelines) and patient BP Passport. The clinical practice guidelines were needed to provide clear BP parameters and tasks for staff to manage their patients across each visit and interval of the clinical pathway. The development process for the guidelines leveraged Penda and Ariadne medical expertise and multiple rounds of iteration to ensure the content and format would meet the needs of the clinicians who would be using them.

The BP Sawa "BP Passport" is a custom-designed physical handout with key information for patients who are newly identified to be at risk for hypertension. The small handout contains links to free educational materials the patient can access in WhatsApp, as well as patient-friendly reminders to track ambulatory blood pressures during the clinical pathway intervals (see Appendix 5: BP Sawa Passport).

Preparing to Pilot

Planning the pilot of the newly designed hypertension clinical pathway and tools within a limited number of health centers helped manage operational complexity and focused energy on maximizing learning and rapid improvement to test and refine how they perform in practice, where limitations lie, and how to address them. From April through June, the Ariadne | Penda team leveraged implementation science and quality improvement approaches to quickly prepare for a several month pilot with four of Penda's health centers.

Approach

The approach for the pilot demonstrated the value of dedicating time and energy up front for systematic planning and preparation in order to lay the foundation for an efficient and effective pilot. We anchored our approach on the implementation framework called EPIS: Explore, Prepare, Implement, Sustain. This framework provides an adaptable, high-level, evidence-based structure to guide pilot planning and rollout. The EPIS phases outlined in Table 2 organize the key implementation activities we focused on developing and carrying out for the pilot (See Appendix 6: Summary of Implementation Activities).

Table 2: BP Sawa Pilot Implementation Activity Steps

EXPLORE	PREPARE	IMPLEMENT	SUSTAIN & IMPROVE
Activity 1: Define the scope and success	**Activity 4:** Assess the context	**Activity 9:** Go live with practice change	**Activity 13:** Routinely communicate progress and results
Activity 2: Establish buy-in	**Activity 5:** Develop the implementation strategy & work plan	**Activity 10:** Provide support	**Activity 14:** Evaluate impact
Activity 3: Build your teams and project governance	**Activity 6:** Develop the monitoring & evaluation plan	**Activity 11:** Collect data and feedback	**Activity 15:** Explore expansion
	Activity 7: Develop resources	**Activity 12:** Systematically iterate based on learnings	
	Activity 8: Provide training		

The Ariadne | Penda team collaboratively defined the pilot scope & goals, developed monitoring and evaluation plans to ensure rapid learning and iteration, and planned for essential implementation activities. This process both developed and anchored on core technical documents that clarified the pilot strategy:

- **BP Sawa Logic Model**—This diagram (see Image 2) provides a working summary of the BP Sawa program at Penda Health. It frames the program components to show the relationship between what is done (inputs, activities, and outputs) and the expected/intended results—outcomes and impact.

Image 2: Working Summary of the BP Sawa Program
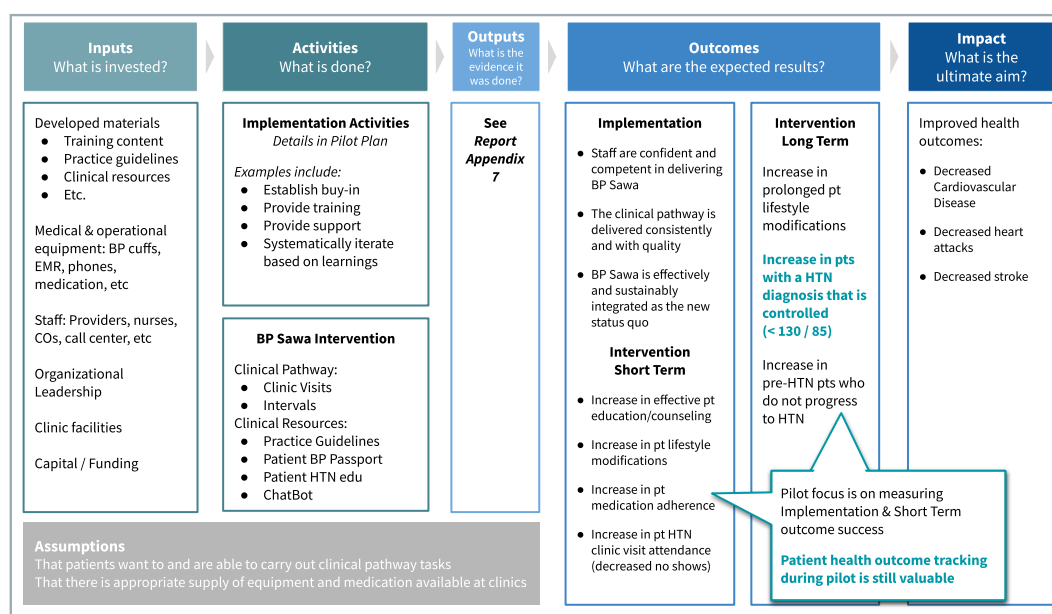
- **Pilot Implementation Plan**—This resource —structured by the implementation roadmap activities—provides the Penda Health implementers and leaders with a working document that articulates the developed strategies and details for planning the BP Sawa Pilot (see Activity 5 in the Implementation roadmap).

- **Pilot Monitoring & Evaluation Plan** — This resource describes the learning goals for the BP Sawa pilot (both for ongoing monitoring and end-of-pilot evaluation), key questions associated with the learning goals, the data that is needed to answer the key questions, and the methods to collect and analyze the data (see more detail in Activity 6 below).

The team's ability to move quickly and effectively to design a robust pilot relied on these documents to streamline planning and communication throughout the short pilot period.

Highlighted Pilot Implementation Activities

While every implementation activity is core to a successful pilot and sustainable practice change, we are highlighting the following activities to showcase their particular value in preparing rapidly and setting a strong foundation for effective pilot learning.

Define the scope and success (Implementation Activity 1)—Transitioning from the design process to piloting required a clear definition of priority metrics that would define success for the pilot. Priority metrics would support learning across the clinical pathway intervention and the process of implementation. Three priority learning goals were therefore established: intervention effectiveness, overall acceptability, and overall feasibility (see Box 4).

Box 4: Pilot Learning Goals

1) EFFECTIVENESS	2) ACCEPTABILITY	3) FEASIBILITY
BP Sawa effectively meets the needs of patients who have hypertension	Penda leaders, staff, and patients demonstrate willingness to participate in BP Sawa	BP Sawa is designed in a way that it can be implemented without causing major disruptions to typical workflows and without significant additional work for staff

Assess the context (Implementation Activity 4)—The deep exploration work of the journey mapping exercises and key informant interviews provided an exceptional assessment of Penda's clinical and environmental context. The time and effort that went into that learning up front was invaluable to implementation preparation and success.

Other methods like context assessment surveys (Example: Ariadne Labs' Atlas Initiative) can provide helpful insight in a more efficient manner, but may leave out the rich perspectives found in interviews and workshops. Both surveys and qualitative perspectives inform pilot preparation for how to leverage organizational strengths and plan for intentional opportunities for improvement.

Develop the monitoring & evaluation (M&E) Plan (Implementation Activity 6)—A clear measurement strategy is a vital part of any quality improvement or implementation effort. Starting with the program's logic model (see Appendix 7), the team developed and aligned on how to systematically and continuously learn. Data-informed decision-making and iteration are essential to reach pilot goals, and systematically collecting M&E data ensures you know what is working, what needs to change, and whether the program successfully achieved impact. Key components of the M&E plan included:

•   **Clinical and process metrics and indicators**—Anchoring on the logic model the team identified and prioritized clinical, workflow, and implementation metrics that would be collected and tracked during the pilot. These data would directly answer our learning goals and show achievement of the logic model outputs and outcomes (see Appendix 8: Priority Data for Pilot M&E).

•   **Data collection tools and methods**—To collect pilot data the Penda team leveraged their robust data analysis and visualization program (Power BI) to pull most priority metrics from the Penda EHR, and the teams developed digital surveys and forms to collect both qualitative and quantitative data for key implementation monitoring and outcomes, including training pre/post knowledge checks and evaluation and an implementation site check-in form.

Provide training (Implementation Activity 8)—Ensuring staff feel confident and competent about BP Sawa and the actions they will take in their daily practice is an essential part of every implementation. With support from Ariadne, Penda outlined a robust set of training modules and planned a single day in-person training to prepare pilot health center staff the week before launching the pilot.

The team was able to rapidly develop the training outline and content over about two weeks to ensure staff were familiar with core concepts including:

•   An overview of BP Sawa
•   Hypertension & BP Sawa Clinical Practice Guidelines

•   Role-based operations
•   Patient-centered communication strategies
•   Motivational interviewing
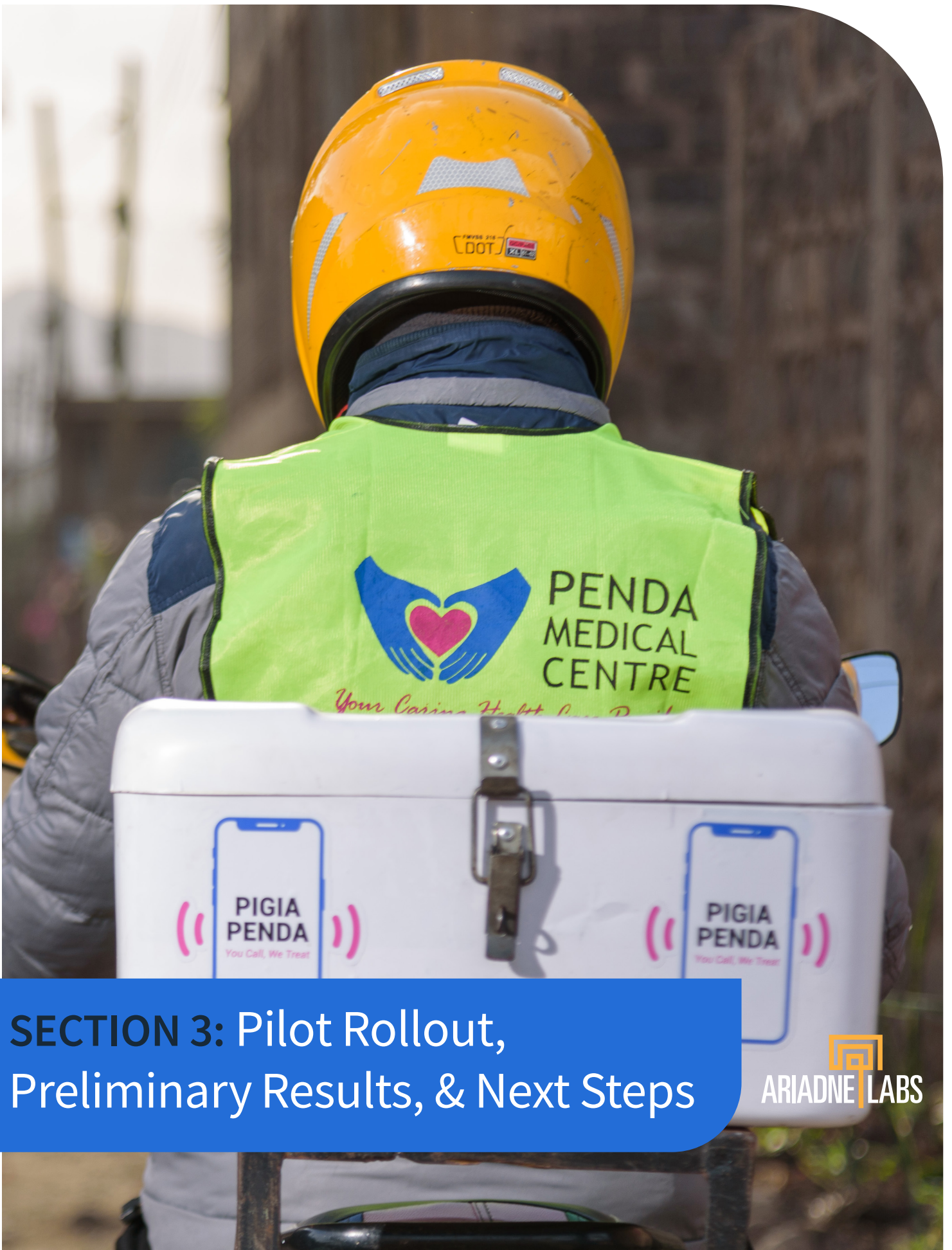
SECTION 3: Pilot Rollout, Preliminary Results, & Next Steps

Pilot Rollout

Pilot planning rolled very seamlessly into pilot launch with several key activities paving the way for rapid testing and learning.

Building Teams and Buy-in for BP Sawa

Socializing BP Sawa across Penda staff began in early Spring with the workshops and interviews, but strong program leadership and socializing efforts continued throughout pilot planning. Penda leveraged dedicated leaders and staff from the medical centers, call center, systems, business intelligence, and quality improvement teams as well as existing quality improvement and electronic health record (EHR) infrastructure. These dedicated staff made up an effective implementation team that owned the work (Implementation Activity 3). Penda built buy-in (Implementation Activity 2) and awareness of the need for improved hypertension management through the BP Sawa program, ensuring staff at pilot sites were receptive to the program's training and launch.

Early learnings and feedback from staff during these conversations, the workshop, and interviews informed the program iteration from the beginning:

- **Branding and program naming** was patient-centered and shared across staff to build buy-in and show commitment to the effort. The program name was changed from Tuliza Tension to BP Sawa based on marketing analysis which ensured the program better connected with patients and the community.

- **Providing clear training and clinical guidelines** to ensure staff were supported in identifying, following up with, and managing pre-hypertensive patients.

- **Demonstrating commitment via partnership** with Ariadne Labs visibly to sites during early interviewing and workshopping efforts meant sites expressed early enthusiasm for improving hypertension management.

Pilot rollout began with two training days in mid June. Centering their health center and staff needs, Penda split the single day training over two days, so they could keep all health centers open while still getting all

staff trained. The training included not only providers, but also key leaders not involved with direct patient care to ensure they could support their teams (i.e., branch managers, quality managers of the pharmacy and lab, and the telemedicine lead). The rest of the training participants included call center staff, providers (aka clinical officers), nurses, and front desk staff. The training days included presentations on hypertension diagnosis and management, grounded in the Clinical Pathway and Clinical Practice Guidelines, as well as opportunities for participants to practice their role, ask questions, and give feedback before launching the pilot the following week.

Key Learnings from Training

- **Leadership attendance & participation** during the training was crucial to build buy-in for BP Sawa at the sites and helped establish site ownership of the program.

- **In-person training** was a very effective way to disseminate new clinical practice guidelines because we were able to identify knowledge gaps and operational gaps quickly and problem-solve on possible solutions with the team. Previous program training at Penda had been provided virtually which did not allow for as engaging of an experience.

- **Case-based learning and role play** improved the internalization of the clinical practice guidelines by the clinical team and departmental leaders. These focused on ensuring staff were familiar with the downstream consequences of poorly controlled hypertension (i.e., heart attack and stroke), and the training referenced real complications seen across Penda branches to build awareness for why the program is important.

- **More time is needed to train on motivational interviewing & counseling techniques,** as these were relatively new concepts to most of the staff, and time constraints limited the amount of direction and practice provided.

- **Specific operational follow-up sessions** after the training would be helpful to connect with smaller teams on technical system components of the clinical pathway: patient identification in the electronic health record, follow-up processes in the call center, data collection, and visualization in the native PowerBI system (see Box 5).

Box 5: Power BI Dashboards

All of Penda's clinical and operational data is securely stored in a data warehouse. Using Microsoft Power BI the team builds bespoke interactive dashboards to monitor key workflows, clinical quality, and population health. Most dashboards are available to frontline staff and managers for real-time review of performance.

Monitoring Progress and Data

True implementation effort begins after training and launch to ensure sites and staff are supported in the practice changes. Penda began weekly site check-ins facilitated by members of the quality improvement team (Clinical, Nurse, Lab and Pharmacy quality managers, and the Head of the Quality Improvement Team) to reinforce training concepts, systematically review clinical pathway activities and resources, respond to questions, and gather feedback from each site (see Box 6 highlighting the Site Check-In Form Components gathered at each visit). While site staff and Penda leadership felt these check-ins were very helpful for supporting the new program, there were several challenges that made monitoring and supporting progress very difficult:

Box 6: Site Check In Form Components

Site Check In Form Components

- % of staff without BP Sawa training
- # of BP Passports in stock
- Accessibility of Clinical Practice Guidelines
- Accessibility of patient education materials
- # of functioning and calibrated BP devices
- # of medications in stock

- Identifying issues with: lab orders, filling prescriptions
- Gathering feedback from staff: what went well, what is challenging, what support is needed
- Observations of BP checks

- **Political unrest** in the region meant sites were inconsistently open or the improvement leads were unable to safely travel for the weekly check-ins.

- **Varying site progress** meant each site had different needs which the improvement leads had to figure out how to address on-the-fly.

- **Clinical support and coaching** was inconsistent because only half of the improvement leads had clinical training and could support specific questions providers raised with the clinical practice guidelines during check-ins.

- **Development of the program dashboards** took longer than expected due to the complexity of the priority data to track care and operations across the clinical pathway. Using Power BI, Penda established an overview clinical pathway dashboard with detailed sub-dashboards for each clinic visit and interval in the pathway; however the time and effort required to develop and iterate the dashboards to ensure validated results delayed the pilot site's ability to use that data to inform coaching.

Preliminary Pilot Results

The BP Sawa Pilot is ongoing since its launch in mid-June 2024. After about 10 weeks of implementation and ongoing iteration, data has shown valuable results that inform both next steps for Penda and some important general learnings.

Training Results

A total of 47 staff were trained over two days, and the results of the training's pre and post knowledge check as well as the training evaluation showed the training was valuable for preparing staff to launch BP Sawa. Before the training, staff on average answered 71% of the 23 hypertension & BP Sawa knowledge check questions correctly, while immediately after the training, the average jumped to 83% correct (Figure 1). While all staff had average scores in the 80s, branch managers and lab staff on average scored highest after the training (Figure 2). These knowledge check questions assessed staff's understanding of the hypertension symptoms, treatment, and the BP Sawa Clinical Practice Guidelines as well as specific moments in the clinical pathway.

Figure 1: Pre and post average of staff scores for training knowledge checks
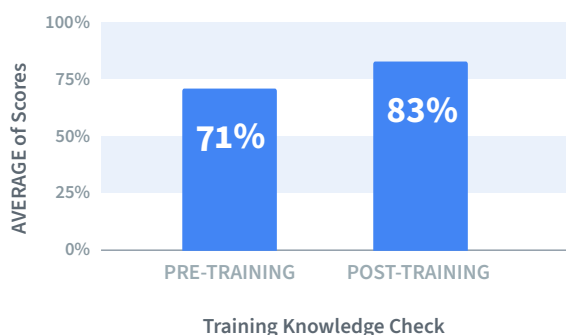
Figure 2: Average score on post training knowledge check by staff role

Training participants responded positively when evaluating the training itself, with the vast majority of responses stating that they Agree or Strongly agree with the four evaluation statements about training content clarity, effectiveness, length, and usefulness (Figure 3).

Figure 3: Post training participant agreement or disagreement with for training evaluation questions
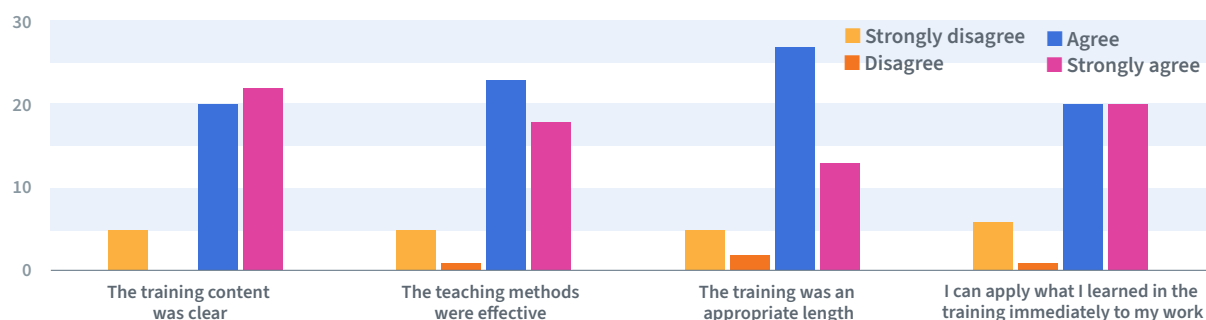
Qualitative feedback on the training was helpful to identify topics staff wanted more support or information on like specific medical complications, alternative medications, and hypertension management in specific case scenarios. Feedback also shared that the training was very well received with participants appreciating the resources provided, and suggesting ways to improve, like spending more time on specific topics. Both the quantitative and qualitative results of the training show progress towards the pilot learning goals of acceptability and feasibility.

Site Check-in Results

In-person check-ins occurred each week with one two-week gap due to travel safety considerations. During these check-ins Penda was able to answer questions and reinforce training content with staff as well as learn valuable details about pilot progress including:

- Two sites were not aware of how to access the clinical practice guidelines or patient education material online.

- Two sites needed to be instructed to ensure the BP Passports were kept in clinic rooms/spaces to be freely given out rather than saved in the pharmacy.

- While many patients were identified to have elevated BPs in their first encounter (aka Clinic 1), call center follow up during Interval 1 (after that first visit) found that many patients hadn't been informed of the elevated BP so were not expecting the follow-up call. There is a need to keep reinforcing with clinic staff that any patient with an elevated blood pressure reading should enter into the clinical pathway and be informed of their elevated blood pressure and the need for follow-up.

Clinical and BP Sawa Process Data

As the pilot progresses and the dashboard iterates, the results of the pilot will become more clear. After only a couple months, we can already see promising trends and results in the data.

Demonstrating Early Clinical Pathway Effectiveness

There are many data points that illustrate how the clinical pathway is working (see Appendix 3: Priority Data for Pilot M&E), and the Power BI dashboard helps showcase snapshots of that effectiveness and identify opportunities for improvement.

In less than three months (June 8 - August 25th, 2024), BP Sawa has identified 3,699 patients with elevated blood pressure who were not already receiving hypertension care (Figure 4). Of those

Figure 4: Total number of BP Sawa eligible (BP >/= 130/85) patients by medical center

Legend: ■ # patients hypertension ■ # patients pre-hypertension

Site	# patients pre-hypertension	# patients hypertension	Total
Tassia	562	339	901
Kangemi	562	416	1075
Kawangware	411	213	624
Umoja 2	700	399	1099
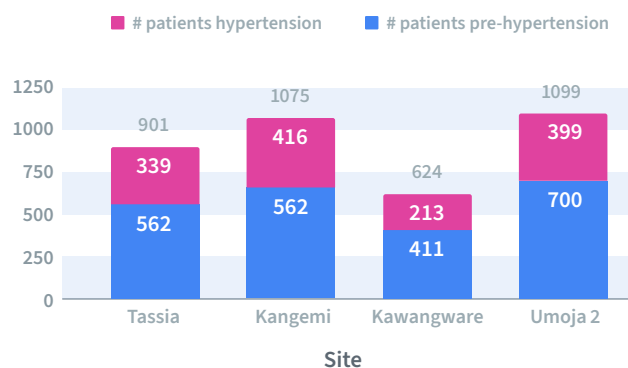
identified with elevated BP in Clinic 1, the BP Sawa call center via phone or the Penda WhatsApp chat successfully contacted 73% of them during Interval 1. Though an opportunity for improvement exists because of those in Clinic 1, only 31% provided a follow up BP during that interval.

Early data also show that the number of BP medication prescriptions has increased from before the pilot launch (Figure 5) showing early effectiveness of the clinical practice guidelines. Specifically, we saw an increase in the use of the affordable and well-tolerated amlodipine medications. Data also showed some beneficial
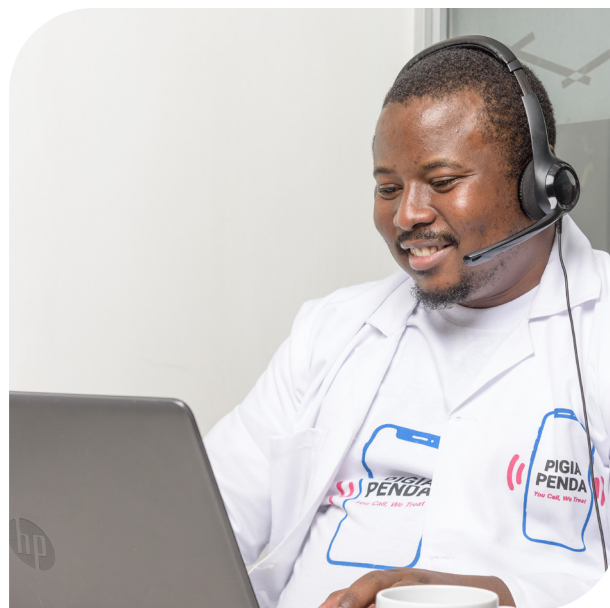
Figure 5: Trend of hypertension medication purchasing before and after BP Sawa pilot launch (June)

Pilot MCs: No. of times sold over month

- Guideline HTN Drugs: 95, 119, 162, 142, 145, 134, 156, 138
- Non-Guideline HTN Drugs: 45, 81, 79, 80, 113, 66, 68, 45
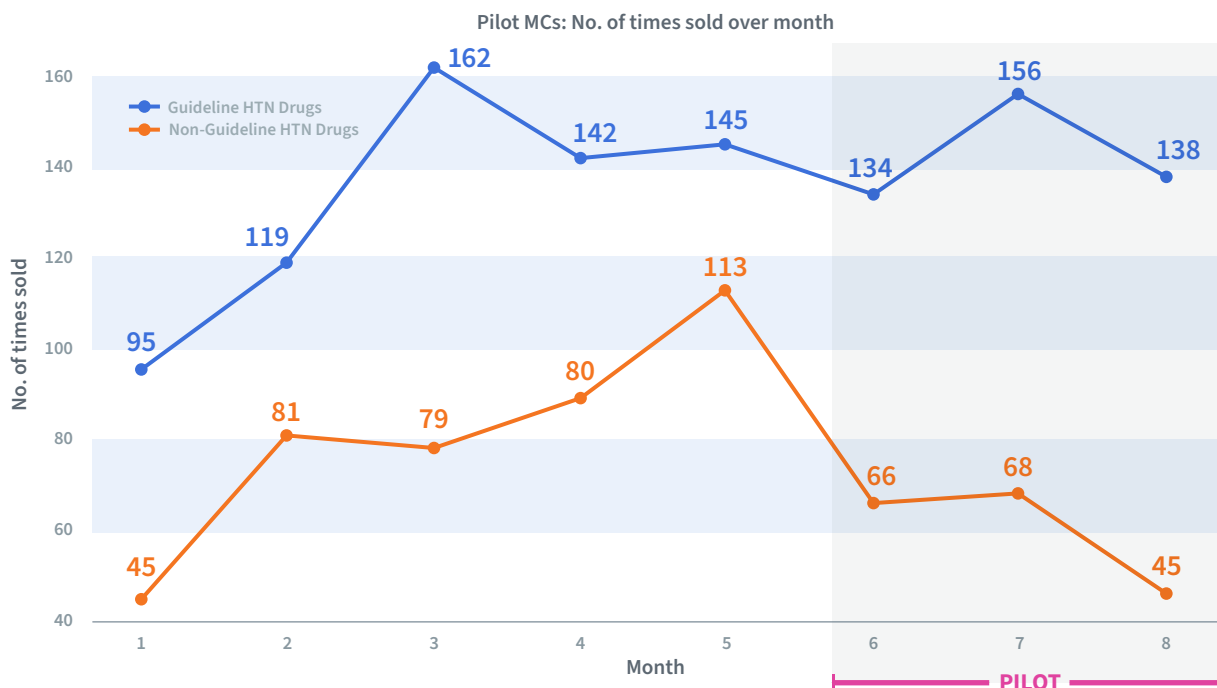
PILOT

spillover into non-pilot Penda medical centers; both pilot and non-pilot medical centers show a decrease in non-guideline hypertension medication purchases since the launch of the pilot (Figure 6).

Figure 6: Trend of non-guideline hypertension medication purchasing before and after BP Sawa pilot launch (June): comparison between the pilot and non-pilot medical centers

Pilot MCs: No. of times sold over month
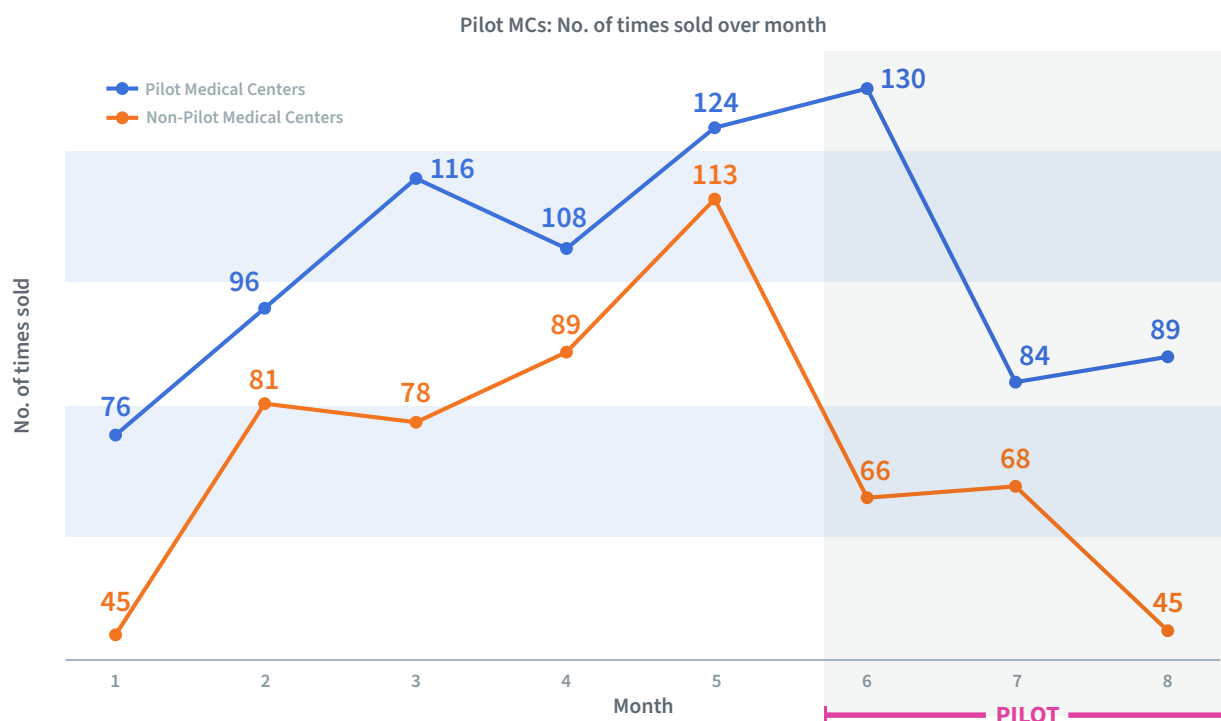
Data is also showing increased completion of Clinic 2 visits which showcases both effectiveness in the pilot as well as the massive opportunity for this work in low- and middle-income countries. In less than three months of piloting, we identified 77 patients across four branches who had multiple ambulatory BP readings consistent with a diagnosis of essential hypertension, as defined by our clinical practice guidelines. Of those 77 patients, 41 attended a Clinic 2 visit during the study period which is an impressive 53% completion rate. This is a remarkable improvement from the roughly 3% of hypertensive patients engaged in care prior to the BP Sawa intervention.

However, of patients who attended Clinic 2 visits, only 51% purchased hypertension medications from Penda at the time of their visit. This is both heartening that so many patients successfully engaged in care, but also presents a large opportunity for improvement. More work is needed to understand why nearly half of patients at Clinic 2 opted not to purchase BP medications at the time of their visit.

Qualitative Clinician and Patient Experience

In addition to early effectiveness, the pilot prioritized understanding acceptability and feasibility (M&E goals) of both the clinical pathway and its implementation. Penda and BP Sawa leaders captured essential qualitative perspectives from their conversations with staff at each pilot clinic (see Box 7).

Box 7: Qualitative pilot findings for each learning goal

1) EFFECTIVENESS	2) ACCEPTABILITY	3) FEASIBILITY
Patients expressed appreciation for the focused attention and support as well as excitement at clinical results.	Overall, Penda staff showed buy-in to the BP Sawa program and appreciated the opportunity to learn more about hypertension and to become more confident in caring for patients with hypertension.	In-person training and check-ins were key to driving understanding and buy-in to the BP Sawa program.
"Thank you Penda Hospital... I have been coming there for BP check up since Monday till yesterday and honestly [my BP] has dropped and am happy about it." — **Penda Patient via Whatsapp**	Some staff raised questions about whether patients with Stage 1 hypertension truly needed pharmacotherapy, which we were able to address clear clinical guidelines and patient outcome data.	In the early phases of the program when political unrest limited the frequency of weekly check-ins, we realized we had lost some momentum. It is important to continue weekly check-ins for support, questions, and re-focusing attention on hypertension.

Next Steps: Internalizing Pilot Learnings to Strengthen BP Sawa Implementation and Expand Non-communicable Disease Care at Penda Health

To enhance and spread NCD care, including the hypertension care model underway, the following key areas will be emphasized to enable continuous improvement and increased engagement with the BP Sawa program once scaled beyond the four initial pilot sites:

Additional Training for Clinical Staff Around the Guidelines and Evidence

In the first weeks of roll out, providers have expressed uncertainty to the Clinical Quality team during periodic visits around the rationale for treating pre-hypertension and grade 1 hypertension where previously providers wouldn't treat. This hesitancy was also reflected in the post-training evaluations.

It will be important to emphasize to providers the medical rationale for treating early hypertension aggressively in order to prevent long-term complications such as heart attacks and strokes. As a first step, Penda can address the current gaps by completing additional training with their pilot sites. Going forward, adjustments to the structure and content of the first training will include additional case studies, more work with the clinical practice guidelines, and spaced repetition. They can also consider 1:1 coaching with providers who are struggling to understand the Clinical Practice Guidelines as well as "drop in observing" to see how providers are managing patients. Another area during initial training where additional training can be focused is on the interpersonal skills of motivational interviewing and counseling techniques in order to empower providers to interact successfully with hesitant patients.

Going forward, it will be beneficial to incorporate some of these aspects into the first round training. Additional trainings will help to reinforce, cement, and clarify the guidelines.

Fine Tuning Support for Patients During the Interval Between Clinic Visits

Preparing patients for increased contact and support from the Penda team during the interval between clinic visits will be a key component in strengthening engagement with BP Sawa. Right now, some patients are surprised when the call center reaches out to them between visits. Penda plans to increase patient awareness that the call center will be reaching out to them. Additional training, specifically for the call center, will help them to play an important role in the "intervals," including training on motivational interviewing, counseling techniques, and specific scripts to use with hesitant patients.

Augmentation of the AI Chat Bot

The "interval" between the clinic visits is one of the most vulnerable moments to lose patients in their hypertension journey and needs to be optimized. AI Chatbots are an important and under-utilized tool to increase patient engagement and increase follow-up completion. Penda will continue to test and optimize the messages sent during the interval between clinic visits and keep questions such as: "Which messages are most convincing? How and with what frequency can we best outreach to patients?" front of mind.

Dashboard Refinement

Ongoing refinement of the dashboard is needed to maximize its utility. Currently, the different clinical patient states (hypertensive and pre-hypertensive) are well-defined, however, it is challenging to put those into black and white terms for the dashboard developers to accurately classify patients. Continuing to work with dashboard developers to develop "tight" definitions of each stage so that the dashboard can most closely reflect reality will be a critical step and area of continued iteration. This will enable continued refinement of the process to identify where patients are falling through the cracks and how we can best progress patients from their first interaction with the clinic through to controlled blood pressure readings.

Addition of a Chronic Disease Management Clinic Day

The addition of a clinic day focused solely around chronic disease management would work to strengthen the care provided for chronic diseases, as well as elevate the image of Penda's chronic disease management in the public eye. Currently, Penda has some specialty days where patients can seek care, such as for antenatal care. This care is provided by the same primary care providers, but by grouping and concentrating care for specific conditions, clinics can optimize their operations to support specific conditions on those days. These specialized days also help to elevate the provision of care for those conditions in the public eye so that they see Penda as the first line for chronic care and hypertension. Chronic disease management services are still available all other days additionally.
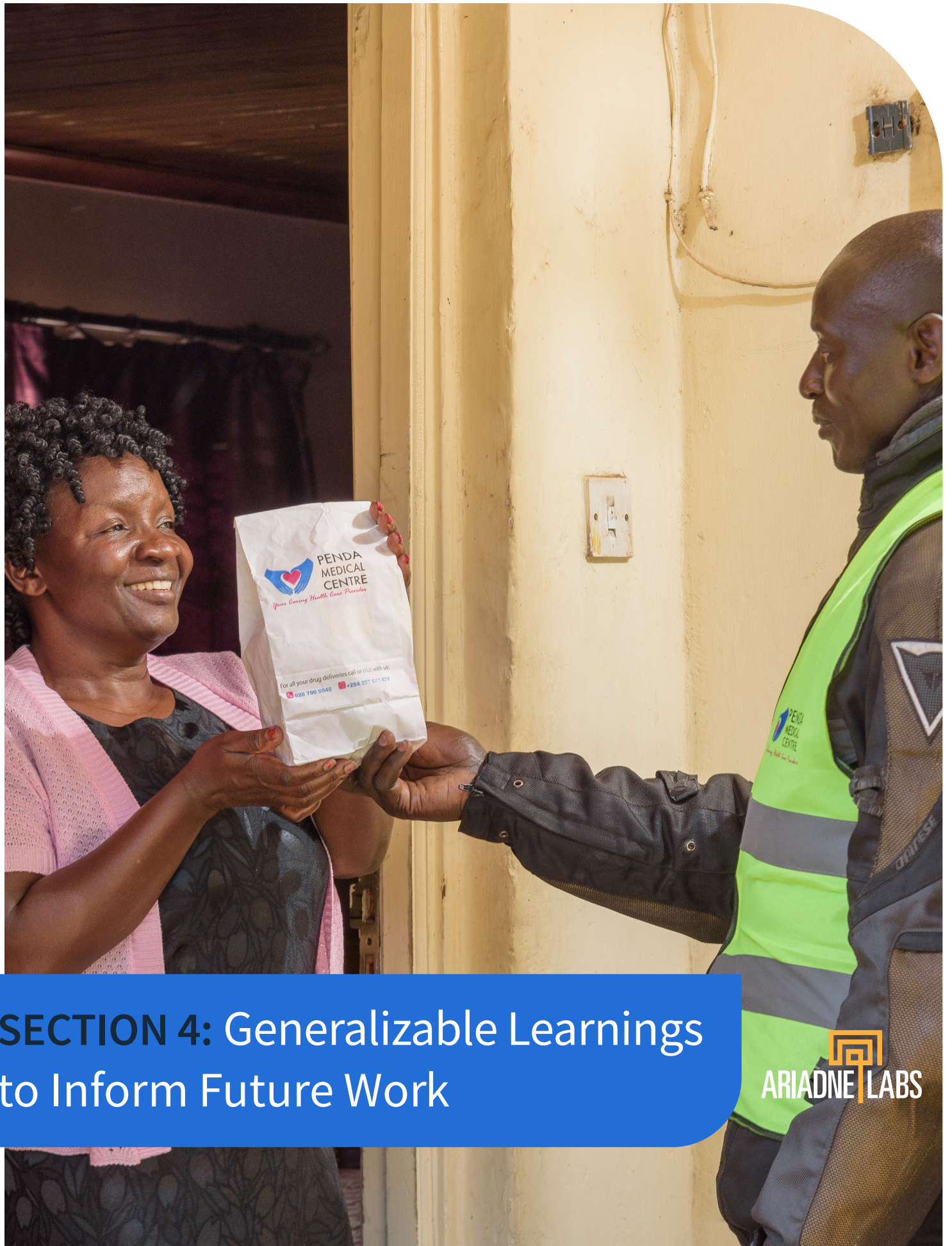
SECTION 4: Generalizable Learnings to Inform Future Work

This section speaks to lessons learned during this process that can be applied to contexts beyond an urban, private health system, as well as across other chronic diseases. First, we would like to emphasize that the implementation of this project reinforced the importance of grounding early pilots and planning for scale from the beginning by leveraging implementation science. Long-standing implementation knowledge continued to resonate with the team during the development and implementation of the intervention, including the importance of the EPIS framework, diligent preparation prior to implementation, and development of a pilot measurement plan. In the coming sections we discuss novel, generalizable learnings to inform others who wish to implement hypertension or other chronic disease interventions. Box 8 also contains initial thinking on opportunities for adapting this work to improve chronic disease outcomes at scale in lower-resource settings.

Box 8: Opportunities to improve chronic disease outcomes in lower resource settings

It will be critical to look into ways to prioritize essential components of this model when resources, time, and money are extremely limited but continued data collection, iteration on the intervention, and continuous learning are necessary before making any definitive calls.

1. **Public Policy**
   a. Food subsidies, food labeling, open spaces for physical activity
2. **Education**
   a. Public information campaigns
   b. School-based education on nutrition, physical activity, NCDs
   c. Changes to medical education curriculum to include training on NCDs
3. **New and expanded disease-based guidelines**
   a. National/subnational clinical practice guidelines
   b. Pharmacy formularies
4. **Patient-facing chronic disease tracking tools**
   a. Print-based
   b. Digital
5. **Leveraging existing resources**
   a. CHW
   b. HIV/other vertical disease programs
16. **Population health management**
   a. Print
   b. Digital

Patient Journey Mapping

Historically, there has been a provider-focused approach to designing chronic disease interventions, and most chronic care has been siloed with specialist providers in capital cities, isolated by geography and finances. Patient journey mapping is extremely useful, if not essential to those aiming to improve chronic disease management. Patient journey mapping serves a dual purpose by creating a patient-focused approach to intervention development and also preparing for intervention implementation.

Augmenting Intervention Development

The process of patient journey mapping enables a stronger intervention to be developed as it creates a clearer understanding of the current state for patients, including pain points and what isn't working well. The process also focuses the intervention development around the patient experience and how they will move through the proposed intervention. For example, during this intervention, patient journey mapping exposed previously unpredicted barriers to hypertension control including seven day prescription lengths, the high cost of specific generic name tablets, and the co-management of hypertension by multiple providers at public/private institutions. By identifying these issues, we were able to design an intervention that specifically addresses these, and other, patient concerns.

Paving the Way for Successful Implementation

The preparatory work involved in current and future state journey mapping helps give the team a deeper understanding of patient needs, provider context, and charts potential pitfalls during implementation. This work augments the Preparation step in the EPIS framework discussed above, specifically the "Assess the Context" directive, which stresses the importance of designing the intervention with the setting it will operate in closely in mind and facilitating a pathway for success when it comes time to implement. Though patient journey mapping can be time intensive, the payoffs are significant.

Chronic Disease Management

In designing an intervention to optimize hypertension control in Penda's patients, we found there were three main areas where chronic NCDs stood out from the clinic's existing approach to identifying and treating infectious diseases and malnutrition.

Clinical Practice Guidelines for Chronic Diseases

Clinical practice guidelines are frequently used to standardize and elevate the quality of care provided across many different conditions. However, clinical practice guidelines for NCDs are different from other guidelines given their chronic, long-term nature and because of the complexity involved in disease management. Clinical practice guidelines should be grounded in the patient experience and the specific context they serve. We found patient journey mapping was critical to developing a clinical practice guideline that would resonate with providers and would make recommendations that patients accepted and were able to follow. For example, through patient journey mapping we identified that cost, the burden of returning to clinics for refills, and the burden of multi-pill regimens were significant barriers, so we designed a clinical practice guideline that emphasized low-cost, single pill regimens.

We also found that clinical practice guideline for NCDs can be particularly difficult to create as there is a tension between the desire to be simple and create a standardized approach to care, while still accounting for the complexities of NCDs (the ways that multiple NCDs may interact, for example with diabetes and hypertension, or heart failure and hypertension). We aimed to follow national and regional best practice guidelines while incorporating additional new evidence from high-income settings. We also aimed to create a clinical practice guideline that was simple to follow and prescriptive to reduce inter-provider variability, while still being adaptable to different patient needs and identifying patients who require a higher level of care.

Long-Term Iterative Nature of Chronic Disease Management

Chronic NCDs are different from other types of diseases in that they are cyclical, long-term diseases that require frequent check-ins and medication adjustments. As a result, they require unique clinical practice guidelines. We needed to create clear ways to visually communicate the cyclical, long-term, iterative nature of chronic disease management into the clinical practice guideline while still keeping it simple and understandable. The scaffold (see Diagram 2) that we used for hypertension can be adapted to other chronic diseases, such as diabetes, heart failure, heart arrhythmias, and hyperlipidemia among others.

This cyclical nature means that patients have frequent clinic visits with intervals between clinic visits where they are particularly vulnerable to being lost to follow-up. These are thus critical time points for interventions to target. There is a need to find innovative ways to optimize clinic flow for continuity and follow-up assurance, optimize communication from the clinic during these intervals without being overbearing for patients, and create ways to recapture patients who have been lost. Particularly in a private market rather than a public market, this requires tact, as patients have varying desire to hear from the clinic outside of a clinic visit. There is a need for future research on clear protocols on making, tracking, and executing follow up periods as well as innovation in the chat/text/call space.

Training and Up-Skilling

We found that the process of Up-Skilling providers is complex and happens across multiple domains with a need for frequent reinforcement. This need is due to a few factors:

New Medical Content for Many Providers

For many front line primary care clinicians in low- and middle-income countries, a substantial curriculum was not devoted to non-communicable diseases in medical training. Many times, NCD management is left for specialist education though the current need for NCD management far outstrips what specialists can provide. Thus, for many clinicians, training may not be a "refresher course" but rather brand new information that they have not heard before. Spaced repetition, case-based learning, and deep explanations will likely be necessary. Additionally it may be necessary to spend time dispelling misinformation that has circulated.

New Skills for Many Providers

The management of a chronic disease requires skills beyond diagnosis and pharmacological management, which is atypical for other types of medical diseases. Both medical knowledge and newer behavioral and social science skills are required for effective management, which providers may need to learn de-novo. This includes interpersonal skills, motivational interviewing, un-learning paternalistic approaches to medicine, nutritional education, and education in physical activity. These skills are important to concertedly teach, rather than to assume that providers will develop over time. Time and attention during the training should be created for these techniques.

In order to best identify which skills and techniques will be most effective with patients in a specific cultural context, we recommend cross-disciplinary learning from other chronic disease projects, such as HIV or tuberculosis clinics. For example, in Nairobi, we found that there were rich lessons to be learned from HIV work, as both programs are working to convince asymptomatic patients to take a daily pill with repeat clinic visits and monitoring, and accompaniment of the patient over time. HIV work often centers the patient's beliefs and needs, which is critical for hypertension and NCDs. This can also be done on a broader scale across multiple chronic diseases. Cost burden, however, differentiates these two programs as HIV medications are typically free-of-cost, while there is a cost associated with hypertension medications for many patients.

Multidisciplinary Training

Multidisciplinary training of not only clinical staff (including providers and nurses) but also for frontline staff (including call center staff, laboratory staff, and pharmacists) is essential. In this project, a multidisciplinary training during the pilot was held, but over the first few weeks of the pilot it became clear that there would need to be additional training for front line staff that was distinct from the training providers received. This is understandable given the cyclical and longitudinal nature of NCD treatment, patients will be interacting with many staff members and will need to have the right direction from all staff for follow up appointments/reminders, etc. It is important to plan for and expect a tension between direct care provision (keeping clinics staffed and open) and creating enough time in training for clinicians to learn a lot of new medicine and new skills.

Population Health Management

Chronic diseases affect a large swath of the population, and ensuring that all patients are achieving disease screening and management targets requires a sophisticated population health management approach. It is best when this approach is tied to the development of the intervention - i.e., how will we evaluate what percentage of our patients with an elevated blood pressure reading have received a diagnosis of hypertension? How will we measure what percentage of our patients with hypertension have achieved blood pressure control? In order to answer these types of questions, it is necessary to have clear population

databases, diagnostic labeling (or disease-based registries), and integration of clinical data (BP) with those population health management structures. Clinics with strong population health management are able to both focus on a single patient's experience and develop a patient-centered approach, while also having the ability to zoom out and analyze how the population as a whole is doing. Electronic health records that are flexible and allow for customized reports can facilitate this work, as was the case with Penda's use of customized dashboards in Power BI. High-quality clinical data is needed for this type of work. While Penda's work was made more facile with technology, other contexts have had success with analog methods of population health management including handwritten disease registries or computer-based spreadsheet disease registries.

Conclusion

BP Sawa, a chronic care management program for Penda patients with hypertension was developed through a focus on patient perspectives and creating a clinical intervention tailored to the needs of an urban low- to middle-income population in Nairobi, Kenya. By using implementation science to prepare for the intervention implementation, the team was able to create a thorough intervention that was effectively rolled out at the pilot clinics sites. Though the pilot project is still in its early stages, we are seeing promising signs of effectiveness, which we expect to grow over time and as Penda Health expands BP Sawa throughout all of its clinics. Important lessons around patient journey mapping, clinical practice guidelines for chronic disease management, and population health management were identified.

Appendix

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Appendix 1: Current State Patient Journey 1

PENDA HEALTH CURRENT STATE | PATIENT EXPERIENCE 2.1

Monitored or Diagnosed Patient

Key moments	Penda Health Support Services		
	Pharmacy & Lab Services	**Blood Pressure Monitoring & Follow-Up**	**Provider-Patient Education**
Description	Penda patients refill medication prescriptions and complete lab orders provided by a provider.	Patients check their BP at Penda, at home, or at another clinic and track their results in a physical "BP Passport.. Providers review these results to inform patient treatment.	Penda providers offer education on hypertension to help patients understand the condition, its risk factors, and suggested lifestyle changes and medication treatment.
Patient Emotions	Informed, Proactive ● Accessing these services can alleviate related health anxiety	Acceptance of Routine Monitoring, Denial, Bothered	Informed, Empowered
Challenges	**Consultation Fee to Get Medication** Extra financial costs for patients to obtain medications can deter them from taking medications.	**Distance/Travel to Clinic** Frequent clinic travel may hinder patients. **Lack of Provider Continuity** Patients often prefer continuity of care from a single provider to build rapport and trust, enhancing their comfort and confidence in the management of their health. **Lack of Patient Consistency in Follow-Up and Monitoring** Patients may not consistently monitor their blood pressure, often checking it only when conditions or symptoms escalate.	**Variations in Provider Practice and Communication** The information patients receive varies based on who they talk to. There is no standardized patient education material or provider guidelines to ensure accurate and consistent recommendations.
Quotes	*"For patients, if they are just coming to us to get their medications from the pharmacy then could you have a specific BP targeted visit that only costs like 100. She thinks we should brainstorm on ways to get medication without consultation fee." - Penda Staff* *"We also have patients who are just here for refills. Sometimes those patients are very informed regarding their course." - Penda Staff*	*"Other patients present with symptoms (most commonly headache and decreased energy) and then they are either put on "monitoring" where they come in every day for BP monitoring and then they write down those BP monitoring number in a little physical book that they give the patients and then in the next 1-2 weeks they make a decision about whether or not to treat the patient." - Penda Provider* *"Some do come back for monitoring some are still in denial. Some do some don't." - Penda Staff*	*"Continuity with patients over time is critical to the success of getting someone to take long term medications because you learn how to communicate with them and what matters to them." - Penda Provider*

Appendix 1: Current State Patient Journey 2

PENDA HEALTH CURRENT STATE | PATIENT EXPERIENCE 1.0

Undiagnosed Patient Journey

Phases	Health Concern	Seeks Care	Diagnosis		Treatment Decision & Follow-Up	
Key Moments	**Local Pharmacist**	**Walk-in**	**Triage**	**Care**	**Pharmacy**	**Follow-Up**
Description	Patient experiences an acute health concern (e.g., stomach pain, ear infection, etc) Patient goes to a local Pharmacist for over the counter medication	Patient goes to a Penda clinic for care for their health concern. ● Register ● Wait for triage for 10-15 minutes	Nurse checks vitals and blood pressure. ● Vitals taken: temperature, BMI, weight, BP ● Informed about elevated BP ● Waits 15-20 minute for provider	Physician or consultant speaks to patient about their concern and their elevated blood pressure. ● Provider checks symptoms and clinical history ● Provides treatment for acute concern ● Prescribes medication for BP ● Patient education	Patient collects medication for acute concern.	Patient receives follow-up call from Pigia Penda Call Center after 3 days. Patient manages their hypertension over time using lifestyle changes and/or medication.
Patient Emotions	Physical pain, Anxious, Focus on relieving symptoms		Confusion, Distrust, Worried	Denial, Resistance, Confusion		Uncertainty
Challenges	**Prioritize Immediate Relief** Dealing with a pressing health concern can be frustrating and exhausting. Patients often feel drained, as their energy is consumed by figuring out how to address the urgent need.	**Barriers to Access** Patients have many challenges getting to a clinic: transportation, time off work, finding childcare, etc.	**Competing Health Priorities** Patient is preoccupied with a competing urgent health care need. They are not aware of or may feel no symptoms from their hypertension. **Lack of Hypertension Knowledge** Patients may not understand what hypertension is or why they should care about something that they don't have symptoms from.	**Patient Resistance During Initial Engagement** If this is their first time hearing about their diagnosis, the new information may shock patients, causing initial resistance. **Lack of Provider Protocol on Hypertension Diagnosis** Variation in how providers treat and respond to elevated blood pressure/signs of hypertension. **Distrust in Health Care System** Distrust in the health care system creates resistance to hypertension care, as patients may feel uncertain and skeptical about medical advice.	**Financial Barriers** Patient may not collect medication for blood pressure due to the cost of the pills. **Inconsistent Follow-up** Patient may or may not pick up medication for hypertension.	**Lack of Follow-Up / Uncertainty in Next Steps for Hypertension Care** Patients have uncertainty about next steps in care and do not receive consistent follow-up support from the health center **Variable Behaviors** Patients may or may not make lifestyle changes, begin monitoring their BP, or continue taking their medications.

Appendix 2: BP Sawa Pilot—Summary of Resources

These clinical and operational resources were developed or leveraged to support care delivery or key implementation activities throughout the pilot.

Clinical Resources

- Medical & operational equipment (BP cuffs, EHR, phones, medication, etc)
- Clinical Practice Guidelines
- Patient BP Passport
- Patient hypertension education materials (paper & digital)
- Call Center Protocols and Penda WhatsApp chat
- Pharmacy formulary & pricing

Implementation Resources

- Pilot Work Plan
- Clinical Pathway Details
- Clinician Training
- BP Sawa marketing materials
- Pharmacy and Lab patient education messaging
- Monitoring Dashboards

Data Collection Resources

- EHR
- Surveys
- Penda WhatsApp chat
- Interview / focus groups
- Manual check-in form

Appendix 3: Workshop 2 Synthesis of Challenges and Opportunities

	Patient Education & Support	**Provider Education & Support**	**Financial Burden**	**Clinic Operations & Efficiency**
CHALLENGES	• Patients have little to no or an inaccurate understanding of what a hypertension diagnosis means • Denial/rejection of diagnosis for various reasons (i.e. religion, stigma, etc.) • Patients' distrust of the system – strong belief that hypertenstion treatment/Rx] is a ploy to squeeze money out of them • Burden of hypertension diagnosis on daily life • Regular BP checks, getting to clinic, regular refills, etc. • Challenges with adherence due to: forgetting, external interference, side effects, mental health	**Motivation** • Providers feeling frustrated or helpless to support patients with a negative response to hypertension • Provider lack of trust that patients will do the BP checks • Provider lack of trust that BP check numbers are too good to be true **Opportunity** • Providers need clear clinical protocols for how and when to provide education, medication, and treatment based on diagnosis types **Ability** • Providers need the knowledge and skills to be confident in their ability to educate and treat patients with hypertension	• Cost of drugs for clinic and patient • Keeping up with cost of frequent BP checks for patient • Paying for travel to clinic	• Long wait times for labs, refills, and visits make it hard to find time to come to clinic • Low stock of medicines • No continuity of care, especially given the lack of standardization of hypertension guidelines, means repetitive or conflicting experiences for patients • Staffing for call center and clinic support of visits is low • Follow-up – 3/7 follow-up for hypertension patients may not be feasible, 2/52 is better • Contact tracing for defaulters is difficult
OPPORTUNITIES	• Education about hypertension & what the diagnosis means and entails. This could come in many forms: • Flyers, videos, social media, and other educational materials • Automated reminders and messages • Support groups & counseling • Set clear expectations with patients on what each visit entails and why they pay for certain things • Utilize "Na Penda" to send reminders and encouragement and work to improve adherence • Link patients to an hypertension coordinator/partner to work with them • Hospital chaplains • Offer a nutritional clinic for high-risk patients	**Motivation** • Incentivize hypertension care • Build buy-in **Opportunity** • Create a standardized treatment pathway with clear clinical protocols **Ability** • Provide easy to use clinical education and tools • Train clinicians on hypertension and the new Penda clinical protocols & tools	• Offer free BP checks • Give Penda points to patients who come to follow-ups/refill Rxs and use them as discounts on future Rxs, visits, etc. • Reduce drug pricing • Offer home/office drug deliveries, BP monitoring, telehealth visits • Source BP machines for patients so they can monitor at home • Budget-friendly drug brands	• Increase staffing to reduce wait times • Set guidelines/automation for scheduling hypertension visits • Ensure integration of chronic disease management to clinic visits • Offer free or easily accessible BP checks • Frequent follow-up by call center team after meds initiated • Automate clinic booking and scheduling • Virtual lab interpretation before the next visit • Next of kin identification to help with contact tracing for defaulters • Clinic day to review hypertension patients with providers/give updates • Specific clinic day for hypertension **TECHNOLOGY SPECIFIC:** • PowerBI reports for pop health management • Penda App to track BP and exercise • Record BP to Penda App that links to EHR records • Talent LMS: provider education on hypertension and clear guidelines and resources • Update EHR to reflect chronic care management – better visuals of BPs, CDSS, templates, packages etc.

Appendix 4: BP Sawa Clinical Practice Guidelines, Page 1

Penda Health BP Sawa Clinical Practice Guidelines

 # 1 - Diagnosis → **#2 - Initial Treatment** → **#3 - Maintenance & Follow Up** →

Clinic 1 — Interval 1 — Clinic 2 — Interval 2 — Clinic 3 — Interval 3 — Maintenance Schedule

Clinic 1 — Any clinic encounter with a blood pressure check

Document BP in EMR

Address reason for visit

BP >/= 130/85*

During visit
1) Provide initial HTN education
2) Give BP Passport
3) Instruct on collecting BP checks
4) Share Chat na Penda/Pigia Penda contacts for follow-up
5) Schedule HTN clinic visit in **1 week**

Interval 1

Patient has at least 3 BP checks each week at the MC triage or home
1) Call **Centre CO/Triage Nurse** reviews BP checks

BPs < 130 / 85

2) Call patient to cancel Clinic Visit 2
3) Instruct patient to check BP yearly

Clinic 2 — Initial HTN Clinic Visit

During Visit
1) Review intake BP and documented BP checks.

2 or more BPs >140/90*

2 or more BPs 130-140 / 85-90*

2) Diagnose **Hypertension**

2) Diagnose **Pre-Hypertension**

3) Provide hypertension education
4) Discuss lifestyle changes (Appendix C)
5) Instruct on BP checks schedule
6) Schedule HTN clinic visit in **1 month**

3) Provide pre-hypertension education
4) Discuss lifestyle changes (Appendix C)
5) Instruct on BP checks schedule
6) Order/plan for HbA1c testing
7) Schedule HTN clinic visit in **6 months**

7) Order labs: UA, UEC, HbA1c
(UA+ Cr strongly encouraged if other labs declined)

8) Start medications (See table below)

Clinic Visit 3 (see next page)

Interval 2

Patient has at least 3 BP checks each week at the MC triage or home
1) Call **Centre CO/Triage Nurse** reviews BP checks

BP >/= 180/120*

2) Call patient, take history for end organ damage and instruct them to come to the clinic
3) Call/inform physician of HTN crisis patient (see **Appendix D**)

Any non-crisis BP

2) Conduct WhatsApp check in with patient as needed
3) Continue to next clinic visit

monitor &/or diagnose HTN if either systolic or diastolic reading is greater than 140/90 or 135/85 respectively

HTN Grade	Lab Results		Medication	
140-159 / 90-99 **Grade 1 Hypertension**	UA - No Protein	Normal UEC	(CCB) Amlodipine 5mg	30 day supply
		UEC - GFR < 90 refer to physician	(ARB) Losartan 50mg (if GFR >30)	
	UA - Protein	UEC - GFR < 90 refer to physician	(ARB) Losartan 50mg (if GFR >30)	
>160 / 100 **Grade 2 Hypertension**	UA - Protein		Losartan/amlodipine 50/5mg (if GFR >30)	

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Updated: 07.22.24

Appendix 4: BP Sawa Clinical Practice Guidelines, Page 2

Penda Health BP Sawa Clinical Practice Guidelines

# 1 - Diagnosis	#2 - Initial Treatment	#3 - Maintenance & Follow Up

Clinic 1 — Interval 1 — Clinic 2 — Interval 2 — **Clinic 3** — **Interval 3** — **Maintenance Schedule**

Clinic 3 — Ongoing HTN Treatment Clinic Visits

During Visit
1) Review intake BP and documented BP checks

Controlled
< 130 / 85

Uncontrolled
>/= 130 / 85

Controlled path:
2) Take history and reinforce hypertension education
3) Instruct to continue medications and BP checks schedule
4) Assess readiness for change in follow up schedule
4) Update Rx refills
6) Schedule next HTN clinic visit based on appropriate maintenance schedule

- Change to **more frequent** schedule
- **Stay** on current schedule
- Change to **less frequent** schedule

Uncontrolled path:
2) Take history and reinforce hypertension education
3) Discuss lifestyle changes (Appendix C)
4) Assess Rx adherence
5) Schedule HTN clinic visit in **1 month**

Medication Adherence: **Good**

Medication Adherence: **Poor**

Good:
6) Update medication according to **Appendix A table**
7) Provide 30 day Rx refills
8) Schedule HTN clinic visit in **1 month**

Poor:
6) Use motivational interviewing to provide adherence counseling
7) Provide 30 Rx refills
8) Schedule HTN clinic visit in **1 month**

Any Interval

Patient has at least 3 BP checks each week at the MC triage or home
1) Call **Centre CO/Triage Nurse** reviews BP checks

BP >/= 180/120

2) Call patient and instruct them to come to the clinic
3) Call/inform physician of HTN crisis patient (see **Appendix D**)

Any non-crisis BP

2) Conduct WhatsApp check in with patient as needed
3) Continue to next clinic visit

Maintenance Schedule — Ongoing clinic visits scheduled based on hypertension control

1 month schedule	**3 month** schedule	**6 month** schedule
BP Checks at least **4** times/week Provide **30** day Rx refill Create pigia penda follow-up task	BP Checks every at least **2** times/week Provide **90** day Rx refill Create pigia penda follow-up task	BP Checks every at least **2** times/week Provide **90** day Rx refill Create pigia penda follow-up task

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Updated: 06.11.24

Appendix 4: BP Sawa Clinical Practice Guidelines, Page 3

Penda Health BP Sawa Clinical Practice Guidelines

Appendix A: Table for guiding medication changes for uncontrolled patients			
Starting medication	**Adjustment #1**	**Adjustment #2**	**Adjustment #3***
Amlodipine 5mg	Amlodipine 10mg	Add Losartan 50mg Obtain UEC	Add HCTZ 12.5mg
		Losartan/ Amlodipine 50mg/5mg	Switch to Amlozaar H 50/5/12.5
Losartan 50mg	Losartan/ Amlodipine 50mg/5mg	Add HCTZ 12.5	Switch to HCTZ 25mg
	Losartan/HCTZ 50mg/12.5mg	Switch to Amlozaar H 50/5/12.5	Switch to Amlozaar 100/10/25
			Add HCTZ 12.5mg
		If BP is still >150/100, double pills to Losartan/ Amlodipine 100mg/10mg	Add HCTZ 12.5mg
Losartan/ Amlodipine 50mg/5mg	Add HCTZ 12.5	Switch to HCTZ 25mg	If remains uncontrolled, refer to MO for further adjustments
	Switch to Amlozaar H 50/5/12.5	Switch to Amlozaar 100/10/25	
		Add HCTZ 12.5mg	
	If BP is still >150/100 double pills to Losartan/ Amlodipine 100mg/10mg	Add HCTZ 12.5mg	
*If BP remains uncontrolled on 3 antihypertensive agents, refer to MO for further adjustments			

Appendix B: Patient BP Check Information
Patients have 3 options to complete ambulatory BP checks: 1. They can have the BP checks at Penda (free with BP passport)   2. They can have the BP checks at outside facility (they should record it in their BP passport)   3. They can purchase a BP machine and take their BP at home (they should record it in their BP passport)   They should document their BPs by doing 1 or both of the following: 1. Writing the BP in their BP Passport and bringing it to their next clinic visit   2. Texting the BP or sending a picture of the BP Passport to Chat na Penda   BP Monitoring patient education resource

Appendix C: Lifestyle Changes
Exercise   • About 30 mins 4 x every week   ○ Ask: "What physical activities do you enjoy doing?   ○ Walking, running, dancing, etc   ○ Lifting weights, using resistance bands, body weight exercises   Smoking, Alcohol, & Caffeine   • Aim to reduce or ideally eliminate   DASH diet: Choose foods that are: • Rich in potassium, calcium, magnesium, fiber and protein   • Low in saturated fat   • Low in salt   Lifestyle Changes patient education resource

Appendix 4: BP Sawa Clinical Practice Guidelines, Page 4

Penda Health BP Sawa Clinical Practice Guidelines

Appendix D: Hypertension Crisis = Severe increase in BP >180/120	
Type: **Hypertensive Emergency** BP>180/120 **with** evidence of target organ damage, such as: ● Encephalopathy ● Myocardial infarction ● Stroke ● Pulmonary edema or AKI Symptoms may include: ● Severe headache ● Vision or hearing changes ● Severe chest pain ● Bloody urine **Immediate inpatient referral is required.** ● Can give nifedipine 20-40mg as a conservative mnx **while** activating ambulance referral.	Type: **Hypertensive Urgency** BP >180/120 **without** evidence of target organ damage. Requires mnx with oral antihypertensive medications. **Treat as uncontrolled hypertension**

Appendix 5: BP Sawa BP Passport

💗 **BP Sawa**

Blood Pressure Tracker

Patient name: _____ Patient ID: _____

Date:	Time:	Upper/ Systolic	Lower/ Diastolic	Pulse	Notes

PENDA HEALTH

Affordable, high-quality healthcare that allows you to *live life to the full*

💗 **BP Sawa**

Send these keywords on WhatsApp to get tips on;

Lifestyle
(Diet and exercise tips)

Dawa
(Medicine for controlling BP)

Tests
(Recommended tests and costs)

Myths
(On controlling blood pressure)

BP
(Info on how & when to measure)

High BP
(What is it?)

Chat na Penda | **+254 207 640 471**
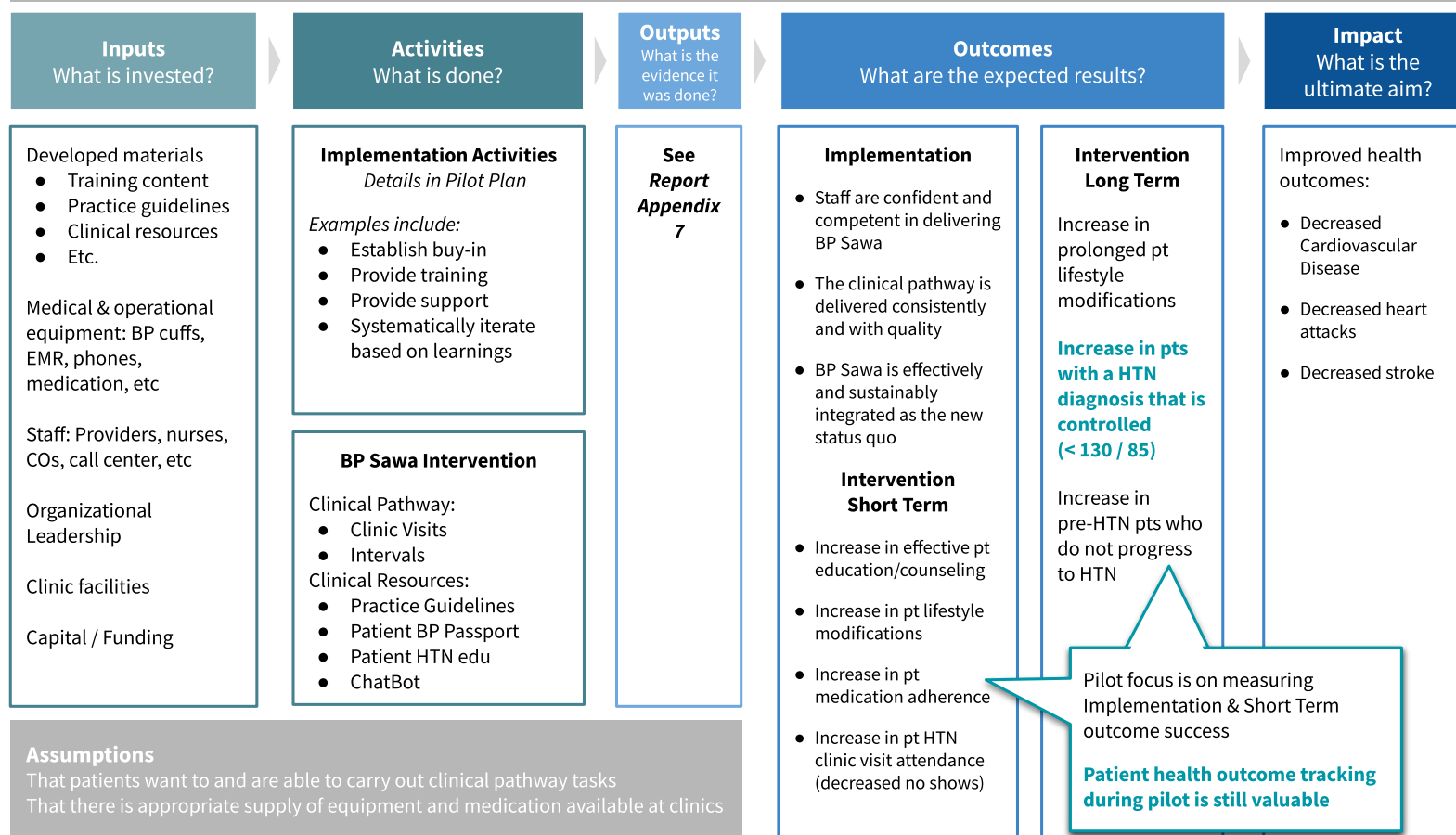
Appendix 6: Summary of Implementation Activities

	Activity	**Defining Questions**
EXPLORE	1. Define the scope and success	How do you define and measure success? What is the scope of the pilot?
	2. Establish buy-in	Who needs to understand the value of this program? How will you engage different roles to build their buy-in and support?
	3. Build your teams and project governance	Who will be responsible for planning and carrying out the pilot activities? How will you structure your teams and have clear communication and decision-making?
PREPARE	4. Assess the context	What are the strengths and opportunities for improvement in your organizational culture? How will you learn from people across the organization to understand your starting point?
	5. Develop the implementation strategy & work plan	What is your plan for carrying out each implementation activity? What timeline and key milestones will you plan for?
	6. Develop the monitoring & evaluation plan	What are your intervention (clinical) and implementation (process) learning goals for the pilot? What data is needed to answer those questions and what methods and tools will be used to collect it?
	7. Develop resources	What clinical and implementation resources are needed to support the pilot activities?
	8. Provide training	What knowledge and skills do staff need in order to carry out pilot activities? How and when will training and ongoing education be delivered to staff?
IMPLEMENT	9. Go live with practice change	When will staff be expected to start doing the practice change?
	10. Provide support	How and when will you support staff throughout the pilot via coaching and check ins?
	11. Collect data and feedback	How and when are you gathering feedback and data from staff and patients? How and when are you reviewing and analyzing that data to ensure progress?
	12. Systematically iterate based on learnings	How will you use the data for decision making? What are you learning that can be used to improve the intervention and/or implementation activities?
SUSTAIN & IMPROVE	13. Routinely communicate progress and results	How and when will you share learnings and data with staff to celebrate progress and motivate improvement?
	14. Evaluate impact	How and when will you analyze your findings to determine if you have achieved clinical and implementation success? How will you measure the impact of your pilot?
	15. Explore expansion	Based on what you learned, what are next steps after the pilot?

Appendix 7: BP Sawa Logic Model

BP Sawa Logic Model Version 6.18.2024

This logic model provides a working summary of the BP Sawa program at Penda Health. It frames the program components to show the relationship between what is done (inputs, activities, and outputs) and the expected/intended results (outcomes and impact). This is a living document that will evolve based on pilot learnings.

Problem Statement: Penda patients don't receive or engage in effective hypertension (chronic care) management
Context/Situation: Penda has primarily provided urgent care services, and does not have clinical pathways for chronic care management
Goal: To establish a hypertension clinical pathway for clinicians and patients to effectively improve hypertension outcomes
Target Population: Penda Health patients with hypertension

Inputs What is invested?	Activities What is done?	Outputs What is the evidence it was done?	Outcomes What are the expected results?		Impact What is the ultimate aim?

Inputs

Developed materials
- Training content
- Practice guidelines
- Clinical resources
- Etc.

Medical & operational equipment: BP cuffs, EMR, phones, medication, etc

Staff: Providers, nurses, COs, call center, etc

Organizational Leadership

Clinic facilities

Capital / Funding

Activities

Implementation Activities
Details in Pilot Plan

Examples include:
- Establish buy-in
- Provide training
- Provide support
- Systematically iterate based on learnings

BP Sawa Intervention

Clinical Pathway:
- Clinic Visits
- Intervals
Clinical Resources:
- Practice Guidelines
- Patient BP Passport
- Patient HTN edu
- ChatBot

Outputs

See *Report Appendix 7*

Outcomes

Implementation
- Staff are confident and competent in delivering BP Sawa
- The clinical pathway is delivered consistently and with quality
- BP Sawa is effectively and sustainably integrated as the new status quo

Intervention Short Term
- Increase in effective pt education/counseling
- Increase in pt lifestyle modifications
- Increase in pt medication adherence
- Increase in pt HTN clinic visit attendance (decreased no shows)

Intervention Long Term

Increase in prolonged pt lifestyle modifications

Increase in pts with a HTN diagnosis that is controlled (< 130 / 85)

Increase in pre-HTN pts who do not progress to HTN

Pilot focus is on measuring Implementation & Short Term outcome success

Patient health outcome tracking during pilot is still valuable

Impact

Improved health outcomes:
- Decreased Cardiovascular Disease
- Decreased heart attacks
- Decreased stroke

Assumptions
That patients want to and are able to carry out clinical pathway tasks
That there is appropriate supply of equipment and medication available at clinics

Appendix 8: Priority Data for Pilot M&E

Clinical Pathway Metrics
that will demonstrate:

- **Success**
- **Drop out***
- **Potential opportunities for improvement***

Data will require follow up to understand "why"

#/% pts with a new BP >/= 130/85 (denominator = all pt visits)

 # pts with # completed BP checks at each interval (0 BP checks)

#/% pts who **attend** or **no-show** each clinic visit (denominator = scheduled visits)

#/% pts who **receive treatment** of **decline prescription** in Clinic 2 visit

#/% pts with **good** or **poor** med adherence in Clinic 3 visit

#/% pts who **attend** or **no show** 1, 3, or 6 month follow-up visit

#/% of pts who use keywords in WhatsApp chat (denominator = pts with elevated BP)

#/% of each keyword used in Whatsapp chat

#/% of pts who bought meds with us (denominator = pts who received Tx)

#/% pts who **complete** or **do not follow through** with ordered labs

#/% pts who **complete** or **do not follow through** with med pickups

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Clinical Pathway Experience Data

*Both categorical data and qualitative data
**Just qualitative data

Patient (stratified by demographics)

- Satisfaction with experience of clinical pathway*
- Facilitators and barriers to care**

Clinical team (stratified by demographics)

- Satisfaction with experience of clinical pathway*
- Facilitators and barriers to providing care**

Implementation Data

Clinical team (stratified by demographics)

- Satisfaction with experience of implementation activities/process**
  - Training Evaluation*
- Facilitators and barriers to implementation**

Activity monitoring

- #/% of staff trained (stratified by demographics)
- # of medical center visit check ins per site
- # of iterations of the clinical pathway and resources based on feedback