



**MEXICO**

# Preventing Chronic Disease through Innovative Primary Care Models

**CASALUD**

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## Mexico

# Preventing Chronic Disease through Innovative Primary Care Models

CASALUD | Mexico (nationwide)

**Provider type:** Nonprofit organization

**Patients served annually:** 1.3 million within the Mexican public health system, Seguro Popular

## PART 1: BACKGROUND

### Country Profile

Over the last 20 years, the prevalence of chronic or non-communicable diseases (chronic disease) in Mexico, a country with a population of 122 million, has increased rapidly (**Figure 1**). The growing prevalence of chronic diseases spans all levels of society and is increasing rapidly among the poor. The Mexican health system is struggling to effectively adapt to the new disease burden facing the nation. Health care spending represents approximately six percent of GDP and is divided near equally between the public and private sector.

Figure 1: Prevalence of Chronic Diseases in Mexico from 1993-2012



Mexico's national health system is characterized by two systems of care. The first is a social health insurance (SHI) system operated through the Mexican Social Security Institute (IMSS) and the Institute for Social Services and Security for State Employees (ISSSTE), which is linked to employment and covers Mexicans who are employed in the private sector and federal and state governments. Money is taken out of the beneficiary's salary to cover a portion of the costs, and the rest is covered by the employer and the government.

The second is a social protection system operated through the National System for Social Protection in Health (or Seguro Popular), is for Mexicans who would otherwise be uninsured. These individuals are non-salaried workers who are employed in the informal economy sector amounting to approximately 60 percent of all workers in Mexico (30 million individuals), although the population includes entrepreneurs and those who are self-employed, the majority are low-income individuals. This case study will focus on the second system or Seguro Popular.

Seguro Popular was established in 2003 to provide a safety net to this vulnerable population that falls outside the formal social health insurance system. Seguro Popular is funded through three sources: insured participants and the federal and state governments. In the last decade, Seguro Popular has successfully scaled up. In fact, as of March 2015, over 57 million Mexicans, including children, are enrolled in the program.

Despite the widespread coverage of Seguro Popular, structural challenges make it difficult to deliver quality health services in an effective way. This creates deficiencies in care including inadequate access to medical rooms. While more than 80 percent of primary health clinics are located in rural areas, 78 percent of rural health clinics only have one medical room. It also results in lengthy wait times averaging over 2 hours and pharmaceutical stockouts, which is when the clinic or hospital runs out of a drug, that range from 3 to 58 percent. As a result, only 56 percent of patients receive all the medicines prescribed by the physician. Finally, there is inconsistent use of standard management procedure where six out of ten patients with diabetes do not receive a foot examination or an eye examination during a consultation.

In general, the Mexican health system under Seguro Popular focuses on treatment of a current illness or condition instead of preventing a future illness or progression of a condition. This approach has led to a weak primary care system that delivers poor quality services in Mexico. CASALUD program aims to reform this approach to care.

### Health System Profile



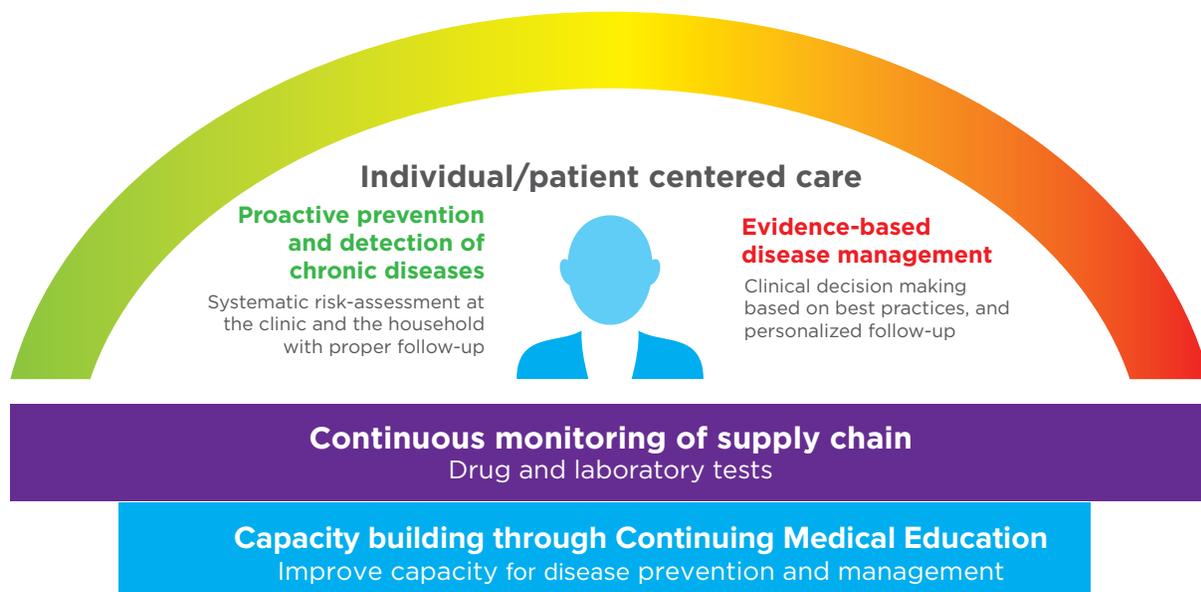
*A nurse in a Mexico City primary care clinic assesses a patient's risk of hypertension using new health technologies.*

In 2008, Fundación Carlos Slim (FCS) established the CASALUD model to develop innovative public health policies that transform primary care by providing mobile health (mHealth) tools and clinician capacity-building and training to reengineer the delivery of health services. FCS does not provide direct medical services or payment to providers. Instead, the CASALUD model fosters technological innovations to better engage patients and manage diabetes and educate health care professionals within Seguro Popular.

The central tenet of CASALUD is to establish a proactive prevention strategy of chronic diseases and to improve the delivery of chronic disease management through the implementation of care innovations (**Figure 2**). Health care delivery extends outside the clinical setting to incorporate more family and community involvement. The program uses mHealth tools to connect households and primary care clinics. The mHealth tools enhance patient-centered care by increasing individual ownership and responsibility for health management. The CASALUD program also provides community outreach to enhance prevention and control of chronic diseases.

The central tenet of CASALUD is to establish a proactive prevention strategy of chronic

Figure 2: The Five Pillars of the CASALUD Model



Source: Carlos Slim Foundation

Starting in 2009, CASALUD was piloted in seven Mexican states, and its results show significant improvement in patient self-management, clinician knowledge of chronic disease management, and informed clinical decision-making. Building on these positive results, FCS convened a partnership with the Ministry of Health of Mexico in December 2012. The goal of the partnership is to deploy CASALUD nationally by implementing the program in a group of primary care clinics as a component of the National Strategy for the Prevention and Control of Pre-obesity, Obesity and Diabetes. To date, CASALUD has been scaled-up in more than 20 states and 120 primary care clinics through a two-stage “social franchise” model covering approximately 1.3 million lives. The roll out will take place over two stages:

**Stage 1:** One technical network is established in each Mexican state. Each network includes between four and ten public primary health clinics. In this stage, the FCS pays for all technology platforms including online courses and mHealth platforms. The federal government will cover costs for new computer equipment in participating clinics while state governments cover costs for the regular operation of the clinics (e.g, medications, lab tests, health workers).

**Stage 2:** The state governments adopting the model will begin to replicate the networks throughout their state using the free license electronic health records (EHRs) and reporting softwares created by FCS. In this stage the technology platforms explained in **Section 3** will be subsidized by the state government, and FCS will assist with technical support. Roll out follows a social franchise model since the FCS owns the EHR and reporting software, which is provided free of charge, while governments support regular operations plus some of the technologies proposed as part of the model.

## PART 2: INNOVATIONS IN CARE

CASALUD proposes a new approach in health care delivery using a variety of technology-based tools to support better diabetes care in Mexico (see **Appendix 1**). There are five pillars of the program: 1) proactive prevention and detection of chronic diseases; 2) evidence-based disease management; 3) supply chain improvements; 4) capacity building of health care professionals; and 5) patient engagement and mHealth.



a partnership with the Joslin Diabetes Center and the Mexican National Institute of Medical Sciences and Nutrition has created a certification of competencies in chronic disease to strengthen five key areas for disease management: detection of a problem, systematic approach, adequate decision-making, follow-up, and opportunities for prevention.

**Patient engagement and mHealth.** Patient engagement and empowerment is enhanced through education programs with curricula created through partnerships with institutions such as the Joslin Diabetes Center, Mexico’s National Nutrition Institute, and the Mayo Clinic. These programs allow individuals to engage in the prevention, management, and control of their health. Patient outreach is also enhanced through mHealth technologies (see **Appendix 1**) that allow at-risk patients to interact with clinicians through text messaging or mobile apps. For instance, MIDO Mi Diabetes (I Measure My Diabetes) is an app developed to help patients achieve metabolic control and avert complications through self-management.

### PART 3: CHARACTERIZATION OF ACCOUNTABLE CARE

This case study applies the five pillars of the Global Accountable Care Framework to showcase the CASALUD program (see **Figure 4**).

*Figure 4: The five pillars of accountable care and key innovations*

| Conceptual Pillar                    | Definition  | Key Success Factors at CASALUD  |
|--------------------------------------|---|---|
| Population                           | Identifying a defined group of patients for which providers are responsible   | Includes all Seguro Popular beneficiaries at-risk and ill patients identified within individual states  |
| Performance measures                 | Defining a set of targeted performance measures that ensure patient-centered outcomes are met   | Evaluates health outcome measures using process measures, clinical indicators, and cost comparisons   |
| Continuous improvement               | Evaluating performance through learning and continuous improvement feedback loops   | Supports continuous education process to improve evidence-based public health knowledge for all clinical staff  |
| Payments and incentives              | Establishing aligned payments, non-financial incentives and rewards to outcomes that matter to patients   | Grants non-financial incentives through a benchmarking contest: <i>Clinics of Excellence</i> . These clinics receive national recognition and further capacity building |
| Care coordination and transformation | Implementing delivery and care transformation reforms that improve low-cost, high-impact, or high-value, care coordination including team-based structures, better decision support systems and enriched IT and analytics | Creates patient-centered model focused on coordinating care across the care continuum via EHRs with increased caregiver and patient involvement through online portals  |

#### Population: What population group is included in the model?

As of January 2015, there are 20 health networks undergoing care delivery reforms facilitated by the CASALUD model, covering approximately 1.3 million lives within Seguro Popular. Seguro Popular’s beneficiaries above age 19 are eligible for the systematic risk assessment through technology-enabled tools for better disease management if diagnosed with a chronic disease. Any eligible patient with Seguro Popular can receive CASALUD services if the clinic they are seeking services from has adopted the program. At this time, the total network includes 103 primary care clinics, 20 specialty ambulatory care clinics, and nearly 3,000 clinicians.

**Performance measures: What types of measures are used?**

CASALUD’s reporting systems include validation mechanisms to analyze data quality and quantity. Up-to-date and reliable information for decision makers is available at the national, state, and clinic level; states are responsible for all data input.

Previously, patient data was recorded using paper registers, but the CASALUD model has introduced electronic monitoring of patient data to improve the accuracy and reliability of patient measures. The CASALUD model has also introduced improved chronic disease measures based on leading evidence such as the completeness of laboratory tests. The performance measures are divided into two categories, process indicators and health outcomes (**Figure 5**) and none of these measures are linked to payments or bonuses.



*A nurse conducts an at-home risk assessment using new technologies.*

*Figure 5: CASALUD performance measures*

| Performance Measures   |
|--|
| <b>Process Indicators</b>  |
| Population screened as percent of total target population  |
| Percent of at-risk patients with a follow-up assessment  |
| Percent of patients with a disease detected with a follow-up assessment  |
| Number of patients with a chronic disease in treatment as percent of expected patients with a chronic disease                |
| Frequency of consultations per patient   |
| Completeness of measurements and examinations in each consultation (lab tests, basic measurements, foot and eye examination) |
| Consistency of prescribed treatment  |
| Monthly stock levels and dispensed quantities, per drug and lab test   |
| Stockout of drugs and lab tests  |
| Anthropometric Parameters (BMI, WHR)   |
| Clinicians with completion of diploma degree as percent of total clinicians enrolled at the clinic                           |
| Number of clinicians that have graduated or received certification in competencies (% of total clinicians enrolled)          |

Outcome Measures

Percent of patients healthy

Percent of patients at risk (pre-disease)

Percent of patients with a disease (detected case)

Percent of patients with DM2 with A1c<7

Percent of patients with hypertension with BP < 140/90

Percent of patients with obesity with BMI < 30

Percent of patients with dyslipidemia with total cholesterol < 200 and LDL < 100

CASALUD is currently using a randomized control trial to evaluate the program’s effectiveness on disease outcomes and is evaluating the cost-effectiveness of the program, specifically hospital service utilization, savings to the health system, and out-of-pocket expenditures.

**Continuous Improvement: What system is in place for performance improvement?**

The Integrated Dashboard displays the continuous measurement, publication of clinical indicators and training completion by health unit and state. This provides non-monetary recognition and increased transparency. While the CASALUD technology system is an effective tool, several operational issues hamper its effectiveness. The information that clinicians input into the dashboard may be inconsistent, which makes producing accurate, comparable metrics challenging. The publication of clinical indicators and training status of health care staff is used to foster competition on quality and consistency. Clinical data is only available to clinicians and policy makers.

The dashboard presents performance measures by clinic and state to highlight regional differences. In regard to training, the dashboard shows what training course each clinician has taken as well as their training status (e.g., graduated, in progress or incomplete). Lessons address complex disease prevention, and management is supported by the latest public health evidence and epidemiology. Clinicians must complete certificates but can also obtain diplomas; CASALUD covers the cost of courses.

**Payment and Incentives: How are financial and non-financial incentives used in the model?**

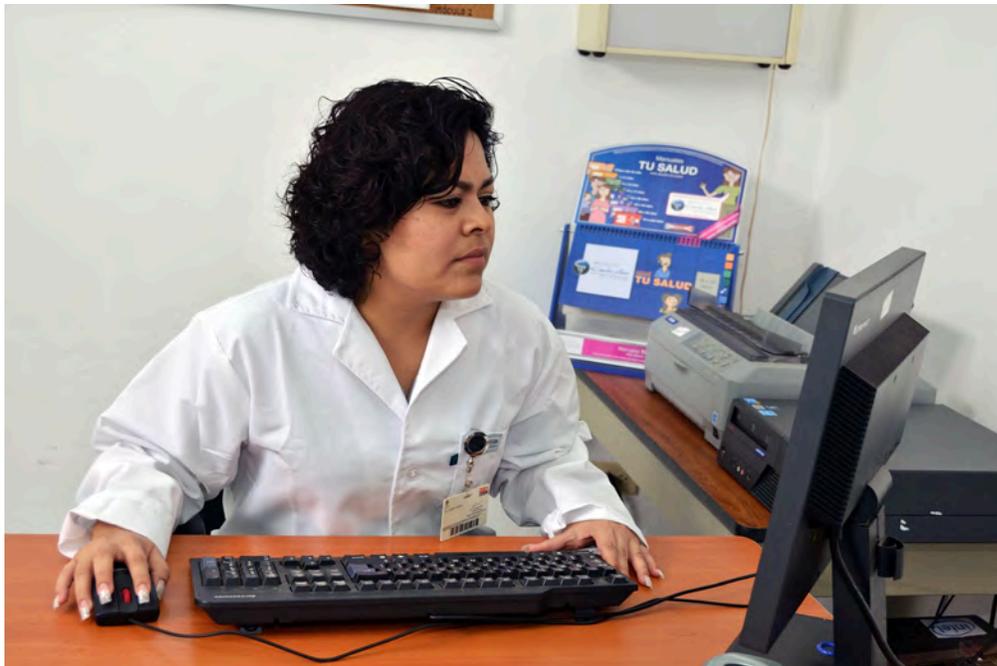
CASALUD is not responsible for provider payment. Under Seguro Popular, the federal and state governments are responsible for payment and enrollees. As mentioned earlier, provider payments are not linked to performance measures. The federal government provides to Seguro Popular a capitated annual budget based on the number of beneficiaries (estimated \$150 USD). State governments provide a smaller additional capitated payment per beneficiary based on geography (estimated \$30 USD) and enrollees pay according to their ability (e.g., low-income populations do not pay for services).

A state’s Seguro Popular annual budget is divided between clinic payroll (max. 40 percent), drug costs (max. 30 percent), prevention efforts (min. 20 percent), and operation costs (maximum six percent). Seguro Popular compensates public clinics on a capitated basis based on the number of patients seen. The capitated fee only covers services within the Universal Catalog of Health Services. Technical updates included within CASALUD are funded through the prevention effort portion of the state budget. In the second stage

of implementation, under the social franchise model, states will pay for the regular operation of the clinics as well as hardware tools proposed by the model.

CASALUD aimed at improving quality of care through close collaboration under learning communities where clinics share their experiences and best practices. CASALUD offers non-monetary incentives to clinics with the best performance. Clinics are evaluated by considering overall performance and speed of improvement over a six-month period. The evaluation is based on information generated from the dashboard and recognition is carried out in two phases. First, a “clinic of excellence,” is selected in each state, and second, the best “clinics of excellence” are selected and publicly recognized. The latter receive non-monetary incentives that include system improvements for connectivity and enhanced capacity.

**Care coordination and transformation: What types of team-based structures or data analytic supports are used to reinforce care transformations?**



The patient-centered model uses innovative mHealth technology to incorporate patients as integral members of the care team. CASALUD integrates the community, families, and patients into the continuum of care through extensive outreach through technology. Technology portals are used to provide tools for patients to manage their health and disease. Such tools were not available before the program and are crucial for this shift.

*A doctor in a Yucatán primary care clinic reviews patient results using health IT tools.*

CASALUD is rooted in technology to transform and better coordinate prevention and care. The dashboard is the central hub that pulls data from all other technical portals to improve care coordination by integrating patient data with supply chain information and community outreach efforts. The information system shows local, state, and national data and reports from all care levels. All participating units have access to patient files and outcome measures to support care coordination.

**CASALUD’s Results**

CASALUD has made significant strides in transforming care delivery in Mexico in each of the pillars of its model (**Figure 6**).

Figure 6: Results of the CASALUD model

| Pillar  | Before CASALUD  | After CASALUD   |
|---|---|---|
| <b>Proactive prevention and detection of chronic diseases</b> | Approach focused solely on treating—not preventing—chronic disease  | Preventative approach. Risk assessment tool has enabled clinics to assess and detect at-risk patients, and perform systematic risk assessment outside of a hospital setting in the community and households   |
| <b>Evidence-based disease management</b>                      | Primary care clinics showed inaccurate estimates for multiple diseases (comorbidity), metabolic control, and pharmacological treatment. The under-estimation of comorbidity has an impact the quality of care provided, and the supply of drugs and lab tests | <p>New technologies have paved the way for evidence-based policy dialogue. Areas for improvement include:</p> <p><b>Comorbidity.</b> Estimates show that 70 percent of patients with DM2 have a comorbidity and 34% have metabolic syndrome</p> <p><b>Metabolic Control.</b> Only 12.8% of patients with DM2 have had an A1c test done in the last 6 months. Of those, only 36.1% have A1c &lt; 7.12</p> <p><b>Pharmacological treatment.</b> Only 19.2% of patients with DM2 are prescribed insulin, compared to the international standard of 35%</p> |
| <b>Continuous monitoring of supply chain</b>                  | Clinics had stock-out rates of 42 percent for drugs, including essential medicines like metformin and glibenclamide. These had had an average commodity stockout rate of 16%  | <p>Stockouts reduced to 15%</p> <p>Clinics have replaced paper-based systems with electronic online systems what support to monitor drugs and lab tests supplies more effectively</p>   |
| <b>Capacity building through continuous medical education</b> | 84% of physicians thought they required more training to prescribe insulin effectively  | Clinicians routinely capture and update results from the assessments, treatment to patients, and drug stock levels, therefore increasing timely decision making   |
|   | 70% of physicians said they were prescribing physical activity to patients, yet only 49 percent of patients recalled receiving a physical activity plan   | Clinicians acknowledge the importance of patient-centered approach  |
|   | 88% of physicians said they were prescribing a nutrition plan, yet only 50 percent of patients recalled receiving one   | After the diploma, clinicians improved their knowledge of prevention, detection and management of chronic diseases  |
|   | Clinicians disease management knowledge baseline on a 1-10 scale before obtaining Diploma Degree was 2.7  |   |
| <b>Patient engagement</b>                                     | Passive patient approach to disease management  | At risk patients use tools to help them understand their health to prevent chronic diseases and sick patients count with tools to self-manage their disease   |

## PART 4: THE FUTURE OF ACCOUNTABLE CARE AT CASALUD

Since piloting in 2008, the CASALUD program has encountered various challenges to successful implementation of the model.

**Challenge 1: Systematic prevention and treatment of chronic diseases.** CASALUD's main objective is to improve patient lives by transforming quality of care through the reengineering of prevention and treatment of chronic diseases. Clinic structure is variable and their performance differs, which means the care transformation process must be flexible. It must not only accommodate technological innovations, but also consider the restricting of primary care altogether.

**Challenge 2: Patient engagement.** Under this new model of patient-centered health care, patients must be engaged in their own health; however, estimates show that only 50 percent of Seguro Popular patients comply with their prescription, irrespective of disease and age. Additionally, patients with chronic diseases usually require complex medication regimens and typically, as complexity increases, patient compliance will decrease. Finally, patients usually stop taking their drugs after a certain period of time (e.g., patients with hypertension usually stop within 90 days) because they feel well. In light of these recurring challenges, patient engagement and patient self-efficacy are the greatest obstacles that CASALUD faces with implementation.

**Challenge 3: Incentives for Providers.** Currently, Seguro Popular provides the payment of health services on a *per capita* basis, but not for outcome or performance. CASALUD aims to transform the prevailing paradigm of care through non-monetary incentives. It created an incentive scheme to provide both social and moral incentives to ease the adoption of the model. The incentive scheme provides non-monetary rewards to both clinics and clinicians. Forthcoming preliminary results indicate that while these incentives are robust in their design, they have not shifted attitudes of clinicians toward new models of care. Clinical delivery reforms require some additional work on behalf of the clinics, and public clinics are already limited in their time and resources.

**Challenge 4: Limits on Accountability in the Current Structure of the National Health Insurance (Seguro Popular).** Health care under Seguro Popular is decentralized, which means that the federal government issues the regulatory framework, and state governments implement care delivery. Each individual state is responsible for budgeting, provider contracts, collection of insurance premiums, and provision of health services. The state contracts with numerous care networks to implement Seguro Popular. Because many networks are involved and there is a lack of price transparency, there are vast differences in pricing, care delivery, and resource management across states. The number of primary care providers, nurses, and specialists vary greatly between states and there are major gaps in service allocation between urban and rural settings. There are many reports of issues such as under-spending, mismanagement, supply chain issues, and resource division differences.

CASALUD is working to overcome transparency and uniform care protocol issues within Seguro Popular. CASALUD aims to reengineer processes associated with prevention, detection, and treatment of chronic diseases to standardize and optimize health services delivery. Traditionally, the processes under Seguro Popular are not uniform. For instance, 87 percent of clinics are not aware of their population, and 50 percent of clinicians believe they only need to serve patients upon office visits as opposed to a more proactive approach.

A 2008 federal government regulation requires that all states allocate 20 percent of Seguro Popular toward prevention; however, this spending is at each state's discretion. Accountability and transparency measures are not enforced at the federal level to ensure adequate spending on thoughtful prevention efforts and efficient management of funding. This allocation of resources on prevention could be used to expand current CASALUD strategies, especially if funds were linked more directly to improvements in prevention.



Photo: Reuters 2015

**Challenge 5: Technology Uptake.** One pillar of the CASALUD model is robust information systems, and while the dashboard is an effective tool, there are also some challenges. Currently, most health records in Mexico are paper-based posing many challenges to implementing new technological systems. Although technology and connectivity are being adopted at an increasing rate, there are still many gaps. In addition, many clinicians are not adequately trained to use new technologies. CASALUD is working closely with clinicians to ensure that the transition to new technologies is smoother, but there is also a need for financial incentives to improve rates of adoption and use.

Further, the organizational culture is not accustomed to results-based management. Previously, paper-based records were filled out for administrative reasons and were burdensome to providers. Therefore, the quality of data varies, and the data entered into the dashboard is inconsistent. CASALUD is promoting an aggressive public health agenda to engage decision makers in evidence-based policy dialogue. Discussions highlight the main instruments available: the dashboard, community screening tool, supply chain monitoring system, online education courses, and two patient engagement tools. Additional discussions focus on the whole CASALUD model and quality of care as an effort to use “big data” to monitor performance. By providing robust, user-friendly analytical tools, CASALUD promotes a new care delivery culture where performance can be monitored.

### **Policy Implications**

The CASALUD model is transforming the Seguro Popular insurance system by incorporating cost-saving public health interventions, which include prevention efforts, screenings, and patient self-management.



The supplemental program works within the existing system to strengthen complex care delivery through technical support and provider training. Lessons can be learned from the challenges during the current national scale-up.

**Incorporate financial incentives for care quality.** The current model does not reform the payment structure of Seguro Popular. CASALUD aims to focus on prevention efforts that achieve measurable improvements in chronic disease care. Process and outcome indicators are available to the

public through the dashboard, and in-house information systems allow clinicians to capture data directly rather than depending on third-party sources. CASALUD also performs comparative effectiveness analysis at the state, jurisdiction, and primary clinic levels. This information not only provides incentives to help decision-makers highlight and promote better care but also empowers patients to demand better care.

To support this new model, CASALUD has implemented a non-financial incentive mechanism that rewards clinicians and clinics performance based on overall results and rates of improvement. In the long run, outcomes-based management performance could serve as the basis for outcomes-based funding. The next step forward to improve the quality of care is to financially support patient-centered outcomes and coordinated care. The first step is to improve the accuracy and consistency of data entered into the dashboard. For example, in the United States many health systems have started with additional payments for accurate reporting and use of technology systems with only limited outcome dependence (e.g. shared savings only, no downside risk). This means working within the regulatory framework to update legislation to incorporate financing measures with bundled payments and additional rewards to ensure measures are reported accurately and with limited burden using tools like those in CASALUD.

**Create patient-centered team-based structures.** The fragmented nature of Seguro Popular funding both within and between states hinders the development of truly coordinated care teams. There is also no financial support for team-based groupings that cross public and private institutions as patients might seek care from various different providers. States need to improve structures and incentives to provide more coordinated care. A proposal is to have the capitated payment be adjusted for quality that could be split among clinics and other providers within a network to support team-based care.

**Improve system transparency.** Seguro Popular should increase transparency to address the differences in care provision and resource management between states. A major challenge is the resource and pricing heterogeneity between states, which can be improved through increased transparency to improve efficiency and provide appropriate cost reallocations. Transparency will also ensure that implementation is consistent for the CASALUD model in each state. All stakeholders including states and providers should have a clear idea of pricing and quality indicators.

**Shift to patient-centered outcomes.** CASALUD should continue to build clinicians' capabilities across Mexico through the medical education program to change their mindset from a traditional approach to a patient-

centered model that empowers at-risk individuals and patients with chronic diseases. CASALUD should also continue engaging patients to learn about their health, understand risk factors, and engage in self-management thereby demanding better health services delivery. CASALUD offers two innovative online portals that patients and caregivers can use to input personalized plans.

**Support technology adoption through financial support.** CASALUD promotes the adoption of EHRs, which enable decision makers to estimate demand of health services effectively through stock-outs and recognizing unmet health care demand. Furthermore, EHRs provide a solid foundation for personalized public health that enable clinicians to follow the individual throughout the continuum of care with up-to-date high quality information. EHRs linked to mHealth platforms aid in proactive prevention, early detection of chronic diseases, and engaged disease management.

**Advance mHealth regulations and access.** mHealth is the backbone of patient self-management in the CASALUD model; it is critical that technical infrastructure and national regulations improve so that mHealth projects can reach their full potential at controlling health care costs and improving quality care access. This requires working within the existing regulatory structure to advance the current technical infrastructure and overcome access barriers. There are opportunities to form public-private partnerships with internet and cell phone providers to increase access for the broader population. In the meantime, there needs to be additional case management support provided to supplement patients who do not have internet access who are often the most vulnerable.

## Next Steps

CASALUD is currently undergoing an ambitious systematic evaluation to generate evidence of its benefits in shifting the model of care through reengineering of processes, in improving overall quality of care, and ultimately, in improving health outcomes. This evaluation will be complemented by economic analysis to estimate its cost-effectiveness. This will help strengthen the CASALUD evidence base as the standard of primary care in Mexico based on solid evidence. Data from this evaluation will also provide essential information to understand additional barriers and challenges to adjust it accordingly. CASALUD must continue to constantly look at these processes to ensure their implementation and maintain its operation.

The evidence and challenges identified in this case study reflect the short term challenges for the national health system overall. Two areas that require further analysis are the payment scheme to sustain and scale up the reforms effectively and the supply chain. There is a need for provider payment to be linked to performance to create a strong business case for adoption of the CASALUD approach, and there is a need to find effective strategies to optimize all stages of the supply chain. Effective treatment for chronic diseases may require a continuous supply of medications as prescribed, so any supply chain issues produce a physical effect on health and reduces confidence in the health system.

The immediate challenge of the national health system is to achieve the midterm performance goals established in alliance with the Ministry of Health: (1) timely detection of chronic diseases: 100 percent of the population aged 20+ years screened in three years; (2) metabolic control in people living with Diabetes Mellitus 2: 33 percent of people living with DM2 with A1c < 7 percent; (3) human capital strengthening: 90 percent of health personnel at primary clinics with a formal CME course; (4) effective monitoring of supply: 90 percent of the primary care clinics with adequate supply of drugs and lab tests.

Finally, CASALUD is broadening its participation in the Mexican public health system by introducing the model into social health insurance (SHI) programs IMSS and ISSSTE, which have different funding and incentive systems. This new phase will bring with it new challenges and solutions to strengthen the CASALUD model.

*Appendix 1: List of mHealth tools for better care*

| Pillar   | Technology   | Description  |
|--|--|--|
| (1) Proactive prevention and detection of chronic diseases | MIDO™ Mobile Cart  | An all-in-one system used in the primary care setting that includes medical equipment to measure weight, height, waist circumference, blood pressure, and glucose on site. Data for risk assessment is captured in MIDO™ Information System to classify individuals by risk and provide personalized treatment options, and ensuring follow-up over time.  |
|  | MIDO™ Backpack   | A tablet-based software that community health workers use at the household or community to assess chronic diseases. Clinicians capture data in an app, and this data is available in real time or can be stored and uploaded later to the cloud. Clinicians can refer diabetic or hypertensive patients to confirm diagnosis and initiate treatment.   |
| (2) Evidence-based disease management                      | Chronic diseases Information System (SIC)                  | SIC is a hybrid system aimed at standardizing healthcare protocols and ease continuous monitoring to improve quality of care. SIC processes the data through a series of algorithms to determine patient health status. All the results of measurements and lab tests, as well as the SIC's analysis are accessible to the patient's physician. With the available information the physician can then prescribe lifestyle changes and the most appropriate pharmacologic treatment, depending on factors such as years of evolution and the patient's metabolic control. |
|  | Digital Portfolio  | A set of applications, including health calculators to estimate BMI, cardiovascular risk, and other health risks; a digital library with information on national health guidelines.  |
| (3) Continuous monitoring of supply chain                  | AbastoNET  | An online information system that enables clinicians and pharmacists to access standardized supply chain metrics daily; pharmacists report monthly stock levels and drugs dispensed to patients.   |
| (4) Capacity building through CME                          | Online Interactive Platform for Health Education (PIEENSO) | PIEENSO is based on a robust educational platform that enables asynchronous education through MOOCs, with traceability for any student enrolled in the platform. Courses are designed from an operational perspective and are tailor-made according to different profiles (MDs, nurses, health managers, etc).<br><br>PIEENSO confers two degrees with academic endorsement from national and foreign universities.  |
| (5) Patient engagement                                     | MIDO Mi Salud (I Measure My Health)                        | A multi-channel mobile phone app (for SMS and smartphones) to help patients understand their health, begin to self-monitor and interpret their own results, and change their lifestyle to prevent the onset of chronic diseases. MIDO Mi Salud enables continuous risk assessment, self-monitoring, medicine and appointment reminders and educational messages.   |
|  | MIDO Mi Diabetes (I Measure My Diabetes)                   | A multi-channel mobile phone app (for SMS and smartphones) where diabetic patients receive: educational messages; schedule medicine and appointment reminders; input results of measurements like glucose and weight; and immediate personalized feedback. Patients are continuously monitored within the Model. MIDO Mi Diabetes enables continuous risk assessment, self-monitoring, medicine and appointment reminders, compliance follow-up and educational messages.  |