Solving Health Industry Problems through Better Management of Chronic Diseases within the *"Communities in Need"*

The Problem:

The health industry is facing a double digit increase in annual cost, largely due to the industry's inability to manage certain high cost areas such as chronic diseases patients in "communities in need". Contributing to this inadequacy, are fragmented processes, incomplete best practices, incompatible technologies, organization redundancies, lack of collaboration, incomplete availability of on-demand information and an inability to recognize and adapt to changing regulations/standards. Over 75% of the healthcare cost is among chronic disease patients, and of those patients, over 75% falls within a *"Community in Need"*.

These *"Communities in Need"* are defined as populations across the country that consists of minority, underserved and poor patients. Additionally, these communities are also comprised of patients who are affected by health disparities due to the type of diseases they have, shortage of healthcare stakeholders, age, location, culture, social, religion, education, military and other background contributors.

Today, chronic diseases are responsible for about 70% of deaths in our country. By 2025, nearly 50% of U.S. population will be diagnosed with at least one chronic disease and *"Communities in Need"* are expected to have 65% of that share. Those with chronic diseases account for 81% of hospital admissions; 91% of all prescriptions filled; and 76% of all physician visits. Finding new and effective ways to better manage chronic diseases, specifically within these communities will not only improve the overall health of populations that have been largely overlooked, but will prove to be extremely cost effective in reducing the amount of money required to treat these patients on an incident basis.

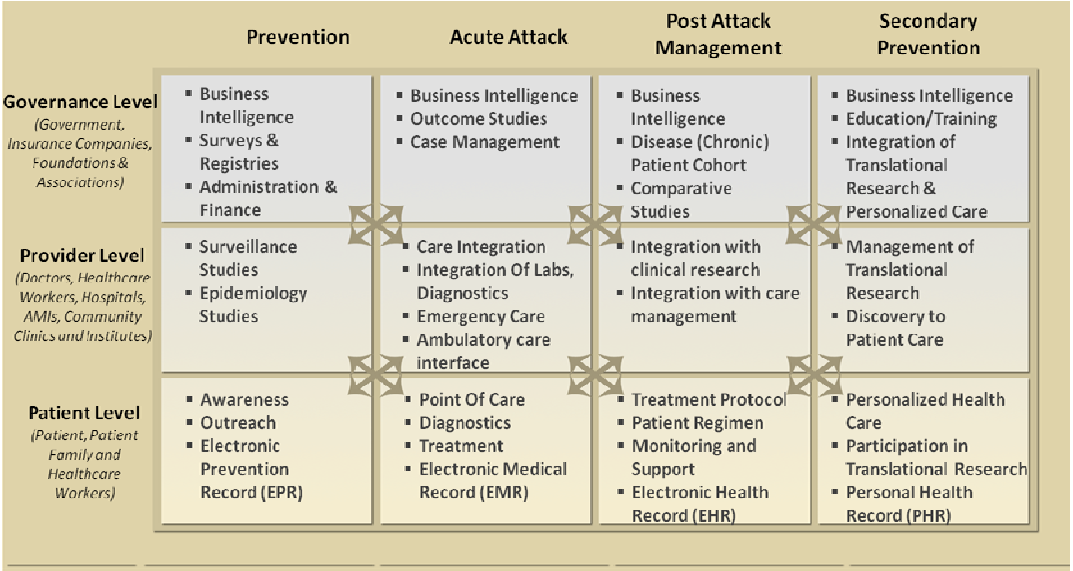
Solution Process:

The most important and critical place to begin solving problems in the health industry is to build mechanisms that better manage the chronic disease population, and first place to begin this is within a *"Community in Need".* This will call for the best and safest patient care, while having the highest economic impact. This can be done by building demonstration projects for diseases such as cancer, AIDS, heart disease, diabetes, Alzheimer's and neurological disorders. These projects would be built in strategic urban, suburban, and rural settings, including mountainous, Indian Nation communities and islands. Key elements of this transformation include:

- Making the right information available, at the right time, in the right place and to the right stakeholders by building an interoperable electronic infrastructure.

- Developing innovative, disruptive and breakthrough technologies such as genomic technologies, nanotechnologies and mobile information delivery platform.
- Building a continuous learning organization for the health industry stakeholder's.
- Developing mechanisms to streamline the care process to deliver access, prevention, intervention and continuity of care as a tailored treatment to the individual patients by better integrating stakeholders such as the individual patient; practicing physician and providers; quality and safety organizations; academic and clinical research organizations; government payers and insurance organizations; and population health and education organizations.

Figure 1: Management of Chronic Diseases through Informatics



As a model, Healthcare Providers are central to making this mechanism work, specifically Community Health Centers, as they have the unique ability to interconnect all other stakeholders in management of the "community in need" for chronic disease. They can uniquely drive the process streamlining, collaboration between stakeholders and the use of information and mobile technology in improving the three levels of health care delivery points in addition to their own health system hospitals and centers. These levels include the following:

- Community doctors, who participate in ambulatory services in conjunction with major medical centers, research institutes, and community hospitals.
- Free community clinics that get funding through federal, state and local government, as well as philanthropic organizations and foundations
- Private practice and stand-alone medical groups comprised of approximately 10-100 doctors, nurses, and health care providers.

Within these three levels of community-provided health care, include approximately 750 community health systems and over 200,000 doctors who offer multi-disciplinary services working with community health centers across the United States.

Figure 2: Impacting the Point of Care

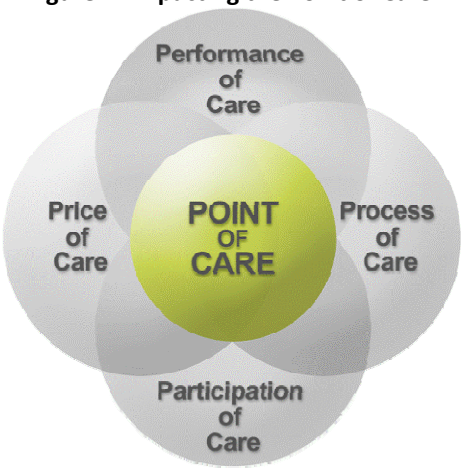
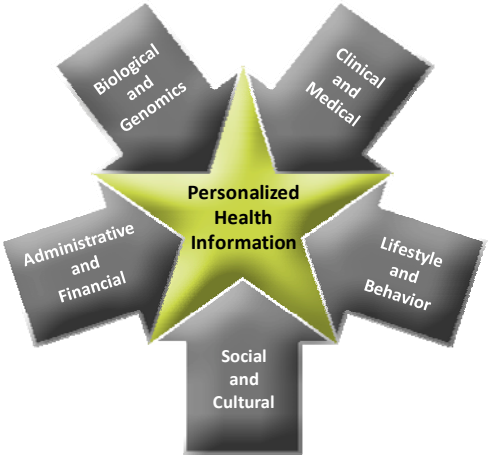


Figure 3: Integration of Individualized Health



Such a model maximizes patient-specific healthcare intelligence at the point of care. Additionally, it improves the Process, Performance, Participation, and Price of Care by utilizing novel analytical tools and informatics resources to provide comprehensive biological, clinical, social/behavioral, cultural, and environmental patient-specific data. This data is appropriately analyzed and integrated with accumulated historical and relevant data concerning disease-specific population outcomes. The data is subsequently delivered through standardized and regulatory-compliant informatics platforms in a user friendly and informative manner that is easily navigated by the caregiver and understandable to the patient using mobile devices.

A typical chronic disease patient, often with co-morbidity, faces daily over 25 medically-related encounters, has four to six physicians and spends a couple of hours a day in dealing with health management issues. This includes performing tests, taking medications, following complementary and alternative therapies, managing diet and exercise, connecting with doctors or health workers, getting blood or diagnostic tests done, learning about their diseases, etc. These healthcare intelligence tools can greatly affect and improve the way a patient manages his or her own health care, and additionally the way providers can offer more comprehensive and tailored treatments.

Specific Function of the New Model is to integrate clinical research and care; and deliver individual care through following elements:

Biological Innovation:

The industry has reached a point in the evolution of genomic testing technologies and information that these can be rolled out at ultra-low costs to assist in reducing/managing chronic disease burden in underserved populations. The focus of testing is on prevention, early diagnosis, and highly effective treatments to reduce the time of morbidity at the end of life. This is a precise and personalized strategy as opposed to a blunt and generalized strategy. Additionally, maturing *"ecosystem"* will deliver this new type of personalized molecular medicine including teams focused on regulatory education, Ethical, Legal, and Social Issues (ELSI), health economics, HIT delivered through mobile technology and other strategies to drive efficiency and safety into delivering new care models in the clinical setting. Specifically, this will be accomplished by genetic

risk assessment early in life, tailored prevention strategies, novel biomarker and imaging approaches for early detection of disease, targeted therapies with knowledge-based pharmaceutical interventions, and outcomes monitoring. As diseases are sub-classified at the molecular level using new technologies such as full genome sequencing, it will enable a new wave of environmental exposure epidemiology mapped against these new definitions of disease, and also be able to develop subclass-specific diagnostics (companion diagnostics) and new more therapeutics on these homogenous patient populations. The best place to pioneer these strategies is in the *"communities in need"*.

- Build and assemble a virtual center for genomic characterization.
- Use sophisticated molecular scanning technologies to identify at-risk individuals prior to disease symptoms, to fuel discovery, and then to develop and test therapies.
- Focus on molecular analysis and translational research for chronic disease detection, management, and treatment by applying a chronic disease-centric approach to public health burdens.
- Build a flexible clinical decision support module that allows physicians to understand molecularly-guided strategies.
- Utilize nanotechnology, such as nano-capsules, in delivery of new drugs to patients for more precise and tailored treatments.
- Utilize regeneration technologies with appropriate stem cells in rebuilding damaged organs.

Stakeholder Collaboration:

- Select and define a target population to serve as the “Learning Model”.
- Educate physicians, patients, and communities about changing needs and opportunities for improved health care.
- Develop a social network or disease-specific blogs for patients and physicians for on-demand collaboration
- Develop mechanisms to improve treatment compliance; incentivize patients, physicians, and providers to make and sustain healthier decisions in collaboration with payers.
    - The key to fostering patient compliance is building awareness, motivation, and benefits which can be delivered through a learning mechanism and the use of virtual affinity groups.

Informatics:

- Generate, collect, store, and process integrated patient-specific data and make it available on-demand in an affordable way, and enable fully-analyzed decision making at the point of care.
- Provide Portals, digital dashboards, and mobile devices to facilitate fast intervention.
- Define a comprehensive data set for targeted disease populations.

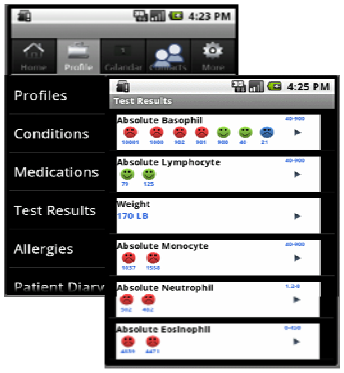
Figure 4: Adverse Event Data Capture - Safety Profiler

- Build modules for collection of medical (Personal Health Record (PHR)/Electronic Health Record (EHR)), social, behavioral, cultural, environmental, and financial patient-specific data.
- Build systems for assembling individual data into disease-specific outcomes, databases for analysis and guidance in patient therapy and cost containment.
- Provide feedback to the informatics backbone, where data warehouses and analytics can enable broader population use of individualized health solutions, and provide targeted knowledge for prevention, epidemiology, and clinical research.
- Build and assemble a virtual center for genomic characterization.
- Assure quality, compliance and safety in patient care.

Figure 5: Personal Health Record Application - imHealthe™

Mobile Technology:

The use of mobile technology can support patients, physicians and providers with a useful tool that can serve as a dashboard. This will be effective because of the following factors:



- 70% of physicians and 55% of patients already own mobile Smart Phones.
- It is estimated that by 2012, those numbers will increase to 90% of physicians, and 75% of patients.
- The initial investment cost of mobile phones and interactive connectivity systems acting as a prevention tool, will ultimately save money in reducing the management of acute attack episodes which end up being approximately 25-100 times more expensive.
- Early result over 40% increase in compliance.

Patient:

- Daily test and medication management through on time and on demand alerts, and reminders.
- Fosters and encourage better collaboration, monitoring, tracking, feedback and intervention between the patient and his or her family, and health worker or physician.
- Health Alerts through texting: Example: Use sun screen, stop smoking, encouraging proper diet choices, encouraging exercise, medicine reminders, stress management reminders, appointment manager, prescription checking, search local urgent care centers, insurance validation, drug interaction information and much more.

Physician:

Figure 6: Mobile Patient Outcomes Data Services (mPODS)

- Alerts on patients who may be encountering an adverse event to treatment/medications
- Patients upcoming visit reminders
- Alerts when patient vital signs are not within the normal ranges
- Notifies physician of new patients, while providing their comprehensive health record for review
- Insurance information along with status of filed claims
- Monitoring/Integration with patient home devices (eg: blood glucose reader for automated data keeping)
- List of emergency contact personnel for each patient
- Organ donor information
- Prescription history
- Database of local physicians to enable collaboration on a specific patient

By utilizing the above model and keeping chronic disease patients healthier, will result in a savings of approximately $200 billion annually, over a period of 5 years. The initial investment required for informatics, technology, process improvement and building of a learning organization would be approximately $20 billion over 3-5 years; however reductions in the cost of health care will be apparent in 4-5 years. This alone would be a great return on investment for the health industry and would make a tremendous dent in the cost of health care, while ultimately facilitating better care for patients.