From "Sick" Care to "Health" Care:
Analytics Driven Transformation

White Paper

AXTRIA
INGENIOUS INSIGHTS

Sick Care to Health Care

Globally, the focus of healthcare has been on treatment of disease and taking care of the sick. The approach has been reactive! This approach basically leads to intervention only when the health of any person reaches a critical stage, with clinical intervention and hospitalization being the outcome. On top of this, the healthcare system is constrained by spiraling costs driven by inefficient care system. As per CMS, total health care spending in the United States is expected to reach $4.8 trillion in 2021[1]. Hospital spending in the U.S. is more than 60 percent higher as compared to OECD countries while spending on physicians, specialists and dentists is almost 2 ½-times higher than OECD countries[2]. Wasteful spending likely accounts for between one-third and one-half of all U.S. health care spending. As per PricewaterhouseCoopers, up to $1.2 trillion, or half of all health care spending, is the result of waste[3]. On similar lines, Institute of Medicine (IOM) report estimated the unnecessary health spending to be $750 billion in 2009 alone[4]. This unsustainable economic impact of cost of care is driving the focus towards proactive health and care management.

In response to this several trends are evident in the US healthcare landscape:

- Focus of healthcare cost to continuously shift toward prevention and diagnosis
- Spiraling cost driven by inefficient system driving focus towards care accountability
- Evolution of new care delivery models to focus on overall Health Risk Management
- Moving away from pay-for-service to pay-for-performance approach towards provider re-imbursements
- Evolution and growth of Accountable Care Organizations, with redefined risk-sharing approach to drive participation and accountability
- And most importantly, increasing focus and investment into proactive care management and population health management

Bringing Care Management in Spotlight

What is care management? Care management programs are expected to leverage systems, incentives, and information to assist consumers and their support system to become engaged in a collaborative process designed to manage medical/social/mental health conditions more effectively. The key objective of care management is to achieve an optimal level of wellness and improve coordination of care while providing cost effective, non-duplicative services[5].

At high level this objective looks universal, however to successfully realize this goal we have to act at more granular sub-population or population cohort's level. Such stratification can primarily be driven by where an individual or a sub-population is on the Continuum of Care – ranging from healthy population to active disease and finally catastrophically ill. The care objectives shall vary significantly across these cohorts of population.
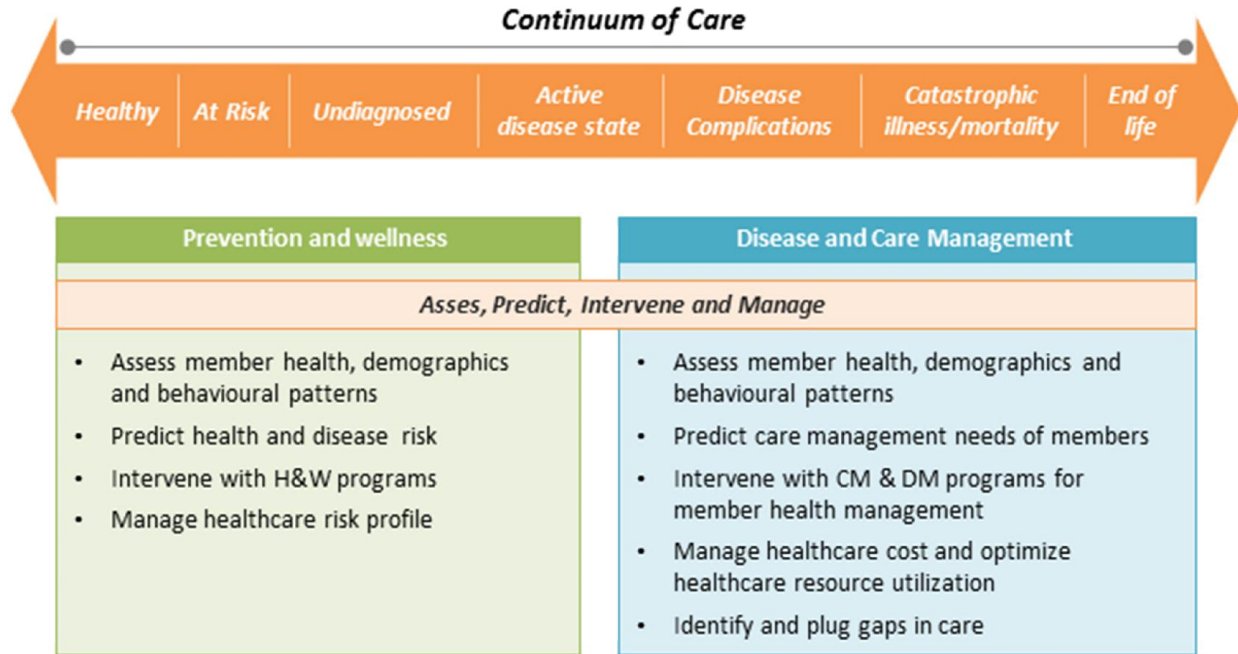
While the primary care management goal for healthy population will be to maintain their health and mitigate risk; active disease population needs focus towards avoiding disease progression, comorbidities and plugging any gaps in care.

The biggest challenge in implementing this approach is the ability to predict and pre-empt varied and various risk factors across the population groups. We have to follow a comprehensive and scalable approach to analyze, assess and act on risk factors to make proactive care interventions and avoid movement of individuals from lower to higher risk categories.

Such an approach needs a well-defined **Care Management Framework** powered by Analytics to enable prediction, pre-emption and proactive management of population health.

Achieving Care Management Goals through Analytics

The **Care Management Framework** needs to focus on five key dimensions of population care management[6]. They are,

- Identification
- Stratification
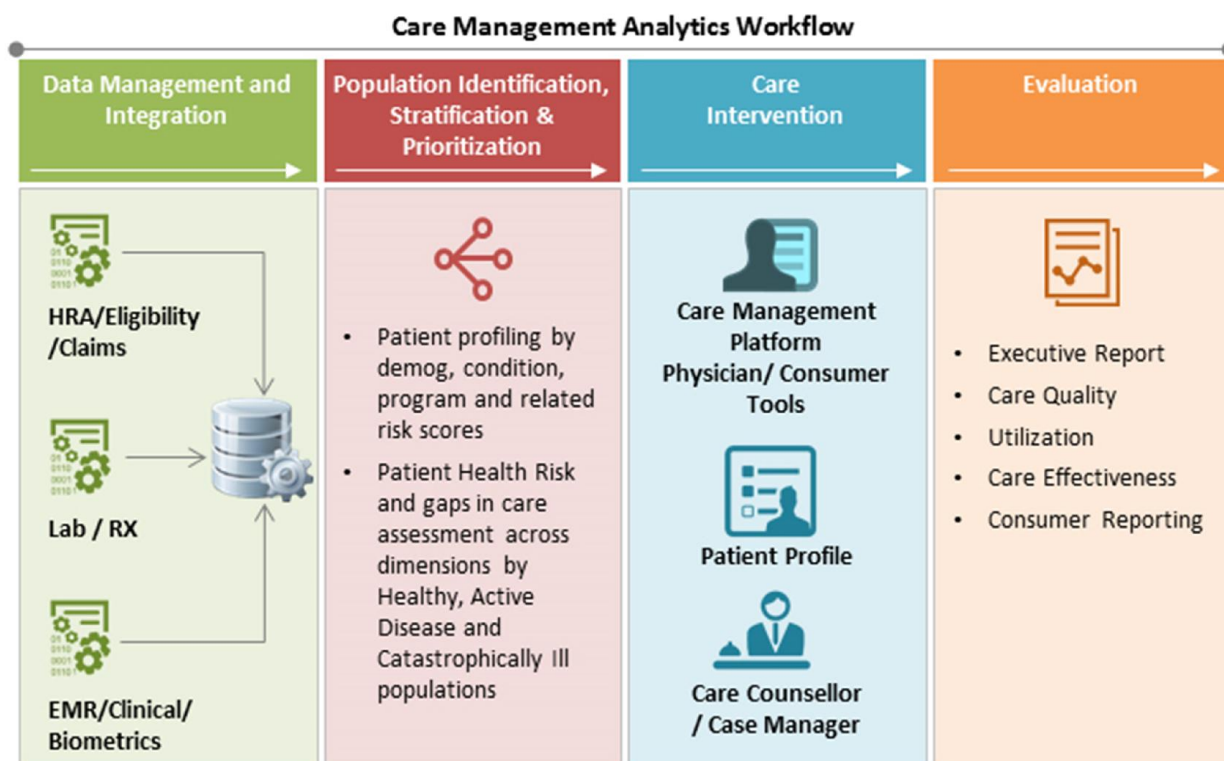- Prioritization
- Intervention
- Evaluation
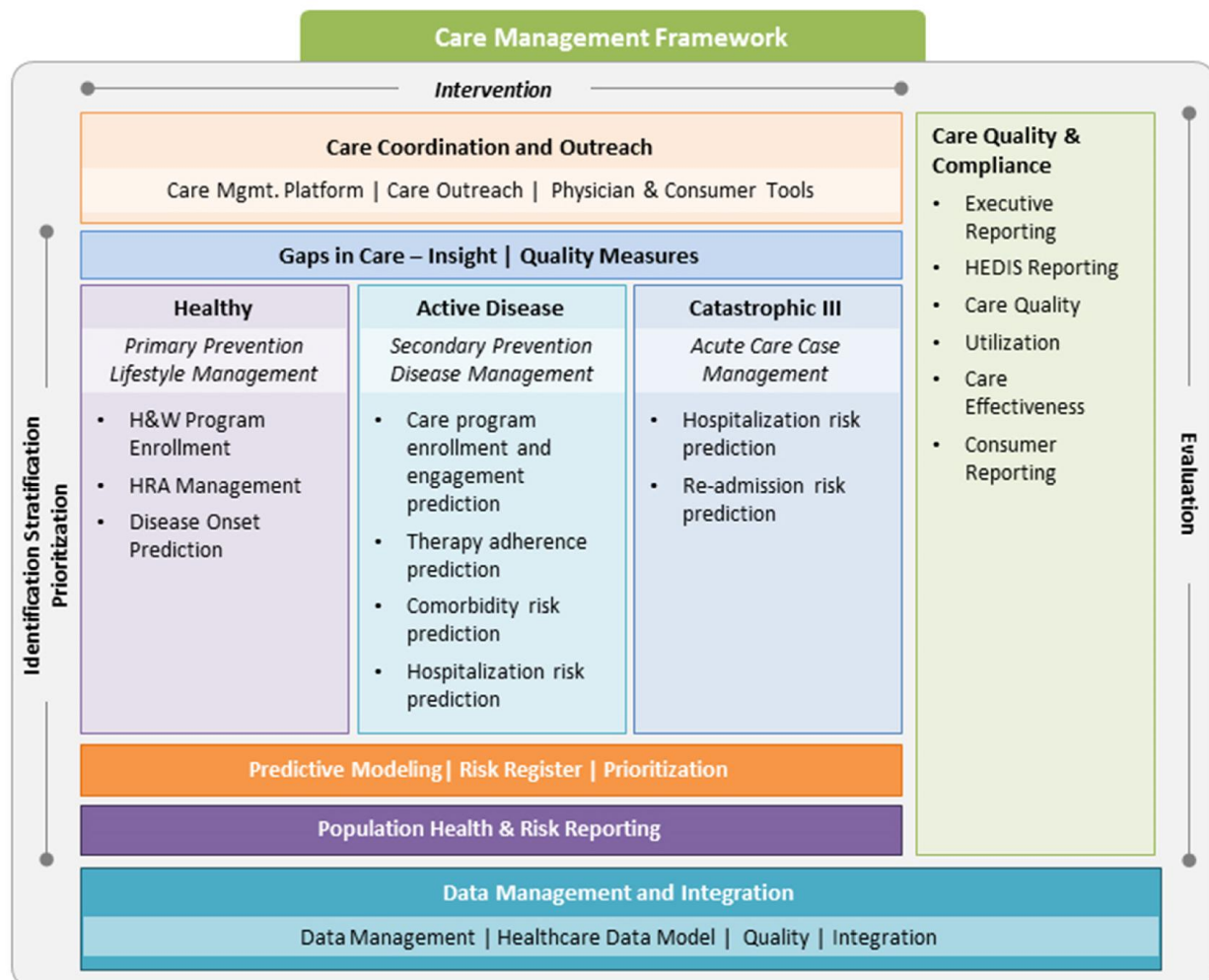
Each of these components actively interacts with each other to assess risk, intervene to manage risk and evaluate outcomes.

Care Management Framework Component	Definition	Analytics and Technology Tools
Identification, Stratification and Prioritization	Identification, stratification, and prioritization should be used to identify individuals with highest degree of health risk as well as gaps in care across various patient cohort categories. Starting point of this component is segmentation of population into cohorts of Healthy, Active Disease and Catastrophically Ill individuals leveraging disease conditions and demographics. Next step is to assess health risk across specific dimensions relevant to each of these cohorts. High risk patients generate the majority of health costs but they offer greatest potential for improvements in health outcomes. This cohort needs to be prioritized for care management interventions and programs. Programs should incorporate clinical and non-clinical sources of information to identify consumers who will most benefit from care management.	• Health Risk Assessments • Predictive Modeling • Member Risk Register and Prioritization • Registries and National Quality Measures
Intervention	Interventions should be customized to meet individual's specific health need. Interventions should be designed to best serve the individual and be multi-dimensional to improve quality and cost effectiveness, and ensure coordination of care.	• Care Management Platform • Physician and Consumer Tools • Specialized patient engagement (e.g., self-management training) • Care Counselling Workflow systems
Evaluation	Evaluation should include systematic measurement, testing, and analysis to ensure that customized care programs and interventions improve quality, efficiency, and effectiveness. Careful and consistent evaluation will build the evidence base in terms of what works for complex sub-population segments or cohorts.	• Executive Report • Care Quality and HEDIS measurement • Care Utilization measurement • Care Effectiveness measurement (ROI) • Consumer Reporting

Care Management Analytics Workflow

Analytics and Technology tools form the core of any Care Management framework. The Care Management framework, discussed in the earlier section, is no exception! The entire idea of proactive care intervention is based on the ability to integrate individual data for a comprehensive care view, leveraging advanced and predictive analytics to forecast risk, utilize technology platforms to implement intervention strategies and above all, constantly evaluate the impact of these approaches.

The successful implementation of this framework needs a "strong core" i.e. a well-structured **Care Management Analytics workflow** – starting from Data Management and Integration to Risk Assessment models and finally leveraging insights to make personalized interventions.

Care Management Analytics Workflow

Data Management and Integration	Population Identification, Stratification & Prioritization	Care Intervention	Evaluation
HRA/Eligibility /Claims Lab / RX EMR/Clinical/ Biometrics	• Patient profiling by demog, condition, program and related risk scores • Patient Health Risk and gaps in care assessment across dimensions by Healthy, Active Disease and Catastrophically Ill populations	Care Management Platform Physician/ Consumer Tools Patient Profile Care Counsellor / Case Manager	• Executive Report • Care Quality • Utilization • Care Effectiveness • Consumer Reporting

The first critical step of implementing this Care Analytics *core* is to integrate Administrative and Clinical data for 360° health view of the member. Claims and clinical data integration requires a unique flexible, integrated member-centered approach, which can consolidate large quantities of Health Plan and Healthcare Provider data into one location or data warehouse. It should be the foundation layer and considered as a "source or truth" to populate analytics and reporting solutions. The system should support integration of different Health Plan data categories including Medical claim, Pharmacy claim, Dental claim, Product, Provider, Member eligibility and Healthcare Provider data categories including Allergy, Adverse Effect, Care Goal, Patient and Provider characteristics, Communication, Condition/ Diagnosis, Device, Diagnostic study, Encounter, Experience, Family History, Functional status, Intervention, Laboratory Test, Medication, Physical exam, Procedure, Risk evaluation, Substance,

Symptom, Transfer; regardless of what coding system they are in (CPT, HCPCS, CDT, LOINC, RXNORM, NDC, SNOMEDCT, ICD, UBREV, UBTOB, POS, DRG, APC, CVX and CCS) and which format they are in (HL7, CCD, QRDA, X12, NCPDP , XML or Flat File). The data warehouse should be an actionable healthcare model to facilitate multiple care management initiatives, quality improvement and pay-for-performance programs.

The next stage of population identification, stratification and prioritization needs an advanced analytics engine which delivers capabilities for customized care need predictions and relative risk scores at individual level. This powerful analytics core needs to predict member behavior and risk score across specific dimensions and care goal related to member's profile.

Population Segment	Care Goal	Analytical and Predictive Models
Healthy Population	Primary prevention and lifestyle management	• H&W program enrollment prediction • Health Risk Assessment management • Disease onset prediction
Active Disease Population	Secondary prevention and disease management	• Care program enrollment and engagement prediction • Therapy adherence prediction • Comorbidity risk prediction • Hospitalization risk prediction
Catastrophic Ill Population	Acute care and case management	• Hospitalization risk prediction • Re-admission risk prediction

In addition to above, the other critical aspect of this stage is to identify and provide insights related to gaps in care. Gaps in care for an individual arise due to number of reasons including but not limited to missed refills for medication therapy, missed screening and preventive care visits, non-utilization of referrals, lack of timely follow-up care, access to care, improper transition of care, incompetency of the provider etc. A gap leads an individual to move from a low risk stratum to higher risk stratum regardless of Patient, Medical or Systemic reasons for the origination of gaps. Hence an effective Care management program needs to be developed with unique techniques and tools to identify and bridge the gaps in care at the right time. This delivery process should be strengthened by the utilization of evidence based clinical quality measures; which are developed or endorsed by various US Healthcare Research Agencies like NCQA, AHRQ, NQF, CMS, CQAIMH, TJC. For example, identify care gap for a diabetics patient by implementation of Comprehensive Diabetes Care measures; which evaluates whether medical attention is received on time for Hemoglobin A1c test, Eye exam, Foot exam, Low Density Lipoprotein-Cholesterol (LDL-C) screening and Blood pressure control. Target of care management should be the implementation of predictive analytics coupled with evidence based measurement to control cost and quality across the care continuum.

The "analytics powered core" of Care Management framework has several benefits, if implemented right.

- Valuable member behavior insights that enable care organizations to develop comprehensive proactive strategies
- Advanced analytical capabilities to predict and pre-empt member care needs/gaps and behavior, so care managers can respond in real-time with focused care engagement strategies
- Improved return on investment in care service by enabling effective and focused targeting across population and member segments

The "Personalized" RISK Register

One of the key outcomes of the *Analytics powered core of Care Management framework* is the *personalized* RISK register. The risk register is a comprehensive view of member health risk profile across multitudes of dimensions. This rounded risk profile of a member becomes a key link between care strategies and individual level customized intervention. The risk register is supposed to include several risk dimensions, including but not limited to

- Disease onset risk
- Active disease severity and progression profile across disease areas like Diabetes, CHF, COPD and others
- Comorbidity risk
- Therapy Adherence risk
- Hospitalization risk
- Re-admission risk
- …and several others.
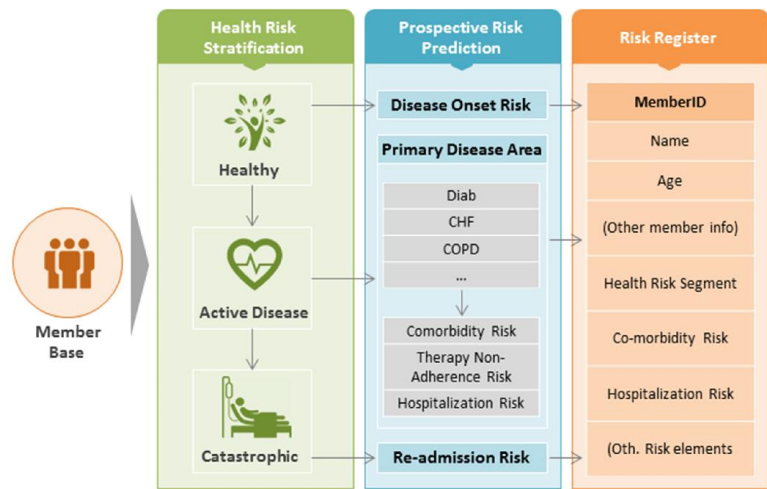
The risk register framework provides a flexibility to enhance the individual risk assessment by augmenting risk assessment model across disease areas and risk factors.
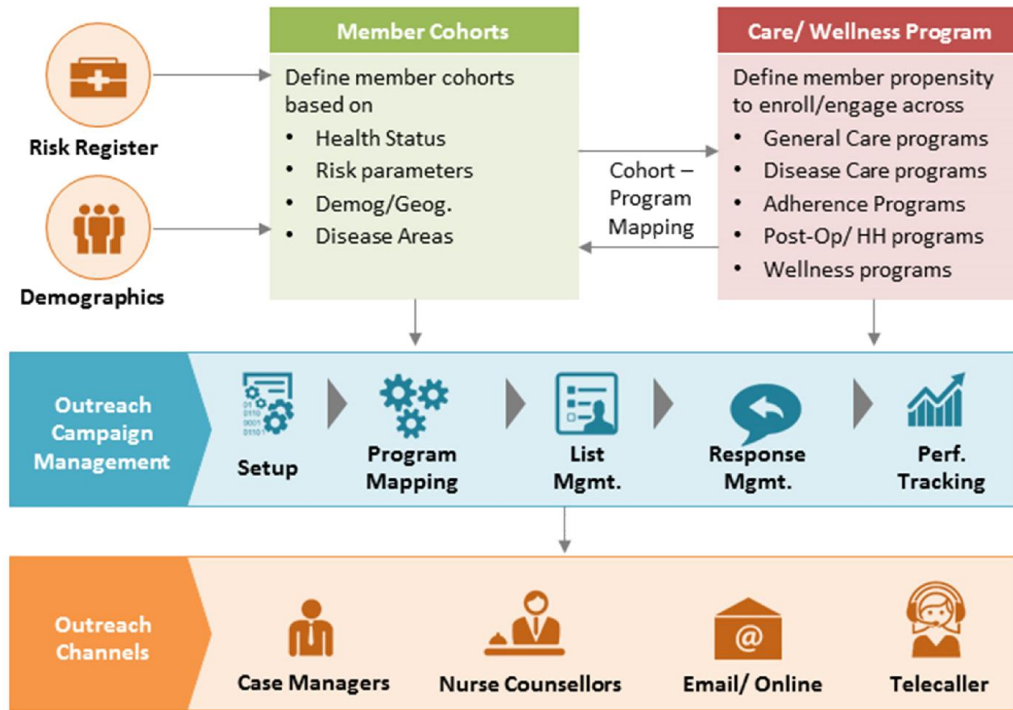
The risk register is leveraged to develop member cohorts, which are mapped to appropriate actions (case management, care program enrollment and other) for member outreach and care interventions. A common and *single version of truth* information about a member's profile, across various care management channels, can be linked to care intervention at an individual level.

Implementing the Care Management Framework

Driving the change from "reactive sick care" to "proactive health care" requires a transformational approach rather than incremental upgrades. It needs a change of organizational mindset and integration of several care management channels. We believe it's a four step process to achieve the desired state of a unified proactive care management system.

- **Organizational** integration of care management programs across channels to drive personalized but cohesive care management intervention for all members
- **Data integration** across disparate sources including administrative as well as clinical
- **Analytical Innovation** to develop, implement and evolve an integrated and comprehensive Health Risk Assessment and Care Insights engine. This engine needs to input a unified and personalized health information for each consumer across all downstream care intervention channels including but not limited to Member/Physician Care Management portal or tool, Care counsellors, Email/Online education channels and others.
- **Change management** to inculcate organizational discipline to embed analytics driven processes into the care management framework
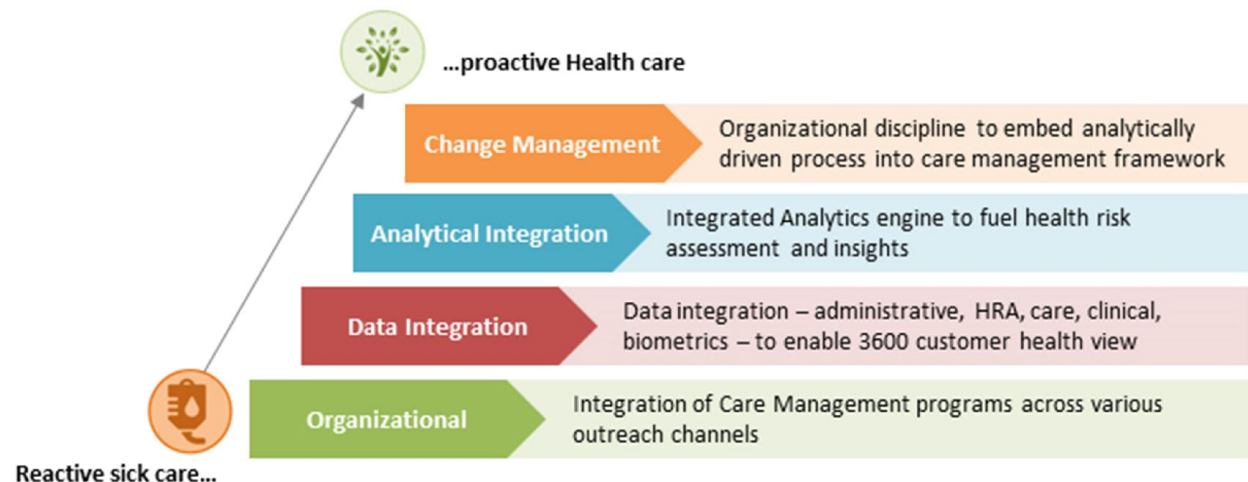
In order to successfully implement the discussed Analytics driven Care Management Framework, the care organization needs to embed analytical process very tightly into the entire member care ecosystem. The first key aspect of implementing the embedded analytics process is to integrate the data from multiple sources and transform that into analytics consumable elements. The extracted data from multiple sources needs to be normalized, cleansed and standardized; then moved to the integrated member-centric DW model. In the current environment, the available solutions for accurate claims (member) and clinical (patient) data integration leverage multiple techniques such as Enterprise Master Patient Index, Biometrics Identification, and Manual Cross Works. However considering the variety, volume and velocity of data; the most scalable solution is to implement an Enterprise Master Patient Index (EMPI) enabled DW, which uses probabilistic and deterministic algorithms to identify, match, merge, de-duplicate and cleanse patient records to maintain an accurate, complete view of member-

specific information. In addition to the EMPI implementation, the member-centric data warehouse needs to apply industry standardized, customizable, configurable and strong Data Quality Validation Rules. Such rules should be applied across all the data categories at the element as well as at the aggregate levels. These rules need to be accentuated with industry proven Unified Medical Language System® (UMLS®) healthcare standards for normalization and standardization for the healthcare vocabulary to address all the disparities in the coding. Such an approach will pave the way for a complete integrated member-centric Healthcare Data Management system.

It is extremely important to conduct thorough exploratory analysis to understand the member population mix, demographics, health profiles and related trends. This stage is extremely important to set the baseline for development of a care analytics engine. The care analytics engine will leverage risk assessment algorithms, care need prediction analytics, segmentation and prioritization algorithms to churn out a member level personalized risk register. As discussed earlier in this paper, the risk register is a 360° view of member health risk profile. The insights and member risk profiles information is delivered for care managers via insightful reports and integrated with care intervention systems, example Electronic Registries, Physician/Member portal, Care Management system, Online Outreach Campaign/Education management system and other such platforms. This ensures that member health risk and care insights are embedded in all care intervention channels in a unified way and is leveraged for all member level interventions across channels.
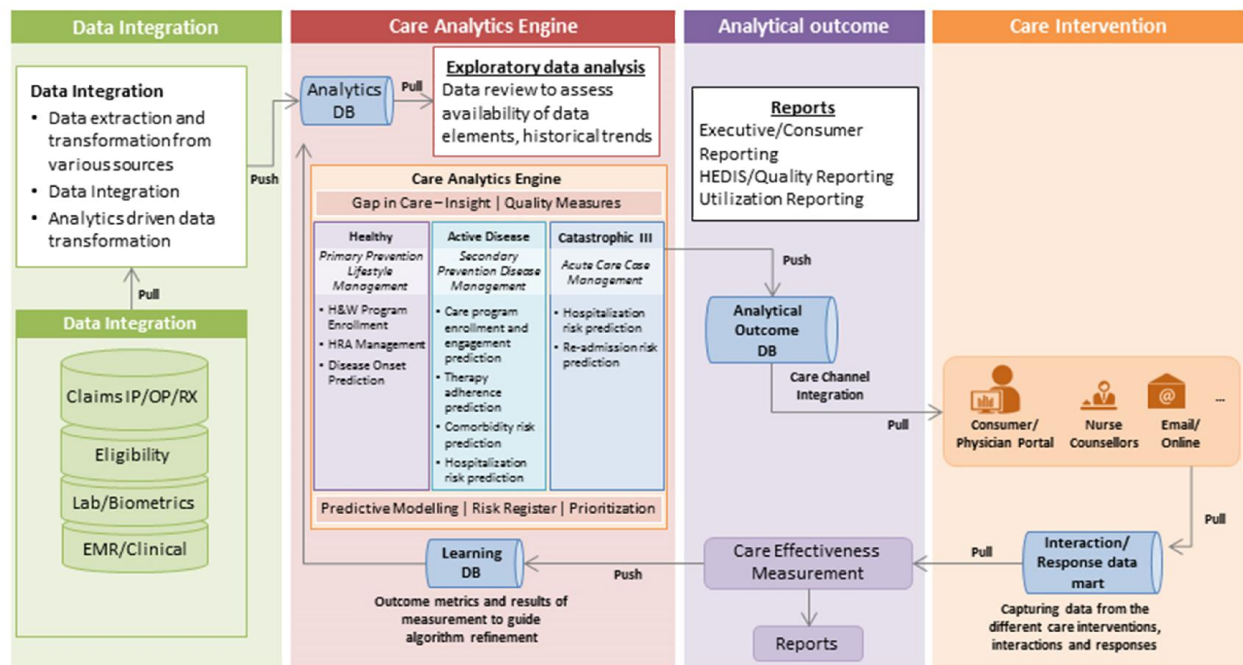
Another very critical aspect of such an analytics powered system is its continuous tracking, feedback and improvement. It is important to capture the interaction data, analyze it thorough, evaluate effectiveness of personalized care intervention and leverage this guide analytical algorithm refinement. Closing the loop ensures that the entire ecosystem become more intelligent as it matures.

Conclusion

Today's healthcare environment needs to undergo a transformation from a reactive approach to a proactive care management approach. A proactive care management framework, powered by predictive analytics and comprehensive insights, can go a long way in bringing about such a transformation by improving member and population health life; and controlling cost of care. Analytics capabilities today are advanced enough to generate individual level insights to make the entire care ecosystem intelligent and personalized.

The roadmap to successfully implement such a framework is not without pitfalls, however with the organizational focus and discipline coupled with sound analytical and technological capabilities, the Care Management Framework can be the big step ahead in our constant endeavor to improve health outcomes and manage cost.

References

[1] Centers for Medicare and Medicaid Services, National Health Expenditures Projections 2011-2021. www.cms.gov/Research-Statistics-data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/Proj2011PDF.pdf

[2] Health at a Glance 2011: OECD Indicators – Why is Health Spending in the United States So High? Nov. 23, 2011. www.oecd.org/health/healthpoliciesanddata/49084355.pdf

[3] PricewaterhouseCoopers' Health Research Institute, "The price of excess: Identifying waste in health care spending." 2010. www.pwc.com/us/en/healthcare/publications/the-price-of-excess.jhtml

[4] Institute of Medicine, "Best Care at Lower Cost: The Path to Continuously Learning Health Care in America." September 2012. www.iom.edu/Reports/2012/Best-Care-at-Lower-Cost-The-Path-to-Continuously-Learning-Health-Care-in-America.aspx

[5] Adapted from R. Mechanic. Will Care Management Improve the Value of U.S. Health Care? Background Paper for the 11th Annual Princeton Conference.

[6] Adapted from Improving the Quality and Cost Effectiveness of Publicly Financed Care, CHCS

About the Authors:

Ashish Gupta – *Ashish is a Director of Healthcare Analytics at Axtria. Ashish comes with over a decade of Analytics, Consulting and Technology experience in Healthcare and Lifesciences.*

Email: ashish.gupta@axtria.com

Dinesh MA – *Dinesh is a Senior Associate - domain expert of Healthcare vertical at Axtria. He comes with 7 years of techno-functional experience in Payer and Provider Data analytics, Quality Reporting and RCM in US healthcare industry.*

Email: dinesh.ma@axtria.com

Axtria Inc.: *Axtria is an advanced analytics company that combines industry knowledge, analytics and technology to deliver solutions that help companies make better data-driven sales and marketing decisions, with measurable results.*

For more information:
Axtria, Inc. | Ingenious Insights; 400 Connell Drive, Suite 1300, Berkeley Heights, NJ 07922, USA
Email: info@axtria.com; phone: +1-877-929-8742
www.axtria.com