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## Leveraging Smart Technology to Deliver the Future of Healthcare

Moving from Sickcare to Healthcare:

Utilizing Analytics to Deliver Impactful Care Management and Care Coordination

A Frost & Sullivan  
White Paper

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Across the globe, healthcare providers, insurers and governments are struggling to improve healthcare, while limiting the impacts on health system costs. In many countries, very large investments are being made in addressing chronic health conditions and treatments. Most of this investment today is in the cost of treating patients with one or multiple chronic conditions. As we look toward the future, healthcare stakeholders are focused on coordinating care management to reduce costly hospitalizations associated with chronic diseases, and to preventative care practices that can be used to reduce the impact of chronic diseases in future generations.

With the cost of healthcare skyrocketing, addressing chronic care is a requirement to create both a sustainable healthcare system and a more productive population. Solutions to reduce the impact of chronic diseases and improve outcomes involve the combination of leveraging analytics to identify high-risk patients, and then increased engagement with these high-risk patients. This, combined with new care models, is expected to change the focus of how chronic care is managed.

In the United States, the shift to Accountable Care Organizations brings with it a number of changes in the way healthcare providers will organize themselves and deliver care. A major focus of this new care and reimbursement structure is population management. ACOs will need to implement sophisticated systems that apply analytics to stratify and score patient cohorts based on risk; leverage predictive modeling to identify opportunities for upstream interventions and patient interaction (both in preventative care and in treatment); and coordinate care among different stakeholders in the healthcare system to achieve the best outcomes, cost-effectively.

In this new world of healthcare, integrated, coordinated care is supported by smart technological capabilities to enable healthcare providers to share, plan, analyze, predict, and intervene, improving both clinical and operational outcomes.

## **IMPROVED CHRONIC CARE MANAGEMENT KEY TO HEALTHCARE TRANSFORMATION**

Chronic disease care models have a considerable impact on healthcare systems globally. Human lifespan has increased more than 50 percent in the past 100 years. The increased longevity and lifestyle changes accompanying urbanization, including lifestyle and dietary changes related to the over-consumption of processed foods, are accompanied by increased prevalence of chronic conditions and associated pain and disability. In 2005, nearly one out of every two adults had at least one chronic illness. The most common and costly of all health problems are heart disease, stroke, cancer, diabetes and arthritis. Seven out of 10 deaths among Americans each year are from chronic diseases. Heart disease, cancer and stroke account for more than 50 percent of all deaths each year. One in every three adults is obese, and almost one in five youths between the ages of 6 and 19 is obese. Modifiable risk behaviors, such as tobacco use, physical inactivity, and diets low in fiber but high in fat and sugar, are responsible for much of the illness, suffering, and early deaths related to chronic diseases. Better management of chronic disease is a key focus of health policy in the United States and many other countries throughout the developed and developing world.

The current healthcare system focuses on “sickcare”—acute care after illnesses develop—and results in costly hospitalizations that are straining system costs. Chronic diseases cost more than \$1 trillion annually in the United States. The five leading chronic conditions mentioned previously account for half of all healthcare spending in the U.S. Much of this cost is in hospitalizations—many of which may be preventable through better upstream primary care and proactive interventions with patients—and in hospital readmissions within 30 days after discharge. While new care models are designed to address the hospitalization issue, public and private payers are working to address the latter immediately, through both long-term carrots (gainsharing) and short-term sticks (reimbursement penalties).

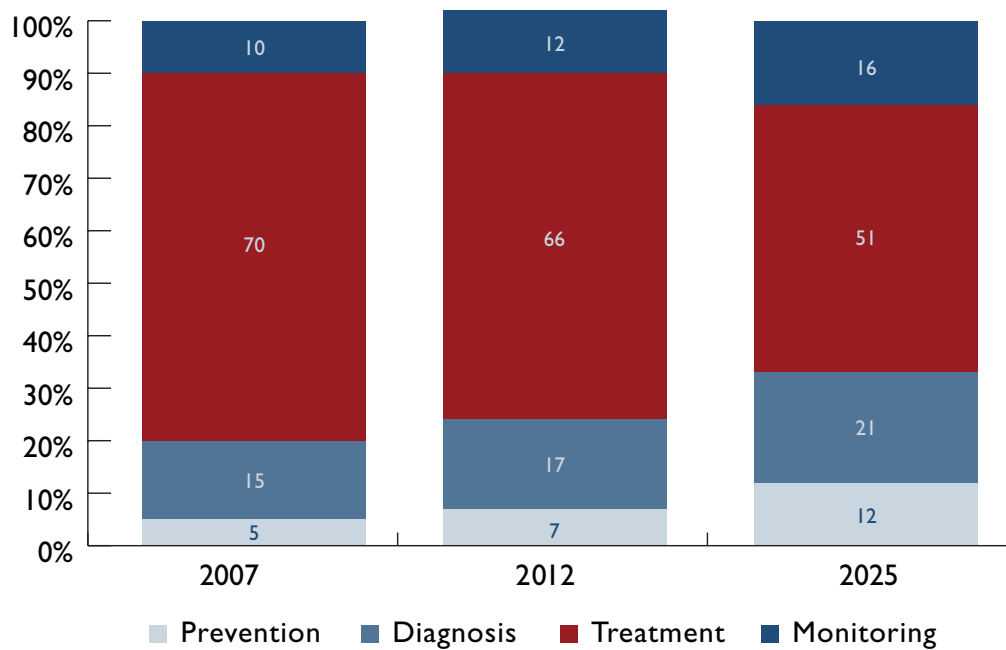
Effective care coordination has been shown to drive significant cost reductions in hospital readmissions for ambulatory-sensitive conditions, or those conditions that are more appropriately treated in the primary care, as opposed to acute care, setting. As part of the Hospital Readmission Reduction Program in the U.S., healthcare providers with high levels of preventable readmissions face the potential of losing a portion of their federal payments. The Centers for Medicaid and Medicare Services (CMS) is implementing penalties starting October 1, 2012, for hospitals with low performance in risk-adjusted, 30-day readmission rates. The conditions being tracked in the initial implementation of this program are congestive heart failure (CHF), pneumonia, and acute myocardial infarction (AMI). These conditions were chosen in part due to their high volumes of readmission rates, as well as their noteworthy cost to Medicare.

Penalties will not just affect billing for these readmissions, but will reduce all Medicare payments to these institutions. Moreover, these rates are also being used as a quality indicator to be analyzed by commercial payers and consumers, which could result in an additional impact on a hospital's finances.

In order to avoid financial losses, and reduce readmission rates, hospitals are investing in intervention programs that include patient outreach and engagement, improved transition of care management, and the use of predictive analytics to identify the high-risk patient groups most likely to benefit from these programs.

These programs and the focus on intervention in chronic care to avoid hospitalizations are part of a shift in health system spending. The goal of this shift is to identify and intervene with high-risk patients early to reduce the total cost of care within the system.

Overall healthcare spending can be segmented into four main areas: prevention, diagnosis, treatment and monitoring. In 2007, Frost & Sullivan estimated that expenses for treatment represented 70 percent of total healthcare spending. With the increased focus on preventative care, healthcare spending is shifting, and expenditures for treatment are expected to decrease relative to prevention, diagnosis and monitoring.

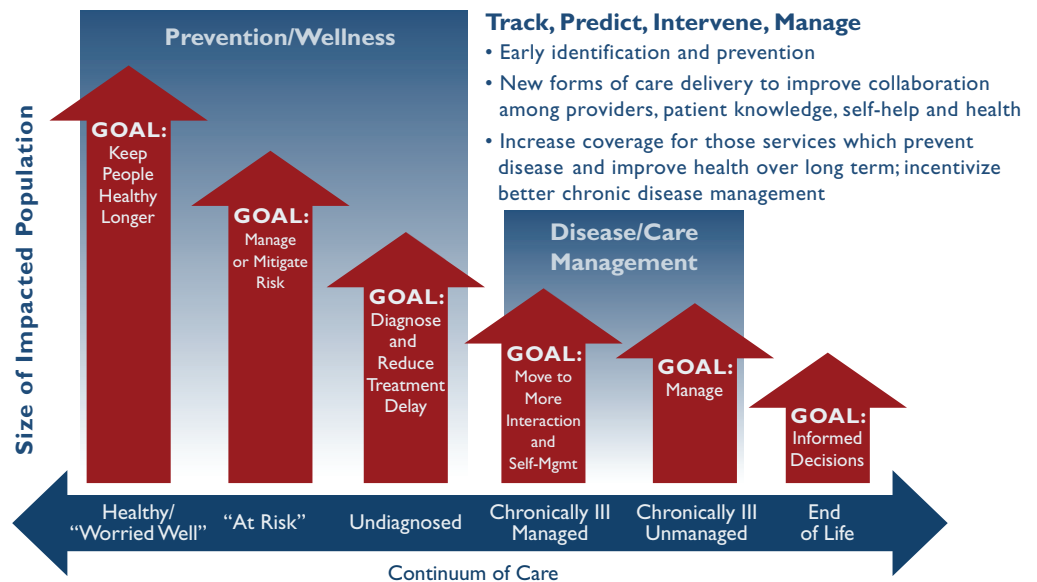
**Figure 1: Healthcare spending by Type of Activity**

Source: Frost & Sullivan analysis

The shift in healthcare spending toward diagnostics and preventative care involves leveraging data and analytics to evaluate significant risk factors, identifying patients within a population needing intervention, and triggering interactions across a coordinated care team. Care coordination models involve increased data collection from remote monitoring technologies and data sharing among providers in different settings.

This focus on leveraging data from multiple clinical information sources is key to moving from a system spending large sums in acute care settings to one more focused on early intervention to preserve health, targeting at-risk patients who are likely to generate high costs in the future. More investment in earlier intervention is expected to result in significant cost-savings, as the impact of chronic conditions is managed better as a person ages. This preventative care requires an even higher level of care management and transition of information between care providers, and with the patient. Creating a single view of the various interactions of stakeholders with the patient is required for this level of care coordination and care management.

**Figure 2: Shifting the Emphasis of the System from Sickcare to Healthcare**



Source: Frost & Sullivan analysis

Moving toward an improved “healthcare” system involves better care management of chronic diseases, both in curative and preventative care. Preventative measures take on a new dimension in this context, beyond typical “wellness” strategies of the past. These management practices must drive efficiencies in care delivery, following several key steps and actions, such as:

- Identifying risk factors and predicting disease onset and progression to ensure personalized elements of preventative medicine are employed, keeping patients healthier longer.
- Access to new intervention methods that improve patient activation, self-management and health (via mHealth solutions, for example).
- Changes in benefit plans to increase coverage for care management services that prevent disease and improve health over the long term.
- Earlier intervention and more coordinated disease management to reduce redundancy, toxic care, and hospital admissions and readmissions.
- Improved care management, bringing together providers across the care continuum to deliver more coordinated and effective interventions to manage chronically ill patients.

## PUTTING THE TOOLS IN PLACE TO REALIZE CARE COORDINATION AND MORE EFFECTIVE CARE MANAGEMENT

Investments in electronic data capture and storage (i.e., systems designed for the collection of clinical data in an electronic format) such as Electronic Medical Records (EMR) and Picture Archiving and Communications System (PACS) are steps toward the goal of exchange of information across the care continuum. Governments are investing in health information systems directly in some countries and offering incentives to the private sector in others to support the movement toward ubiquitous EMR and the ability to exchange health information.

Market numbers demonstrate the expansion of these IT and informatics systems. Sales of EMR systems reached \$17.9 billion in 2011, an increase of 14.2 percent compared to the previous year. The worldwide market for PACS, replacing film with electronically stored and displayed digital images, is expected to increase from \$2.8 billion in 2012 to \$5.4 billion in 2017. Other health IT systems are growing at comparable rates.

Additional data sources that are now becoming available provide a plethora of individual patient data, from genetic information to streaming biometric data from home medical devices. The majority of this data, whether captured in an EMR, medical images, comments on forms, patient-entered information on social media sites or call center conversations, is unstructured data, complicating data consolidation and utilization.

A significant factor in making this data useful in improving care coordination is data integration and data sharing. Care coordination requires data collection from a variety of settings—hospital, physician's office, imaging center, pharmacy and home—and then exchange of information in a coordinated fashion among the care team. Data exchange and coordinated care models involve enterprise health information exchange, as well as regional and national information exchange structures.

In Europe, for example, government initiatives are driving integrated health IT information exchange via regional and national shared databases. In Finland, the Helsinki Medical Imaging Centre has implemented a multi-site PACS across one of the largest hospital districts in the country, allowing clinicians in any facility to access patient records electronically. In France, a digital image management proposal is being adopted by the government, with the goal of achieving widespread adoption and cost-savings over current practice. The French proposal would include the creation of a national image archive. These investments in more collaborative, information-sharing infrastructure enable easier exchange of data and harmonization of knowledge across the care continuum, with the goal of improved care coordination, optimized outcomes and lower costs.

An additional driver of health data exchange to improve care coordination and care management is the implementation of new care delivery models. At the micro-system or physician-practice level, the implementation of the Patient Centered Medical Home (PCMH) model has grown considerably, and Accountable Care Organizations (ACOs) are forming at the macro-system level. With these new care models, the care team now is extended to include a wider range of providers acting in concert to coordinate interventions in a preventative fashion, designed to keep patients out of acute care settings as much as possible.

The PCMH model involves the assignment of a patient to a care manager, who works under the leadership of the physician and coordinates the care across the care team. This team works together to ensure that care is coordinated, integrated, comprehensive, and delivered using evidence-based guidelines. The PCMH care model focuses on care coordination across settings, and disease management, wellness and preventive care; practices that have transformed to PCMH-level care have shown decreased hospitalizations and lower overall costs, particularly for patients suffering from chronic conditions. In order to become recognized as a PCMH, providers must demonstrate their capabilities in a number of areas, including care coordination, which is fundamentally enabled by the use of health information technology solutions.

ACOs have emerged as an important part of the U.S. healthcare reform model, driven by the Affordable Care Act. An ACO is defined as an organization with a specific legal structure that is not only focused on care coordination, but also includes mechanisms of payment reform, such as shared savings programs through risk sharing and gain sharing. ACOs may consist of many practices under the umbrella of one organizational entity and are intended to cover thousands of patients. ACOs will be based on creating alliances across the medical neighborhood: physician practices, hospitals, home health agencies, nursing homes, etc. ACOs may be “virtual” organizations as well, led by individual physicians in rural areas or other entities, such as a local medical foundation, that acts to govern a network of providers set up in a formal relationship.

The ACO provides a legal framework, leadership and infrastructure, and may provide other resources (including IT tools) that assist small practices in care coordination and care management, resulting in better-coordinated, cost-effective care and more profits (or gains) for members of the ACO. Providers organized in an ACO are liable for the quality and cost of care delivered (and share risks as well) and thus are incentivized to manage patients across the full continuum of care, in contrast to episodic care delivery (similar to integrated delivery systems, IDNs). Under healthcare reform, groups of providers who voluntarily meet certain criteria, including quality measurements, may form ACOs and share in the cost-savings for Medicare and Medicaid programs.

In both the Medical Home and ACO models, the efficient operation of the care team will be highly dependent on a robust health information technology infrastructure, inclusive of data capture and integration or exchange. Communication across the care teams is essential, requiring an extensive use of health IT, including capabilities such as use of an Electronic Medical Record and e-prescribing, population management via retrospective and real-time dashboard reporting tools, clinical decision support, automated tasking



and alerts, secure messaging and patient/provider Web portals. Additionally, advanced analytics tools, including predictive and text analytics, are needed to provide new insights for care management, targeted interventions, and understanding organizational risk.

## **WHAT IS NOW NEEDED TO DELIVER THE BENEFITS OF CARE MANAGEMENT AND CARE COORDINATION?**

### ***Population Management and Data Analytics***

A major focus of this new care and reimbursement structure is population management. Key to achieving the goals of improved patient outcomes and preventative care, while lowering costs, is the application of data analytics to continuously monitor the population, identify system risk factors, stratify patients by risk and target those patients requiring intensive care management. Patients are managed in “next-generation” care management systems, used across the outpatient and inpatient settings to track patient and provider interactions along a preferred care path, and prompt adherence to defined evidence-based protocols. Clinicians gain efficiency and productivity with automation that supports tracking, alerting and tasking, and are able to focus their scarce time on patient interactions, coordinating interventions, and preventing expensive acute episodic care. Patient and clinician satisfaction increases, the quality of care is improved and costs are significantly reduced, all attributable to enhanced care coordination and more informed, intelligent targeted care management.

Healthcare providers need to determine which portion of their patient population (as a cohort and individuals) are at greatest risk in order to better manage risk and cost-effectively implement care plans. There is a critical need for provider organizations across the care continuum to identify which patient population is at increased risk, target specific patients, and deliver more personalized interventions. Healthcare leaders recognize that, in order to reap the benefits of health IT systems and leverage the breadth of health data collected, there must be a dedicated focus on data analytics, combining clinical data with financial and administrative data. Adopting new technologies that use advanced data analytics helps the provider better identify and process information in order to make more successful decisions based on evidence, optimizing outcomes and value.

The unstructured data component, locked in free-text form of the various electronic systems, is the most complex and often overlooked element. The data analytics solutions used must have the ability to mine and analyze both structured and unstructured information in patient records in order to most accurately identify and assign risk, predict hospitalization and coordinate interventions.

The ability to extract and analyze both structured data (data that is identifiable because it is organized in a structure, and therefore relatively easy to search and extract) and unstructured data (data that has no pre-defined identifiable structure, such as data stored in images, videos, e-mail, documents and text) in patient records is crucial for healthcare organizations at all levels. Advanced health IT software enables users to search, discover and perform analytics

on structured or unstructured information. At the practice or individual level, these programs help clinicians prioritize their cases, accomplish their tasks faster and smarter, and make better decisions. At an enterprise level, users can analyze unified data on a global scale with trend breakdown and guide detection, and identify inaccuracy. Therefore, organizations have a better understanding of patterns across entities, which facilitate decision-making for healthier performance, address compliance requirements and maximize value.

The importance of unstructured data in healthcare should not be minimized. As much as 80 percent of the information in an EMR is unstructured, in the form of physician notes, discharge summaries, registration forms, and assessments, as well as text stored in e-mails, text messages, social network websites, published research and the huge volume of images stored by healthcare organizations. It is hard to understand how we could possibly determine the best care protocols and make care decisions without the details of this unstructured information, yet unstructured data is inaccessible to most analytics engines, which are not able to locate and extract these details. Because unstructured data is difficult to locate and extract, it is often not included in business and clinical analysis.

An additional challenge with unstructured data in healthcare is the need to understand medical-specific terminology that is included in text documents. To make unstructured data usable in healthcare analytics, correctly interpreting technical terminology in written language is another key capability required.

Current technology from more advanced analytics solutions allow for the extraction, collection and processing of data from these unstructured information sources (combining this data with structured data). These analytics tools detect trends and patterns, and identify deviations or anomalies, determining relationships. Predictive analytics solutions generate and evaluate hypotheses, and determine a confidence level for the hypotheses. One key use in the future of healthcare is the ability to score predicted outcomes to better guide the care team on the need to intervene, when and how to intervene, enabling clinicians and organizations to focus on patients at risk before they present with more severe conditions.

While we now have advantages, in that more and more systems are in place to capture and record health information on specific patients, the large volumes of data make analysis and the drawing of conclusions complex. Even more difficult is predicting the probability of outcomes that can be relied upon in medical decision-making.

Additional data that could be useful in making care decisions may come from sources beyond hospitals and their affiliated physicians. Predictive analytics relies on inclusion of as much relevant data as possible, and thus in healthcare, the inclusion of medical records, medical imaging, clinical trial data, genomics and the varied sources of unstructured data create the most robust (and complex) set of information on which to base analysis.

Health IT systems providing advanced analytics can be optimized and customized for secondary use of data. Providing a global, unified view of the environment with flexible and robust role-based access capabilities, advanced health IT solutions offer these capabilities using the

system EMRs as a key data source, but offering a single-view overlay that can help organizations optimize tools and information according to their needs. This results in empowerment of the care team, giving them the ability to extract more value from their health IT information, transform the IT infrastructure into a strategic asset that drives smarter and faster decision-making, and support the goal of better health outcomes.

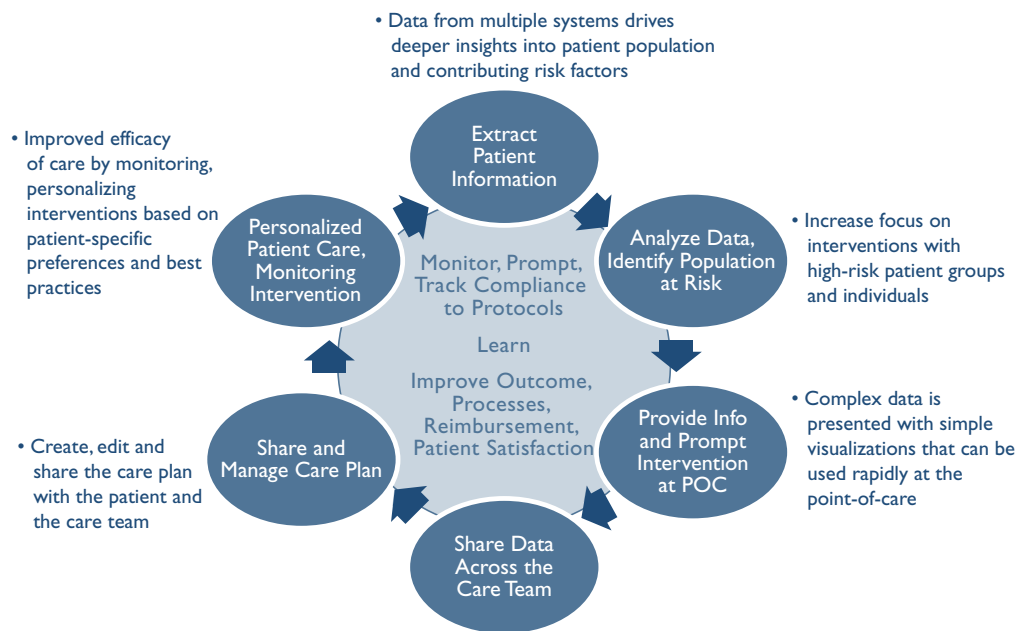
### ***Coordination of Strategic Patient Interventions***

Coordination of strategic patient interventions is necessary to ensure successful outcomes, and improve the quality of care and care management. Healthcare organizations must understand the importance of including both patient intervention and engagement in the process of adapting new approaches to quality improvement. Collaboration and communication between patients, providers, clinical staff, medical equipment and medication vendors, and payers are essential for better care coordination, continuous quality improvement and cost reduction.

Collaboration is step one, and implementing care management processes in the context of team-based care and collaboration is step two. Coordination of targeted patient interventions based on preventative and wellness-focused concepts helps ensure the appropriate members of the care team are engaged in the management of chronically ill patient populations. Care management requires the ability to derive individual patient risk. Early identification and prevention requires analyzing and anticipating risks. Based on a patient's history, including medication and behavior information pulled from structured and unstructured data, advanced analytics systems can determine individual patient risk.

Also important is the ability to create digital and shareable care plans, especially for high-risk populations. The goal is to keep people healthy longer by managing and reducing risks through patient engagement activities, goal setting, coaching and monitoring, along with timely intervention and treatment.

**Figure 3: New Care Models Leveraging Smart Technologies**



Advanced analytics-enabled care management solutions facilitate the process of determining optimal intervention, coordinating information flow, and prompting steps within an approved “digital care plan” or protocol and standard workflows. The intent is to simplify collaboration through a single view, flexible software, and facilitate communication via a coordinated workflow, improving overall productivity for better preventive and wellness-focused care.

Solutions need to track and prompt adherence to clinical protocols, customized to an organization’s workflow. Operational effectiveness is enhanced by a robust and flexible information infrastructure that ensures compliance and fulfillment, and enables customized healthcare protocols.

Overall, care coordination and care management is enhanced, productivity across the care continuum can be measured and maximized, and cost controls maintained. All the tools exist to deliver the future of healthcare, in both acute and preventative ambulatory care management. In order to expedite care delivery transformation, healthcare organizations must determine their technology gaps and implement the tools that support care coordination. Leveraging such technology is not only smart, but is a necessity to improve and achieve successful care coordination and care management, and to accelerate the shift from sickcare to healthcare.

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