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- A STRATIFIED APPROACH TO PATIENT
 - SAFETY THROUGH HEALTH INFORMATION
 - TECHNOLOGY

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I. Introduction

Over the past fifteen years, the United States has begun to reform its fragmented and inefficient fee-for-service healthcare system. A recent combination of policy- and market-driven forces has accelerated a shift towards a value-based system that strives to improve the quality, safety, and efficiency of patient-centered care. This paper explores how health information technology (IT) is critical to supporting these efforts by helping organizations identify at-risk patients and avoid unnecessary care.

II. Background

The U.S. spends more per capita on healthcare than any other developed nation, and healthcare expenditures are projected to nearly double over the next twenty-five years. However, the higher levels of spending do not correlate with significantly better quality of care or health-related outcomes in comparison with other countries. While many factors contribute to elevated costs, the healthcare system suffers from a high degree of fragmentation that severely limits its ability to prevent inefficiencies, medical waste, and error – much less reduce unnecessary spending. Indeed, it is estimated that medical errors alone lead to nearly \$1 trillion in direct and indirect costs each year.

Over the past decade, the Institute of Medicine (IOM) has helped galvanize the healthcare industry with reports such as *To Err is Human*, *Crossing the Quality Chasm*, and *Best Care at Lower Cost* to raise awareness around the need for increased quality, safety, and efficiency of care. A flurry of reform efforts across the private and public sectors have aimed to transform the delivery of care, including the passage of two critical legislative acts. In 2009, the Health Information Technology for Economic and Clinical Health (HITECH) Act provided the groundwork to digitize the healthcare field by incentivizing the use and exchange of electronic health information. The Patient Protection and Affordable Care Act (ACA) subsequently introduced provisions focused on the value of and access to care. Fundamental to many ACA initiatives is the Triple Aim, a conceptual framework that seeks to improve health outcomes and the patient care experience while simultaneously reducing per-capita costs. New value-based delivery models such as accountable care organizations (ACOs) and patient-centered medical homes (PCMH) employ data-driven approaches towards population health management to achieve these goals. By adopting shared risk and responsibility for patient care, ACO and PCMH models are critically dependent upon access to and exchange of timely, up-to-date health information to measure, analyze, and manage provider performance and patient outcomes. Over the next several years, the ACA will expand access to

health insurance for more than 12 million people through Medicaid and the Children’s Health Insurance Program, and an additional 27 million newly eligible enrollees through Health Insurance Exchanges.

As states prepare for these changes, the healthcare system will be challenged to care for vulnerable and hard-to-reach populations with complex and/or chronic conditions that have been previously mismanaged. It is therefore imperative that healthcare organizations be able to effectively deliver care in a safe and appropriate manner to maximize optimal health outcomes. Underscoring the need for health IT, the IOM has recommended that healthcare organizations leverage data to prioritize care for targeted patient populations based on their risk of conditions that are costly and/or easily preventable. By processing and analyzing information from multiple data sources, health IT can provide decision support for the intervention(s) best suited for patients at high risk of a Triple Fail event, which are processes or procedures that result in higher costs and suboptimal health outcomes and patient experience. This stratified approach can not only increase the efficiency of services delivered to those in greatest need, but can also improve the overall safety and quality of care through health IT.

III. Patient Safety

Adverse health events can occur at any point in time and location across the continuum of care as a result of human, medical, systems error, or any combination of the three. The IOM has identified two types of human error: active and latent. Active human errors are direct operational mistakes that can occur at the frontline of care and result in immediate consequences. Latent errors are the conditions and factors which triggered the error – such as poor design or organizational processes – but can be subsequently identified and prevented. The fragmented nature of the current healthcare system can lead to poor coordination of care, causing unnecessary readmissions, complications, and mortalities. Interactions with technology, reductions in staff, and inadequate training are some of the many factors that can create adverse events in a health system. Because of the complexity, frequency, and intensity of the services they receive, chronically ill patients stand to benefit the most from efforts to improve the quality and coordination of care. When patients consult multiple providers in different settings, it is often difficult to access complete information on a patient’s diagnosis, medical history, or prescriptions – which in turn can impede informed decision-making and increase the risk of adverse events. However, health IT can facilitate the collection and exchange of real-time data to enable timely decisions and improve the quality, safety, and efficiency of care. Health IT can be further leveraged to reduce the occurrence of potentially preventable events (PPEs) that unnecessarily increase costs and jeopardize

patient safety. Described below are five PPEs that are a significant threat to patient safety: complications, readmissions, admissions, emergency room visits, and ancillary services.

Potentially Preventable Complications (PPC)

PPCs refer to potentially preventable harmful events or negative outcomes occurring during inpatient care that result from treatment rather than the natural progression of disease. Complications directly impact resource utilization and are often associated with longer hospital stays and increased cost. PPCs often are a result of incomplete medical history or poor hospital communication. Hospital-acquired infections occur among as many as 10 percent of hospitalized patients, costing the United States more than \$30 billion and leading to nearly 100,000 patient deaths each year. Similarly, more than 1.5 million preventable adverse drug events occur as a result of inaccurate prescribing and unintentional overdoses each year, leading to as many as \$29 billion in direct and indirect costs.¹

Potentially Preventable Admissions (PPA)

PPAs are hospital admissions that result from lack of access to care or coordination of ambulatory care. As the prevalence of chronic disease increases and the elderly population grows, there will be an increased need to prevent hospital admissions and increase access to appropriate primary care. PPAs lead to more than 4.4 million hospital admissions and \$31 billion in unnecessary costs each year.² Medicare patients make up a disproportional amount of these hospitalizations, consuming 67% of total hospital costs for potentially preventable admissions among adults.

Potentially Preventable Readmissions (PPR)

PPRs refers to patients that are readmitted to the hospital as a result of deficiencies in care during a previous hospital stay before being discharged. Readmissions typically result from poor coordination and integration of a care team as patients move along the continuum of care. It is estimated that approximately 18% of Medicare patients are readmitted to hospitals within 30 days of discharge, leading to \$15 billion in unnecessary expenditures.³

Potentially Preventable Emergency Department Visits (PPV)

PPVs are emergency department visits for conditions that could otherwise be treated in a non-emergency setting. Often resulting from a lack of adequate access to primary care, PPVs are particularly prevalent among underserved patient populations. However, the use of the emergency room is a highly inefficient and costly means of care.

Potentially Preventable Ancillary Services (PPS)

PPS are services ordered by primary care physicians or specialists which may not provide useful information for diagnosis and treatment, such as unnecessary lab tests and imaging. These excess services are not only costly, but reduce patient satisfaction and quality of care representing a Triple Fail event.

IV. A Comprehensive Approach to Reducing Readmissions

Healthcare organizations can prevent adverse events from occurring by implementing a stratified approach towards patient safety. The first step begins with the development of a comprehensive baseline assessment to construct a profile of patients at risk of being readmitted to the hospital. Historical data can be leveraged to indicate vulnerable populations that received care in the past and may require prospective monitoring and targeted intervention in the future. Predictive models subsequently incorporate this information to build statistical algorithms that estimate the probability of an event occurring based on the trends and patterns observed. By adjusting for the severity of a condition, data analysis can suggest whether a clinical outcome occurred due to the patient, provider, or nature of services delivered. Given that patients may not always be amenable to a proposed intervention, organizations can use impactability models to further prioritize the delivery of care to the high-risk patients most likely to respond well to a specific intervention. Finally, the establishment of an ongoing feedback loop is critical to assessing the impact of interventions on health outcomes and further refining predictive models with new data.

In an effort to help providers achieve the Triple Aim and avoid Triple Fail events, 3M has developed a comprehensive software suite to reduce the burden of medical error in a variety of clinical settings. By systematically identifying patients at risk of potentially preventable events, the suite is an effective tool for population health management. For example, the 3M™ Potentially Preventable Readmission (PPR) Grouping Software helps to identify potentially preventable readmissions by using real-time data and clinical methodology to determine whether a readmission is clinically related to a previous admission. The solution uses criteria such as patient characteristic, reason for admission, procedures and the interrelationships between underlying medical conditions to create predictive models for readmissions for both Medicare and non-Medicare populations.

The 3M PPR solution leverages predictive analytics to identify trends among populations at high risk of readmission. For example, the highest rates of readmission occur among patients with heart failure,

COPD, psychosis, intestinal problems and those who have undergone various types of surgery. Hospital readmissions within 30 days of discharge occur more often among Medicare beneficiaries than commercially insured populations, and patients taking at least six medications or who are discharged on weekends or holidays are also at higher risk. By utilizing software to identify these sub-populations at the time of admissions, providers can mitigate and alleviate the possibility of preventable readmissions.

The 3M PPR Grouping Software groups individuals by similar health characteristics, helping organizations to identify the factors that cause variations in outcomes, quickly adapt the delivery of care to targeted groups, and focus resources effectively to reduce waste and overhead. The software can also be used for performance measurement at a physician, department, and organization level using risk-adjusted data. The use of the 3M PPR Grouping Software represents a stratified approach to the Triple Aim that involves identifying and prioritizing subpopulations based on their risk of experiencing health failures and the impact of prevention efforts.

V. Case Study: Reducing Avoidable Readmissions Effectively (RARE) Campaign

The RARE Campaign is a collaborative statewide effort across healthcare organizations in Minnesota that has strived to prevent and reduce avoidable hospital readmissions within 30 days of discharge.

Spearheaded by the Minnesota Hospital Association, Stratus Health, and the Institute for Clinical Systems Improvement, the campaign successfully met its Triple Aim objectives of reducing hospital readmissions by 4,000, achieving more than \$40 million in associated savings, and improving the patient experience through 16,000 more nights of sleep at home rather than in the hospital between 2011 and 2012. Currently, RARE is focusing on further reducing readmissions by an additional 2,000 to achieve a 20% rate reduction by the end of 2013. “RARE began in recognition of the fact that approximately one in five Medicare patients discharged from Minnesota hospitals are readmitted within 30 days,” noted Mark Sonneborn, Vice President of Information Services at the Minnesota Hospital Association (MHA).

“Before this got off the ground, we were all working independently to reduce hospital readmission rates in a highly ineffective manner. But we’ve made incredible progress over the past two years and are already working with more than 80% of hospitals in Minnesota to make a significant impact on our system and turn things around.”

As the healthcare system transitions from fee-for-service to value-based paradigms of care delivery, the reduction of hospital readmissions is an example of a critical but achievable goal for healthcare

organizations. Working with 145 hospitals across Minnesota, MHA was able to communicate the value and financial incentive of preventing hospital readmissions early on. MHA approached the RARE Campaign with a holistic population health strategy around five key areas: discharge planning, medication management, patient/family engagement, transition care support, and transition communication.

In the past, MHA was unable to track data with the methodology used by Medicare since it wasn't replicable with their database and needed outpatient information from physicians that was unavailable. But by using the 3M PPR Grouping Software in combination with analytics tools, MHA was able to calculate, compare, and forecast preventable readmissions rates among specific patient populations – such as Medicare vs. commercial patients – and then further analyze data by type of care. The 3M PPR Grouping Software identifies potentially preventable readmissions based on clinically precise criteria, allowing hospitals to detect new trends and insights from their data through risk identification that targets basic demographics and key diagnostic groups (e.g. heart failure). The 3M software also takes into account the patient's procedures, and additional conditions such as mental illness, which are strongly correlated with a higher risk of readmission. The collection, analysis, and tracking of data not only provided a granular picture of performance, but also led to the development of standard measures and benchmarks that were critical to driving action at a state level to improve patient safety and quality of care.

VII. Conclusion

Healthcare organizations can leverage health IT to improve patient safety by using a stratified approach to the delivery of care. Several lessons can be learned from the experience of the Minnesota Hospital Association, Stratus Health, and the Institute for Clinical Systems Improvement in their efforts to reduce hospital readmissions in Minnesota. After identifying winnable battles with providers to achieve the greatest impact, it was deemed critical to educate staff on the potential benefit of stratifying patients and delivering targeted interventions towards receptive and at-risk populations. By continuously measuring and monitoring patient populations across the state, hospitals were able to develop a highly accurate baseline of performance and establish a tailored, evidence-based approach to care.

¹ http://www.cdc.gov/hai/pdfs/hai/scott_costpaper.pdf

² http://www.acpinternist.org/archives/2009/10/national_trends.pdf

³ http://www.medpac.gov/chapters/jun07_ch05.pdf