Getting HIE "Just Right" for Population-Level Clinical Decision Support

I. Overview

I will focus my comments on the potential for the nurse care coordinator in primary care to avoid admissions, readmission and revisits to the acute hospital when supported by low-cost interoperable health information exchange (HIE) and population-based clinical decision support tools. The key points are as follows:

1. Evidence-based interventions to improve continuity during care transitions from the acute hospital to the community can be effectively delivered at a population-level using telephone outreach by nurses in new roles (care manager, care coordinator).
2. Effective solutions need to build on existing HIE infrastructure and be interoperable.
3. Multiple decision support tools are needed to deliver information in the right dose and right time to the right person in the right place so that the right questions can be asked to promote patient-centered care across the healthcare continuum.
4. The right information delivered appropriately can empower the nurse to make care patient-centered and engage the patient in self-care using sustainable population-based decision support.
5. The expected long-term outcome is fewer avoidable visits to the hospital, care continuity during transitions, better quality care, lower healthcare costs, and improved patient experience of care.

Previous experience as the population health analyst at a regional managed care organization (MCO) convinced me that evidence-based interventions could effectively be delivered at the population level using telephone outreach by nurses skilled in care coordination. The MCO split care mangers into specific teams for Medicare, Medicaid and privately insured populations. The nurse-mediated intervention included a phone call within 48 hours of discharge, assessment of need and triage to the appropriate level of care which included nurse practitioner home care for those with the greatest need. The intervention incorporated elements of Eric Coleman's 4 pillars of transitional care with Mary Naylor's advanced practice nurse model (Coleman, Parry, Chalmers, & Min, 2006; Naylor, Aiken, Kurtzman, Olds, & Hirschman, 2011). In the first year after implementation, the intervention was associated with a $54 reduction in per-member-per-month expense in the Medicare cohort with chronic disease for an overall savings of $16,923,708 (Hewner, 2014). The results demonstrate that systematic telephone outreach by nurses has the potential to bend the medical expense trend. Our challenge in the Coordinating Transitions Project was to determine how the process could be automated to deliver just the right amount of information at the right time to the right person to change the way transitional care is delivered.

II. Our Model: Getting It Just Right [1]

The flow diagram (see slide 3) for the Coordinating Transitions Project starts with Admission, Discharge, and Transfer (ADT) notifications generated by the hospital and sent to the Regional Health Information Organization (RHIO). The RHIO distributes ADT notifications simultaneously to our pilot primary care

practice and to the Clinical Data Repository (CDR). Within the CDR, the ADT notifications are filtered for discharges from the inpatient setting and matched against the practice's Subscribe and Notify list and the Cohort Table, which adds information about disease complexity, to create the Care Transitions Alert. The alert is delivered via secure email to the nurse care coordinator's mailbox and triggers her to make an outreach call and complete the PCAM tool to assist in developing a care plan which addresses social determinants of health. Cases which generate an alert are followed to ensure primary care visit within a week and no 30-day readmission to allow for enhanced visit billing.

The Coordinating Transitions Intervention requires that the hospital participates with the RHIO and sends automated ADT notification. The RHIO needs to have an infrastructure that supports sending ADT to the primary care and CDR and which allows for transmission and storage of Continuity of Care Documents (CCD). The practice must be able to develop a Subscribe and Notify roster of patients for the nurse care coordinator, be able to transmit a listing of ICD-9 codes (problem list) for their entire roster of patients, have secure email and results delivery with the RHIO, and a nurse in the role of care coordinator. Our COMPLEXedex™ algorithm creates the Cohort Table which identifies high risk cases and the Patient-Centered Assessment Method (PCAM) developed by the University of Minnesota Department of Family Medicine and Community Health to evaluate how social determinants of health contribute to the risk of readmission.

The conceptual model for the project is the Risk Stratified Care Management Model (Hewner & Seo, 2014). This model demonstrates how the COMPLEXedex™ algorithm identifies the population cohort with major chronic disease. For this cohort there is a need for fully integrated care which includes informational continuity, managerial continuity, and relational continuity. Primary care is the ideal location for care coordination because of the long-term relationship with the patient resulting in the strongest relational continuity. To implement this model, knowledge about population-level disease complexity and information about person-specific social determinants of health, is needed. The tools to accomplish these tasks are part of the Coordinating Transitions Intervention.

The COMPLEXedex™ algorithm is used to create a Cohort Table which flags individuals for 12 prevalent chronic diseases including smoking, hyperlipidemia, hypertension (HTN), obesity, asthma, substance abuse (SA), mental health (MH), chronic obstructive pulmonary disease (COPD), diabetes (DM), coronary artery disease (CAD), heart failure (HF), and chronic kidney disease (CKD). The source for the diagnoses is the primary care EHR (electronic health record) and currently the information comes from the past 3 years of billing codes, although the plan is to use the CCD archive as the eventual source for diagnosis codes. The Cohort Table also classifies combinations of these conditions into 17 hierarchical disease categories which are grouped into complexity segments and cohorts.

The algorithm, originally designed for Medicare, was adjusted in 2014 to add smoking, obesity, substance abuse, and the depression category was expanded to all mental health diagnoses to address conditions with greater prevalence in the younger Medicaid population. Unlike Medicare, where the prevalence of heart and kidney system failure accounts 15% of the population (Hewner, Seo, Gothard, & Johnson, 2014), only 1% of Medicaid adults have chronic kidney or heart failure. As disease complexity increases, the rate and the relative risk of hospitalization increases to as much as 30 times that of the population without any of the classified diseases.

A Care Transitions Alert is generated by the CDR when an individual who is in the Subscribe and Notify List and the chronic cohort is discharged from an inpatient stay based on the ADT. The alert is sent by

secure email directly from the CDR and arrives at 7 am the day after discharge. The alert includes information from the ADT notice such as discharging hospital and discharge diagnosis. Information about the 12 chronic conditions is included from the Cohort Table to remind the care coordinator of other complicating diagnoses. The relative risk of hospitalization is included to help the coordinator prioritize cases based on disease complexity. Contact information is included to facilitate telephone outreach. The alert instructs the coordinator to contact the patient and provides critical knowledge about the admission and of underlying disease complexity.

After speaking to the recently discharged patient, the nurse completes the PCAM (see attached tool). This 12 item, paper-based tool developed by the University of Minnesota (Maxwell, Hibberd, Pratt, Cameron, & Mercer, 2011; Peek, 2009), evaluates 4 domains of social complexity including health and well-being, social environment, health literacy and communication, and service coordination. Currently the care coordinator enters the level of complexity for each question as a PCAM laboratory value. The nurse totals the score for each domain by hand. We are developing a web-based PCAM Calculator that incorporates automated scoring, data visualization and decision support in developing a patient-centered care plan. We expect to have the prototype of this operational by fall 2015. When this is completed, the Coordinating Transitions Intervention could be deployed at any primary care practice with the required capabilities.

Originally ADT notices were delivered by results delivery into the primary care EHR. However, the volume of notices that were not actionable overwhelmed the practice. The system was revised to send the notices via secure email to the care coordinator. She scans the notices for admissions and visits to the emergency department. Emergency visits that didn't follow a hospital discharge are forwarded to the triage nurse for follow-up. Our preliminary findings support a redesign of the workflow in the practice with ability to track high utilizers much more closely than in the past. Recently the office has been able to use the Enhanced primary care billing code for patients meeting the criteria which suggests that as a possible approach to sustainability. The care coordinator reports better rapport with patients and patients have appreciated the outreach. Furthermore, patients are more engaged in their care and some have begun to contact the coordinator for questions. Because the intervention builds on existing capabilities in regional primary care practices and the RHIO supported by the ONC Beacon program (Maloney, Heider, Rockwood, & Singh, 2014), the program is cost effective.

III. Partners

The University at Buffalo School of Nursing (SON) serves as a hub for the activities surrounding the Coordinating Transitions Intervention. Our collaborative includes both clinical and technical partners. Clinical partners include Family Medicine and Elmwood Health Center, our pilot primary care site. The outcomes analysis using the Medicaid Data Warehouse, is supported by the School of Pharmacy and Pharmaceutical Services. The New York State Department of Health allows access to de-identified claims to evaluate outcomes (hospitalization, emergency room and outpatient utilization). The University of Minnesota serves as a consultant to the project, offering suggestions on the use of the PCAM and supporting the automation of scoring. The COMPLEXedex™ algorithm, developed by Hewner is used to both identify high risk cases and to evaluate outcomes. A key stakeholder is the recently discharged patient with chronic disease who experience continuity of care across settings with resultant avoided readmissions and increased engagement.

The UB Department of Industrial and Systems Engineering (ISE) is a critical co-investigator and they have taken the lead in designing the architecture for the health information exchange (HIE), analyzing workflow, and ensuring an interoperable solution. Weekly conference calls between the RHIO and CDR and SON have been essential to working out glitches in the system. Because of the recent emphasis on avoiding readmissions, it has been relatively easy to get leadership buy-in on the project, especially since there is potential for sustainability.

IV. Successes and Challenges related to technology systems and supports (Question 3)

Currently in the 4th quarter of implementation, the project has had a number of successes. First we were able to build on existing capabilities to have on-time deployment of the intervention including HIPAA compliant transmission of clinical information. We are in the process of analyzing baseline health outcomes using de-identified data from the New York State Medicaid Data Warehouse (MDW) by individual primary care practice, and have validated the risk-stratification algorithm in both the MDW and EHR. We have developed a series of filters for the ADT notifications so that Care Transition Alerts are created for high risk discharges and have automated the system so that alerts arrive at 7AM from the previous day. We have included the PCAM results in EHR as laboratory study.

There have been a number of challenges as well. Initially there were a large number of false positive alerts that overwhelmed the care coordinator in the first month. It was a challenge to identify and correct the problems because the research team was unable to view either ADT notices or Care Transitions Alerts because of required separation of data between the clinical intervention and research evaluation of health outcomes portions of the project. We still need to develop a solution that allows us to filter ADTs that go to the care coordinator. We estimate that the care coordinator spends an hour daily deleting notifications that are not actionable. We had to revise our initial plans to develop a Care Transitions Dashboard within the primary care EHR, but that forced us to come up with an interoperable solution. We found that adapting the paper PCAM to an electronic format with discrete data has required revision based on findings in the prototype usability test. Finally we have not yet been able to transmit CCD for the Care Transitions encounter from the primary care office, although we are continuing to work on that process.

V. Opportunities and Barriers for Advanced Health Models

Strict separation of research and clinical information has allowed us to maintain privacy of protected health information while exchanging critical information. However this makes problem solving much more difficult and time consuming and can result in inappropriate messaging. An example is an outreach phone call made to the family of a recently deceased individual. After the call occurred and the care coordinator notified the research team, we were able to work with the CDR and RHIO to find the information on the ADT and develop a plan to flag deaths. This privacy consideration has HIE policy implications to HIPAA requirements.

 A second policy issue that hinders broader adoption of the intervention is the focus on the hospital and specific chronic diseases as the focus for readmission reduction. There is a need to consider readmissions as a systems problem, and to strengthen integration of information across settings. Hospitals are reluctant to include primary care practices as partners in reducing readmissions. The lack of interoperability between hospital and community providers is exacerbated by current practices around electronic transmission of discharge summaries in real time. Current summaries arrive too late

for primary care follow-up and this limits the ability to spread the intervention because practices with late information are not able to use enhanced billing codes. Furthermore, competition between hospital systems may further limit communication with unaffiliated community providers. Hospitals have focused on heart failure, but this condition is rare in the Medicaid population. Finally social determinants of health are largely missing from these summaries.

Regionally we have been blessed by ONC Beacon investments that support electronic communication and effective collaboration. However, hurdles to interoperability remain. EHRs that lack the ability to communicate effectively with each other is problematic in the primary care setting. Regionally there are six major EHR vendors serving primary care practices, and many more that are used infrequently. Another issue is the lack of an all-payer repository for administrative data such as claims. The availability of data to evaluate outcomes using the MDW with about a 6-month lag is unusual, but although this system includes Medicaid claims from across the healthcare system, it doesn't include Medicare or private insurance claims, thus offering an incomplete picture of the total population and limits our outcome analysis to adults aged 18-65 with 10+ months of enrollment who are not dually-eligible for Medicare. A final hurdle is lack of provider patience to retry an HIE intervention that did not succeed initially. One example is the results delivery of ADT. A number of practices have tried getting ADTs from the RHIO, but have been overwhelmed by the volume of notifications, especially those that are not actionable. Careful planning to get the intervention right the first time is critically important.

How is health IT used to identify and to support high risk individuals across settings, over time and what tools are utilized to insure social determinants information is available at the individual and data system level?

The Coordinating Transitions Intervention aims to get the right information (discharge notification) about the right persons (those with pre-existing chronic disease) at the right time (within 24 hours of discharge) to enable the right person (the primary care nurse care coordinator) to make the right decisions (by incorporating social determinants of health and PCAM results into care planning) to prevent avoidable readmissions. Carefully filtered ADT notifications combined with knowledge of both medical and social complexity results in patient-specific interventions for the high risk population with chronic disease. Tracking post-discharge utilization using ADT notifications allows the care coordinator to evaluate the effectiveness of interventions at the practice level and monitor the individual over time. Adding PCAM results to the EHR makes information about social determinants of health, collected at the primary care setting with the greatest relational continuity, available electronically and eventually to transmit this information across settings using CCD stored in the CDR. This integrated and interoperable solution has the potential to self-sustaining through use of the enhanced billing codes and sets the stage for broader use of nurses in expanded roles to improve continuity in our fragmented health care system.

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Patient Centred Assessment Method (PCAM)

Vs2.0 February 2015

ID _____   Date: __ __/ __ __ __/2 0 __ __

Nurse/Clinician:

> **Instructions: Use this assessment as a guide, ask questions in your own words during the consultation to help you answer each question. Circle one option in each section to reflect the level of complexity relating to this client. To be completed either during or after the consultation.**

Health and Well-being

1. Thinking about your client's **physical health needs**, are there any symptoms or problems (risk indicators) you are unsure about that require further **investigation**?

No identified areas of uncertainty or problems already being investigated	Mild vague physical symptoms or problems; but do not impact on daily life or are not of concern to client	Mod to severe symptoms or problems that impact on daily life	Severe symptoms or problems that cause significant impact on daily life

2. Are the client's **physical health problems** impacting on their **mental well-being**?

No identified areas of concern	Mild impact on mental well-being e.g. "feeling fed-up", "reduced enjoyment"	Moderate to severe impact upon mental well-being and preventing enjoyment of usual activities	Severe impact upon mental well-being and preventing engagement with usual activities

3. Are there any problems with your client's **lifestyle behaviors** (alcohol, drugs, diet, exercise) that are impacting on **physical** or **mental well-being**?

No identified areas of concern	Some mild concern of potential negative impact on well-being	Mod to severe impact on client's well-being, preventing enjoyment of usual activities	Severe impact on client's well-being with additional potential impact on others

4. Do you have any **other concerns** about your client's **mental well-being**? How would you rate their severity and impact on the client?

No identified areas of concern	Mild problems- don't interfere with function	Mod to severe problems that interfere with function	Severe problems impairing most daily functions

Social Environment

1. How would you rate their **home environment** in terms of **safety and stability** (including domestic violence, insecure housing, neighbor harassment)?

Consistently safe, supportive, stable, no identified problems	Safe, stable, but with some inconsistency	Safety/stability questionable	Unsafe and unstable

2. How do **daily activities** impact on the client's well-being? (include current or anticipated unemployment, work, caregiving, access to transportation or other)

No identified problems or perceived positive benefits	Some general dissatisfaction but no concern	Contributes to low mood or stress at times	Severe impact on poor mental well-being

3. How would you rate their **social network** (family, work, friends)?

Good participation with social networks	Adequate participation with social networks	Restricted participation with some degree of social isolation	Little participation, lonely and socially isolated

4.	How would you rate their **financial resources** (including ability to afford all required medical care)?			
Financially secure, resources adequate, no identified problems	Financially secure, some resource challenges	Financially insecure, some resource challenges	Financially insecure, very few resources, immediate challenges

Health Literacy and Communication

1.	How well does the client **now understand** their health and well-being (symptoms, signs or risk factors) and what they need to do to manage their health?			
Reasonable to good understanding and already engages in managing health or is willing to undertake better management	Reasonable to good understanding <u>but</u> do not feel able to engage with advice at this time	Little understanding which impacts on their ability to undertake better management	Poor understanding with significant impact on ability to manage health

2.	How well do you think your client can **engage** in healthcare discussions? (Barriers include language, deafness, aphasia, alcohol or drug problems, learning difficulties, concentration)			
Clear and open communication, no identified barriers	Adequate communication, with or without minor barriers	Some difficulties in communication with or without moderate barriers	Serious difficulties in communication, with severe barriers

Service Coordination

1.	Do **other services** need to be involved to help this client?			
Other care/services not required at this time	Other care/services in place and adequate	Other care/services in place but not sufficient	Other care/services not in place and required

2.	Are current services involved with this client **well-coordinated**? (Include coordination with other services you are now recommending)			
All required care/services in place and well coordinated	Required care/services in place and adequately coordinated	Required care/services in place with some coordination barriers	Required care/services missing and/or fragmented
Routine Care	**Active monitoring**	**Plan Action**	**Act Now**

What action is required?	Who needs to be involved?	Barriers to action?	What action will be taken?
Notes:			