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Predictive Modeling NEWS

Applying PM to Transform Access to Healthcare in Communities

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The number of uninsured in America increased by more than 13% nationally between 1996 and 2005. Uncompensated care costs increased 28% over the past decade. A recent study showed that uninsured patients will receive more than $56 billion in uncompensated care in 2008.2 In 2004, 44 million uninsured Americans (including those without coverage for all or part of the year) had total medical care expenditures of about $125 billion.3 Safety net providers, usually a group of amorphous hospitals, community health centers and volunteer clinics, share most of the responsibility of society to provide care to those uninsured and indigent patients.4 Most safety net providers report an increase in uncompensated care due to population growth, local economic downturns and increased chronic disease burdens. Financial pressures are forcing many of those safety net providers to respond by limiting their services and their exposure to indigent patients.5 However, some safety net providers are attempting to address the issue through better coordination of care for low-income patients to reduce the total cost of uncompensated care to the community.

Over 10 years ago, the safety net providers in Austin came together to do something about the lack of access to healthcare for the indigent and uninsured members of their community. It was obvious that uninsured and underinsured patients can be best served through coordination and integration of their care across the community. The broad consortium of hospitals, community clinics and local public health agencies formed the Integrated Care Collaboration. The members realized, quite astutely, that to address the myriad pitfalls and gaps in the healthcare system, the most valuable resource that could be shared among them was their information. The beginnings of a health information exchange were thus established, which has since served as a master patient index or central data repository for the participating members.

According to the *Fourth Annual Survey of Health Information Exchange at the State, Regional and Community Levels,* by eHealth Initiatives, only 32 health information exchanges are fully operational in the country. Of them, only about half are incorporated into separate legal entities.6 The ICC is, therefore, a unique model of care coordination through the establishment of a health information exchange that can provide insights into addressing the issues related to uncompensated care and community safety nets. It also provides a great opportunity to use predictive modeling methodologies to improve access and disease management for the indigent.

Formed in 1997, the ICC is a 501(c)(3) non-profit organization striving to improve access to healthcare for people in Central Texas. Members include non-profit hospitals; public, volunteer and private clinics; and government and academic institutions (Table 1 – see page 2). It is currently serving an area with estimated population of over 1.5 million. The member entities are all represented at the Board of Directors level and contribute to the annual expenditures of the ICC through membership fees.

Description of ICC Database

The ICC developed the I-Care database, which is a master patient index and clinical data repository. Member entities contribute patient data for patients identified as uninsured or underinsured to I-Care on a daily to monthly basis. Patient records are then built by the ICC in HIPAA-compliant, HL7-standard record formats, which may be subsequently accessed by authorized providers. Figure 1 (see page 2) describes the information flow and the diversity of systems that contribute to the central data repository at ICC, mainly through secured file transfer.

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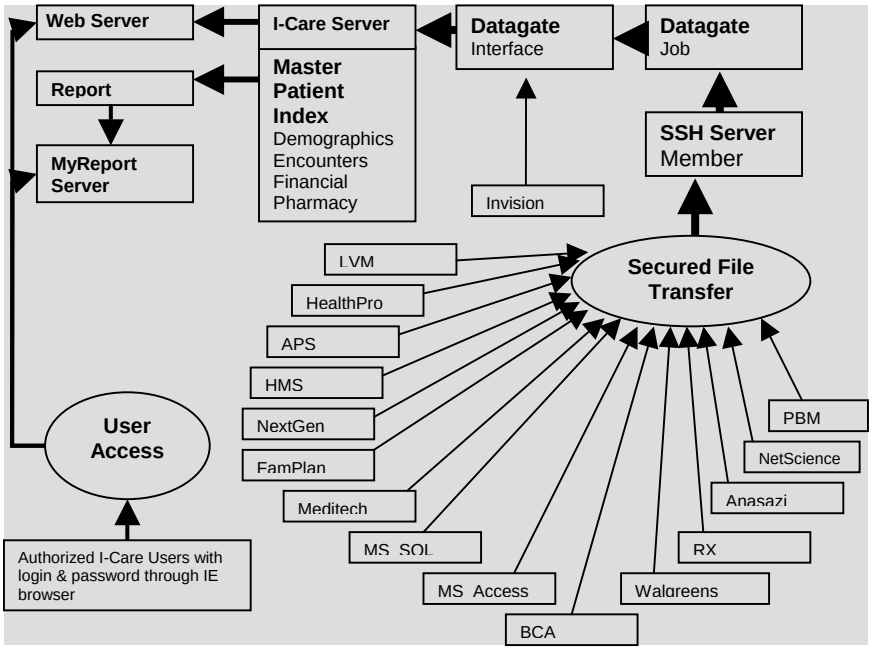
Table 1: List of Current ICC Members

- Austin Travis County Mental Health Mental Retardation Center
- Austin Women's Hospital
- Austin/Travis County Health and Human Services Department
- Blackstock Family Health Center
- Central Texas Medical Center
- City of Austin Community Care Services Department
- Del Valle Children's Wellness Center, Family Wellness Center – University of Texas, School of Nursing
- El Buen Samaritano: Episcopal Mission
- Front Steps Recuperative Care
- Hays County Independent School District – Student Health Services
- John's Community Hospital
- Lone Star Circle of Care
- National Center for Farmworker Health, Hays County
- People's Community Clinic
- Planned Parenthood of the Texas Capital Region
- Project Access - Travis County Medical Society
- Samaritan Health Ministries
- Seton Family of Hospitals
- St. David's HealthCare
- Travis County Healthcare District
- University of Texas Medical Branch – Austin Programs
- Volunteer Healthcare Clinic
- Williamson County and Cities Health District

FIGURE 1: ICC Health Information Exchange



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Residing on an SQL server, the information collected for most patients in the I-Care database includes: name, date of birth, sex, Social Security number, patient address, race/ethnicity, marital status, primary care provider, funding program, encounter type, location of encounter, attending doctor, admission date and time, discharge date and time, diagnosis code (ICD-9) and procedure codes (CPT-4) (Table 2). The different types of encounters sent to I-Care include hospital, outpatient, emergency department and clinic visits. Data on prescriptions dispensed is also available from some ICC Members. Patients are asked to sign an authorization for sharing data across the ICC membership. That authorization is valid for two years and is updated whenever a new authorization is provided. It allows members in the collaboration to share personally identifiable patient information across the membership in a HIPAA-compliant manner. Access to the database is strictly controlled and monitored. Users log on to the database using the Internet Explorer web browser. Users can look into a patient's past history of utilization, diagnoses and prescriptions. The system is currently working on adding laboratory data and more prescription details from various locations.

Table 2: I-Care database

Data Category	Variables
Master Patient Index	Patient Name, Date of Birth, Gender, Social Security Number, Medical Record Number
Demographic data	Address, Telephone Number(s), Primary Language, Race/Ethnicity, Marital Status, Next of Kin
Clinical data	Medical Diagnoses (ICD-9), Medical Procedures (CPT-4)
Funding data	Payer or Funding Program (Medicaid, CHIP, Locally Funded Programs)
Encounter data	Encounter Type (ED, Inpatient, Clinic Visit, Etc.), Visit Date, Location, Attending Provider, Admission and Discharge Date, Time of Admission or Discharge
Pharmacy data	Prescription Start and End Date, Prescribing Provider, Amount Ordered, Number of Refills Allowed, National Drug Code (NDC) and Name of Medication, Dispense Date and Amount, Prescription Number

The I-Care database is a great data resource for its members, the community and health researchers. It currently holds data for about 700,000 patients. There are details of about 4 million patient encounters taking place in the ICC network. Data are being received from more than 70 locations in the Central Texas area. Encounter data go back to 1999, although a majority of encounter records are from 2002 onwards. More than 850,000 encounters of about 250,000 patients were reported in the I-Care database in calendar year 2007. That included more than 200,000 emergency department (ED) visits, 37,000 hospitalizations and about half a million clinic visits. Because all members have shared ownership of the database, they are keen to keep an eye on the demographic and disease trends in the community. Also, the community leadership is interested in informed policy-making based on evidence and data available in the I-Care database.

Examples of Innovative Programs in the Community

The I-Care database has already helped the community and its providers develop innovative interventions and initiatives to improve access for the uninsured and indigent. Here are some examples:

ICC-Asthma Network

The program identifies patients in the database who will benefit from an educational self-management asthma program. Patients who have had at least one hospitalization, one ED visit or four outpatient visits with a diagnosis of asthma are selected from the I-Care database. Those patients are then contacted by program staff to participate in the asthma education and training program. The patients interact with a certified respiratory therapist, who works with them to establish a medical home, guides them about medications and helps them cope with their chronic disease symptoms. Disease management software is used to capture clinical information for those patients, which is then merged with their records in the I-Care database. A recent evaluation of the program found a 40% decrease in ED visits and 95% decrease in hospitalization before and after the program in enrolled patients. The I-Care database not only helps in identifying the most appropriate patients for the program but also helps in tracking their utilization across community providers.

High-Alert Program

Another program that uses I-Care to identify patients is the "High-Alert" program at Seton Family of Hospitals. The I-Care database is used to identify patients who have complex needs. Besides other more specific criteria, such as having chemical dependency or behavioral issues, generally patients who have presented at an ED more than three times within a month are treated as having complex needs. After looking at the patient's treatment history in the I-Care database, the High-Alert program coordinator and ED directors create a care plan for his or her future management.

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The I-Care database is used to research the clinical background and utilization patterns of patients across the healthcare system. It also helps in finding a primary care physician for a patient for coordinated care. When an identified patient presents for treatment at any of Seton's EDs, a flag identifies that the patient has a care plan to guide his or her future management. Early evaluation of the program shows that 75% of "drug-seeking" patients who visit EDs to seek narcotics do not return for ED visits because attending physicians are able to see their care plans. Access to patient care plans for those complex patients has also brought about a measurable decrease in door-to-door times in their ED visits.

EMerge Program

The EMerge program is an integrated behavioral health and primary care program provided by the Austin Travis County Mental Health and Mental Retardation Center in collaboration with Austin Travis County Community Health Centers. The program addresses the limited availability of safety net mental health services and the need for better coordination of services for patients with psychiatric problems that can be managed in primary care settings. Psychiatric assessment of indigent and uninsured patients is conducted at MHMR. Those in acute crisis are referred to safety net psychiatric facilities. However, those who are stable and need counseling for less-severe levels of depression, anxiety or other mental disorders are provided outpatient counseling and referred to a primary care physician in a community health clinic. In the absence of that program, many of those patients were never properly assessed for psychiatric treatment and often ended up in EDs with psychosomatic symptoms. The I-Care database provides much-needed access to information to providers at MHMR and CHCs that helps them identify safety net patients by looking up past utilization, diagnoses and medication records. The EMerge program helps reduce the burden on the limited psychiatric specialty services for the really sick patients while providing a chance for stable psychiatric patients to be included in a routine care regimen at city clinics. Better care of safety net patients, facilitated by access to their health records through the I-Care database, also lessens the burden on area EDs, lowering costs and freeing up beds for more serious patients.

MATCH Program

A study at the University of Texas at Austin found that 13% of uninsured patients are readmitted within 90 days of their discharge from the hospital.[7] One of the key reasons for that high rate of recidivism is that most uninsured patients do not have a primary care provider and are unable to get medications and routine follow-up treatments to prevent subsequent hospitalizations. The goal of the *Medical Assistance Through Community Healthcare* (MATCH) program is to reduce the risk of admission, readmission and ED visits for uninsured patients seen at St. David's Medical Center and match them with a community clinic that can serve as their medical home. That match-making is facilitated by the MATCH staff's being able to look at any previous outpatient visits for uninsured patients in the I-Care database and referring them for follow-up to the clinics.

Potential of PM Applications

As a rich source of information about how and for what conditions indigent and uninsured patients seek care in the community, the ICC's I-Care database provides a great opportunity to use predictive modeling tools. One purpose for which the ICC database has been used in the past, and for which more sophisticated PM applications will be extremely suitable and productive, is the identification of most-deserving or "high-risk" indigent patients.[8] Using information about prior utilization and disease codes, those patients who can benefit most from disease management and care coordination can be identified and approached for provision of education, self-management training, coordinated care and financial support. Those patients can also be assisted in establishment of a medical home for them, where they can get continued quality care.

"There is an increasing demand by community members to be able to use the data to identify "high risk" or "high-opportunity" patients and then accordingly make sure that the system provides them access to quality care to minimize their suffering."

The high-risk patients identified through I-Care are not necessarily the "high-cost" patients that many health plans want to look for in predictive models.[9] Instead, high-risk patients who may be identified through I-Care are the ones who are at higher risk of landing in an ED or in a hospital for conditions that are preventable.[10] Such patients are also termed "high-opportunity" patients because they have a higher likelihood of being helped by a disease management or case management intervention.[11] The I-Care database can also be used to help design interventions, enroll patients in different programs and evaluate the effectiveness of interventions.

The ICC has only recently started to explore the potential of using predictive modeling tools with the rich data at its disposal. There is an increasing demand by community members to be able to use the data to identify "high risk" or "high-opportunity" patients and then accordingly make sure that the system provides them access to quality care to minimize their suffering. Better management of those indigent patients will also save costs to the healthcare system, and those savings can be reinvested to expand programs that work. A recent evaluation of the ICC-Asthma program, which provides education and care coordination to indigent patients identified through I-Care, showed a high return on investment – for every dollar spent on the program, more than five dollars were potentially saved in hospital and ED utilization.[12]

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Conclusion

Most experts agree on the benefits of prevention, care coordination and disease management. Those benefits can be far more dramatic for the indigent, uninsured and vulnerable subpopulations in our communities who have limited access to healthcare services. However, discovering those subpopulations accurately and implementing programs and policies that provide such services in an efficient and effective manner is a daunting task. Information technology and modern data analysis techniques have given us the capability to identify those subpopulations. The ICC is an organization that is setting an example of how to integrate care for the underserved and uninsured in our communities, using information-sharing among diverse providers in an environment of trust, protection of privacy and collaboration. Predictive modeling techniques can take the model to another level of sophistication in targeting delivery of services to those who are in greatest need and who will benefit the most. Used in that manner, predictive modeling techniques can become a transformative technology that promises to bring about a system-level change in the delivery of services to the uninsured and poor in our communities.

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