

**State University of New York**  
**Comments on New York State Department of Health HIT Briefing to**  
**Stakeholders April 7, 2010**

**May 10, 2010**

We thank Dr. Figge and New York State DOH for the opportunity to make comments on the HIT/HIE plans. We share in the "To-Be" vision and the planned activities to develop statewide HIE infrastructure and facilitate access to patient data. We believe that this will improve care coordination and quality care for New York Medicaid beneficiaries.

The national transition to health information technology (HIT) through implementation of electronic health records (EHRs), automated medication dispensing systems, and personal health records (PHR) creates an opportunity to enhance disease pattern recognition, optimize diagnostics included in clinical decision support, and increase patient safety through evidence-based prescription of medications.

### **1. SUNY Experience with Patient Centered Medical Home (PCMH)**

The SUNY-NYSDOH Medicaid Initiative is built on the HEAL 10 initiative that established a Patient Centered Medical Home (PCMH) and a corresponding data warehouse that collects data in real-time from an integrated EHR network.

From a clinical management perspective the PCMH is an important advance that promotes quality care, patient safety and patient-centered disease management. The challenge for clinical and translational researchers, and more recently implementation science investigators, is to design novel approaches that utilize the wealth of health information in the data warehouse to conduct comparative effectiveness research to inform evidence-based guidelines and reimbursement policies. The SUNY-NYSDOH Medicaid Initiative seeks to expand existing Medicaid databases and registries to include patients with hypertension, diabetes and diabetes resulting in a Hypertension, Diabetes and Renal Disease (HDR) Management and Outcomes Registry. The enhanced registry will provide an HIT infrastructure with excellent environment to conduct HIPAA compliant, comparative effectiveness research protocols that will incorporate evidence-based medical care and also evaluate optimal use of HIT to attain improved clinical and economic outcomes.

The HEAL NY Phase 10 award to the Academic Health Center at SUNY Buffalo focuses on "Improving ESRD Outcomes in Patients with Progressive Diabetic Nephropathy by Interoperable Health Information Management in a PCMH Model." This \$7 million dollar award was matched by \$21 million of public-private partnerships and leverages the implementation of a single electronic health record system among the 450 physicians of UB/MD. Leveraging the prior NYS investment in the Computational Computer Facilities at the Center of Excellence in Bioinformatics & Life Sciences at Buffalo, these super computers can serve as a data repository for large datasets which can be shared across broad geographic regions. Currently these facilities are engaged with Fair Health Inc to house and provide analysis for the dataset in Attorney General Cuomo's settlement with United Health Care and other insurance providers.

## **Innovation**

Enhanced Registry and Comparative Effectiveness Research: The technology enhancements that will result in the SUNY-NYSDOH Medicaid Initiative Registry will provide an innovative approach to including primary care practice sites in the conduct of comparative effectiveness research. The important NIH Roadmap initiatives that have encouraged translational research at the community level, the recent emphasis on implementation science and the existing network of practice-based research networks have a common need for a health information technology architecture that facilitates applied research while considering the challenges to completing this research in a primary care practice environment. The enhancements will provide new insight into the design of prospective, randomized longitudinal assessment protocols using an enhanced registry. In addition, the enhanced registry that is linked with health information exchange will allow more comprehensive datasets to be developed that will facilitate improved feedback of prescription refill rates, patient education needs, health literacy concerns and online health status management. From the reimbursement perspective, the research conducted within the enhanced registry will allow for ongoing evaluation of the financial impact of disease management and treatment plans and their relationship to overall resource planning and allocation, to achieve quality health outcomes. The enhanced registry will provide new opportunities to develop models for integration with a patient safety organization (PSO), and in collaboration with statewide network partners, access novel disease management approaches while also fostering continuous quality improvement. This approach will also inform other AHRQ PSOs as new informational technology strategies are evaluated so that the larger national network can benefit from the innovations in the SUNY-NYSDOH Medicaid Initiative and enhanced registry approach.

## **2. Medication History**

### **Current Status**

NYSDOH currently has the ability to access an unadjudicated medication history from the pharmacy data system. However, this dataset is not always complete and, moreover, is not organized in a manner that readily provides salient information to the clinician. SUNY could provide guidance and input on, first, how to include OTC as well as complementary and herbal medications, in order to arrive at a meaningful and adjudicated medication history; second, through its resources at the College of Pharmacy at the University at Buffalo, provide input on appropriate data flow for these data; and third, this College of Pharmacy is also positioned to participate in the development of a meaningful clinical presentation of medication history.

### **Using Advanced Technologies to Ensure Meaningful Use of Electronic Patient Data**

Information sciences and technology will be necessary and instrumental in collecting and integrating patient data from multiple disparate data sources and then analyzing such data to create a complete and comprehensive medication history to perform medication reconciliation. Today, many hospital information systems (HIS), electronic medical record (EMR) systems, personal health record (PHR) systems, e-prescribing systems, and computerized physician order entry (CPOE) systems exist and are being used by healthcare professionals. All of these systems have mechanisms to capture, store and structure patient data and, in particular, medication related data. While basic decision support systems are currently included in EHRs, these systems do not obviate the need for extensive manual review of records to perform medication

reconciliation. The current state of the decision support tools is such that this review process is time-consuming and prone to human error. What is needed is an advanced, rule-based clinical decision support system (CDSS) to automate the medication history generation and facilitate medication reconciliation in real-time.

There are two major challenges in how we can achieve this and, ultimately, *meaningful use* of electronic patient data to deliver high quality healthcare. First, rapid and efficient extraction of patient data from multiple, disparate data sources in multiple locations is a challenging problem. If the accuracy of medication data, extracted from these systems, cannot be verified or cross-referenced with prior diagnoses and other relevant patient information, it is impossible to put together the “big picture” of patient medication history or to perform reconciliation. The second challenge is to provide meaningful and relevant information to the healthcare professional in a concise manner that can be acted upon quickly and accurately. Just giving more information is not enough. Physicians, nurses and other healthcare professionals are already spending too much of their time entering and retrieving information. Merely making more patient data available to them does not lead us to higher quality care, because, without a well-designed clinical decision support system, it would require a lot more time, clinical skills and effort than are currently needed to search for and analyze the data to reach a sound decision. The medication related data need to be transformed automatically into *actionable information* (e.g., alerts on adverse drug interactions or recommendations on alternative treatment based on evidence-based medicine guidelines), so that they can be used, meaningfully, in delivering patient care.

We note that NYSDOH has taken the initiative to address the first challenge and is in the process of developing and deploying a state-wide data sharing infrastructure, using the enterprise services bus to link various data sources, including both state-owned and provider-operated information systems. We believe this is an important step to facilitate easier access to and more effective sharing of patient data and that this step also makes it possible to develop an advanced clinical decision support. Such a system will rely on semantic-based information retrieval and machine learning techniques (such as rule-based inference engines) to uncover and extract the latent semantic structure of complex data sets. This system will play a crucial role in reducing or eliminating the “mental clutter” and data overload faced by healthcare professionals when dealing with complex information systems. It will allow for the effective and efficient transformation of large volumes of disparate data into succinct, structured and actionable information that can be used directly and in real time to deliver patient care. It will also provide a platform to integrate clinical knowledge and evidence-based medicine guidelines so that best-practice recommendations can be provided to healthcare professionals to ensure the quality of care.

### **A Semantic-Based Approach to Medication Data Analysis**

RDF ("Resource Description Framework"), a semantically enabled data format, is a standard general-purpose language designed specifically to allow data integration and interchange from multiple sources on the Web. This is particularly important with pharmacy data, which can include information from prescribed medications in outpatient and inpatient settings, as well as OTC and herbal medications. RDFs, Dublin Core, and OWL2, are RDF schema, which build on top of RDF and allow rich metadata to be associated with the original data. When integrating the pharmacy information from multiple RDF sources, this RDF generated metadata can be used to build intelligent algorithms to reconcile pharmacy data from different sources and to provide a

unified view of the information, in ways that are significantly more robust, fast, and efficient to implement and query than using relational database schema.

There are several developed ontologies (formal representations of specific domain knowledge elements and their relationships) related to pharmacy that are RDF based. "Translational Medicine Ontology" is one that links information in a patient focused setting; it provides a common means to talk about drugs and patient care allowing bridging across disparate systems (<http://esw.w3.org/HCLSIG/PharmaOntology>). An RDF version of the "RxNorm" database of drugs from the National Library of Medicine is also available (<http://link.informatics.stonybrook.edu/rxnorm/sparql>). SUNY has practical experience in integrating drug information from claim databases, public data sets, and specialized databases like "First Databank's NDDF+."

### **SUNY Expertise in Clinical Decision Support System (CDSS)**

A semantic-based clinical decision support system (CDSS) is currently being developed at the New York State Center of Excellence in Wireless and Information Technology (CEWIT) at Stony Brook University. This system provides an advanced, bidirectional, rich audiovisual interface that transforms data into easily interpreted, uncluttered, and directly actionable information. Clinical data is processed and presented visually using text, anatomic models, images, and icons in a way that provides maximal cognitive support to the clinicians, provides clinical clarity, and guides clinical actions. Actions can directly be initiated by voice, touch, or gesture, in response to the information displayed; for some information, a recommended course of action based on the information selected can guide the physician and decrease the time to action. By presenting information as directly actionable items, the system results in "the right thing, at the right time, in the right place, and in the right way."

The ultimate goal of our system is to offer intuitive, quick, integrating and displaying comprehensive information in an easily digestible and meaningful format, support and enhance clinical decision making, and allow for simple, rapid input and assimilation of data from a variety of sources, including input from the clinician. All input and output, as well as all the actions, would occur from the same interface, eliminating the gap between the thought and the action. Instead of consuming much of the clinicians' time and effort on "pulling" data out of the information systems, this system is able to use machine intelligence and clinical rules to "push" immediately actionable rules that apply to specific conditions (e.g. a lab finding of high potassium) and broad populations (e.g. who should receive pneumococcal vaccine), to assure that highly repetitive jobs are done consistently without "cluttering" the focus of the clinician. Recommended actions can be implemented literally with the click of a mouse. Creating an interactive display rich with information and yet easily understood is a key component of our system. We also emphasize creating a system where information can be directly and definitively acted upon as the information is viewed, thus assuring prompt and thorough care.

In the design and development of this system, we paid special attention to the fact that queries for medical information regarding diagnosis, treatment, and other queries must be literally at the physician's fingertips. Medication safety has become a huge issue in medicine, raising complex clinical issues that require immediately available and directly accessible knowledge bases to assist the clinician. Drug-drug interactions can be directly queried, and a search querying the

possible relationship between a patient's symptoms and their medications can be initiated directly through the interface. If the information is not immediately available, it might simply not be sought out. Rather remarkable evidence has repeatedly shown that, due to time constraints, physicians often do not seek out the answers to specific clinical questions about their patients, some of which could have a substantial impact on patient outcome.

Our current focus is to develop this system for one of the most challenging areas for electronic patient information systems – the emergency department (ED). The need for speed, rapid assimilation of information, clarity, and appropriately directed action, is paramount in the ED. The need for all patient information, past and present, is greatest in such an environment. The clinician typically needs to care for multiple patients at the same time. Additional tasks include adherence to core measures, such as disease-specific actions, as required by CMS, JCAHO, and other regulatory bodies, specific health initiatives (e.g., the Surviving Sepsis Campaign from the IHI), and other regulatory requirements. These measures can affect patient outcome, hospital and provider reputation, and payment as well. A clinical decision support system that is designed for and works in ED can easily be adapted to other healthcare environments, including intensive care units (ICU) and other inpatient settings.

To summarize, our goal is to develop an advanced clinical decision support system that is able to:

- 1) Overcome obstacles to the adoption and meaningful use of electronic medical record systems;
- 2) Improve information retrieval and interactive presentation processes to provide patient-centered cognitive support to healthcare professionals;
- 3) Minimize, and ultimately eliminate, the mental clutter experienced by many healthcare professionals and the need to pull information from complex information systems
- 4) Transform patient data into actionable information using semantic-based machine learning techniques;
- 5) Allow healthcare professionals to extract, analyze and act on patient information from the same user interface, by voice, touch, gesture and other intuitive input methods;
- 6) Provide success metrics for the application of the CDSS recommendations to the care of various patients.

### **3. Monitoring of Adoption of Meaningful Use**

An in-depth investigation of the major barriers to EHR/PHR adoption would help us to understand the factors involved with resistance among both healthcare providers and patients. Offering direct and more extensive access to patient data will inevitably expose providers to more liability. Allowing patients to access or carry PHRs brings major challenges to safeguarding privacy and preserving data integrity. The issues of reconciling the information in a patient's EHR and PHR need to be addressed as well. The potential liability issues for health care providers who submit EHRs to the system and who access data from the system may represent significant barriers to adoption of EHR by practices. Potential liability issues have been

noted both at the point of submission and at the point of data access. At the point of submission, providers may have a greater ability to monitor and ensure that appropriate permissions have been granted by the patient. Clear rules regarding practitioner liability when patient data are accessed are essential.

Under the Health Information Technology Evaluation Collaborative, SUNY's Center for Health Workforce Studies (CHWS) conducts periodic surveys of hospitals and a sample of ambulatory physicians to evaluate progress in HIT adoption in the state. These surveys could be augmented to include questions tailored to DOH's needs for effective planning and implementation of HIT/HIE.

In addition, the Center surveys physicians and dentists at re-registration; surveys of nurse practitioners, physician assistants and midwives will shortly be added. All of these surveys could be adapted to gather information of value to DOH. The inclusion of appropriate HIT questions on the re-registration surveys could support long-term monitoring of these providers on their use of HIT. In addition, this could provide an important opportunity for trend analysis of HIT adoption that considers the influence of factors such as geography, specialty, and setting on use rates.

SUNY's CHWS could also conduct surveys of providers who receive funding under the Medicaid HIT Incentive Program to learn about their experience. Information from this survey could inform future efforts to provide HIT incentives to eligible providers.

#### **4. Outcomes Analysis**

It is of paramount importance to assess the outcome of the statewide HIE/HIT initiatives and how these facilitate the delivery of evidence-based medicine. The EHRs impact on improving care coordination and patient safety, and on reducing the overall cost to deliver healthcare need to be analyzed.

##### **Pilot Studies**

SUNY recommends that additional pilot studies be conducted with selected practices to evaluate the quality metrics that can be developed as a core component of the EHR. Currently a study is underway at SUNY Buffalo to measure healthcare outcomes using values from routine blood chemistry tests. This novel approach provides a mathematical metric based on objective measures of illness which generates an illness complexity score, which permits more realistic grouping of patients within cohorts of similar severity, and which relates significantly to overall cost of care. As noted above, SUNY has extensive experience in this area of research and can make available practices that are sufficiently advanced in their adoption of EHR to serve as pilot sites.

## **5. Other Systems Considerations**

### **Security**

The proposed plans emphasize securing patient data using data encryption. We believe adopting more advanced encryption standards (e.g., 256-bit) need not be postponed for a future date but could be implemented earlier, as these offer significant advantages compared to 128-bit protocols, and are already widely adopted standards.

### **System Models**

The decision on whether to adopt a centralized or decentralized (i.e. federated) model, or a hybrid one to certain extent, should be made as early as possible in HIE planning. Specifics such as how to facilitate interoperability and support efficient exchange of large amount of patient data, including radiographic images, need to be addressed. We think it is a very good idea to establish the RHIOs as both data clearinghouses and service bureaus. The importance and broad impact of RHIO interoperability warrants additional review, perhaps in a separate planning document, focusing just on this topic so that the vision, objectives and road map of expanding and improving the RHIOs are very clear.