IOWA DEPARTMENT OF PUBLIC HEALTH

Iowa e-Health Recommendations on Use of Data for Research

5/1/2013

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Iowa Department of Public Health
Promoting and Protecting the Health of Iowans

Mariannette Miller-Meeks, B.S.N., M.Ed., M.D.
Director

Terry E. Branstad
Governor

Kim Reynolds
Lt. Governor

TO: Chief Clerk of the Iowa House
Secretary of the Iowa Senate
Office of the Governor and Lt. Governor

FROM: Iowa Department of Public Health
DATE: May 1, 2013
RE: In response to Senate File 2318

I am pleased to submit this report from the lowa Department of Public Health (IDPH) in fulfillment of the requirements of Senate File 2318 as passed by the Iowa General Assembly and signed by Governor Branstad during the 2012 legislative session. Per the legislative charge, this report reviews the "potential of the use, release, or disclosure of protected health information under this Act for the purposes of research…"

In submitting this report, I want to particularly thank the committee of individuals whom I appointed to develop its contents and recommendations. Chaired by Dr. Patricia Quinlisk, State Epidemiologist in the Department of Public Health, the committee was comprised of a wide range of stakeholders including consumers, hospitals and physician representatives, public health, insurance industry stakeholders, and representatives of the legal and research communities in Iowa. Their efforts to evaluate the Iowa Health Information Network (IHIN) infrastructure and bring a series of thoughtful recommendations are very much appreciated. A list of the membership of the committee can be found in Appendix A in the report.

My staff and I look forward to working with the members of the General Assembly, the Governor and Lt. Governor, and the public to answer any questions about these recommendations. We appreciate the opportunity to provide them.

Sincerely,

Mariannette Miller- Meeks, B.S.N., M.Ed., M.D.
Director
Iowa Department of Public Health

Executive Summary

Iowa e-Health, a public-private collaboration – led by the Iowa Department of Public Health (IDPH) – was created to work to improve healthcare quality, safety, and efficiency through the use of health information technology. A main goal of Iowa e-Health is development of Iowa's statewide health information exchange, the Iowa Health Information Network (IHIN).

The IHIN is a system used to connect disparate electronic health record systems (EHR) based on standard and consistent methods. It allows for the secure sharing of individual electronic patient information between authorized healthcare providers who are connected to the IHIN. The IHIN permits the participating providers to access their patients' vital information when and where it is needed to support accurate and timely decision-making, allowing for improved patient outcomes.

With the establishment of the IHIN, the potential exists to access data for the purpose of examining the health status of Iowans in more accurate and complete ways, including use of this data in research. In this instance, research uses of IHIN data can be distinguished from uses of this same data for individual patient care. Research use of this data would lead to publication – a sharing of findings for the greater good – and activity that contributes to the corpus of general knowledge. Data moving through the IHIN is clinical and not administrative or claims data, which presents new opportunities for the review and analysis of utilization, prevention, treatments and clinical effectiveness not previously possible.

Privacy concerns must be addressed in an effective way in any effort to release clinical data for research purposes. A clear case for public benefit must be made to attempt to justify any release of these data for that purpose. If data are made available, systems must be devised to compile appropriate data through the decentralized IHIN. Patient data protections must be provided to ensure privacy considerations are addressed, and the concerns of healthcare providers supplying the data are satisfied.

In response to these opportunities, Governor Branstad and the Iowa General Assembly approved Senate File 2318 in its 2012 legislative session. SF 2318 contains the following section relevant to this report:

> Sec. 16. DETERMINATION OF USE, RELEASE, OR DISCLOSURE OF PROTECTED HEALTH INFORMATION. The department of public health shall review the potential of the use, release, or disclosure of protected health information under this Act for the purposes of research, and shall submit its findings and recommendations to the general assembly within twelve months of the effective date of this Act.

Public Health Director Dr. Mariannette Miller-Meeks appointed 16 members to the eHealth Research Committee (see Appendix A for complete list of members)

The following statements comprise a consensus of the Committee's findings and recommendations:

1. Enrollment and use of the IHIN is top priority. Use of the IHIN for research purposes is premised on the IHIN being fully operational, experiencing high participation among providers, and also high patient participation in the system. For the next several years, IHIN staff efforts must be focused on these enrollment and

utilization initiatives. Allowing access to the IHIN for purposes of research may jeopardize participation of providers concerned about patient privacy and take the focus off critical enrollment efforts. Additionally, higher enrollment and use of the IHIN will more likely ensure its financial success and thereby, its long term sustainability.

2. The legal authority for the release of data from the IHIN for the purpose of research must be thoroughly evaluated. Protection of patient rights, informed consent, legal authority and accountability for appropriate use and release of data must be determined along with appropriate codification within Iowa law.
3. An additional system with specific research capabilities will need to be developed and financed to enable data to be queried for research purposes. Because the IHIN has been developed without a central data repository, additional computer programming will be necessary to enable researchers to access patient data from the IHIN. Efforts to develop the database architecture necessary to support the complexities and uniqueness of data acquisition will be challenging and incur additional costs for which no revenue source currently exists.
4. Sufficient infrastructure to manage and oversee research will need to be developed and financed to ensure appropriate, ethical and legal stewardship of the data. Processes governing submission, review and disposition of data requests and release, as well as monitoring use and compliance with contractual requirements need to be established in order to ensure the appropriate stewardship of any data used for research purposes.

As a result of the foregoing, the Committee's recommendations to the Director are:

1. Significant potential exists to better assess healthcare utilization, community health, tracking of medical treatments and interventions, the burden of disease, as well as to support substantial improvements in healthcare and in identifying cost-effective treatments and prevention through the use of data available through the IHIN. The state of Iowa should continue its evaluation of using IHIN data for this purpose, looking to health informatics research for guidance and experiences in other states as a way of determining whether Iowa can have similar success.
2. In the next several years, efforts should be focused on enrollment in the IHIN and use of IHIN data for purposes of improving clinical healthcare for individual Iowans. Additionally, communication should be provided to the public on the benefits and functions of the IHIN to ensure the original purpose of the system is understood and realized.
3. In the meantime, stakeholders and policymakers should monitor the use of the IHIN data for clinical improvement of healthcare at both the system and community level to ensure that the system is positively contributing to population-based improvements in the local healthcare delivery system. Because future payments for medical care will be based on quality and performance outcomes, healthcare providers have a strong interest in gathering data to analyze and improve their own performance. Regional efforts are already underway within the state to enable this community and system-level analysis and improvement to occur.
4. Once the IHIN approaches a completely functioning exchange with a sufficient majority of the State's population and providers invested in the technology, system, and processes, policymakers should conduct a thorough evaluation of the feasibility of developing either a centralized query or repository system to enable access to IHIN data for research, and the costs associated with its development and ongoing operation. Included in this evaluation should be an assessment of personnel and information technology resources required, funding necessary (both capital and

sustaining), and identification of the potential legal requirements to enable access to the data for research. This evaluation will be critical to ensuring that the network can provide appropriate stewardship of the data released for research purposes.

Background Review

There is inherent value in charting a path for use of Iowa patient electronic health records (EHRs) in research. Patient-level health data have long been of great value to researchers seeking to characterize health conditions, assess medical interventions, and to understand health-related behaviors. EHR exchanges provide an unprecedented opportunity for access to large sets of population-based data. At the same time, there are many complicated issues that must be resolved before any type of data use, whether for health surveillance or research, may be realized. The following sections of this report summarize the review of the Iowa Health Information Network (IHIN) issues in accessing, storing and providing access to data, and recommendations from the Committee to the Director of Public Health.

With the establishment of a functional IHIN, the potential exists to evaluate individual patient data for the purpose of examining the health status of Iowans in a more accurate and complete manner. Use of patient data by researchers has the potential of advancing our understanding of various healthcare topics like comparative effectiveness research of treatments, and comparative reporting of health outcomes across providers and systems, among other purposes. Research uses of the IHIN can be distinguished from uses of this same data for individual patient care. Research use of these data would lead to publication – a sharing of findings for the greater good – and activity that contributes to the corpus of general knowledge. Because data moving through the IHIN network is clinical and not administrative or claims data, new research opportunities not previously possible are open for review and analysis.

New opportunities also present new challenges which must be addressed if these data are to be used for research purposes. For example, Iowans' concerns about the privacy of their health information must be allayed prior to any plans to release patient clinical data for research purposes. A clear case for public benefit must be made to justify release of these data for research purposes. If data are made available, systems must be devised to retrieve appropriate data through the decentralized IHIN.

Provider institutions who were involved with the initial development of the IHIN were also very explicit in their position that the IHIN be structured in a way that did not store any clinical data. These institutions were concerned that the IHIN was not well positioned to store and manage highly sensitive clinical data, and felt any potential data breach from the IHIN would result in affected patients losing confidence in their provider's ability to manage their sensitive data. If the IHIN architecture were modified to collect and store clinical data being transmitted over the network, there is a significant risk that provider institutions would withdraw from the IHIN and develop alternate solutions for exchanging clinical data. Any loss of provider participation in the IHIN would seriously jeopardize the financial sustainability model for the IHIN, and would compromise the primary mission of the exchange.

In response to these opportunities and challenges, Governor Branstad and the Iowa General Assembly approved Senate File 2318 in its 2012 legislative session. SF 2318 contains the following section relevant to this report:

> Sec. 16. DETERMINATION OF USE, RELEASE, OR DISCLOSURE OF PROTECTED HEALTH INFORMATION. The department of public health shall review the potential of the use, release, or disclosure of protected health information under this Act for the purposes of research, and shall submit its findings and recommendations to the general assembly within twelve months of the effective date of this Act.

Definition of "Research"

The Committee began its work by discussing the definition of research, understanding that this was foundational to it's' understanding of how health data would be applied to answer critical health-related questions. The term, "research", is defined in Iowa Department of Public Health data management policies (Research and Ethics Review Committee Policy) as the following:

> A systematic investigation designed primarily to develop or contribute to scientific, medical, public health or psychosocial disciplines and generalized knowledge and not for private gain.

A general understanding of research is helpful in framing the context for which IHIN data may be used. Under of the aforementioned definition, for example, the application of data for use in developing specific, individualized patient treatment plans would not be within the definition of research. The Committee's understanding is that the research for which IHIN data could be applied would entail some type of population-based investigation that would be beneficial for advancing the broader health interests of Iowans.

Iowa Health Information Network

Iowa e-Health, a public-private collaboration – led by the Iowa Department of Public Health (IDPH) – was created to work to improve healthcare quality, safety, and efficiency through the use of health information technology. A main goal of Iowa e-Health is development of Iowa's statewide health information exchange, the IHIN.

The IHIN is a system used to connect disparate electronic health record systems (EHR) based on standard and consistent methods. It allows for the secure sharing of individual electronic patient data between authorized healthcare providers who are connected to the IHIN. The IHIN permits the participating providers to access their patients' vital information when and where it is needed to support accurate and timely decision-making, allowing for improved patient outcomes.

IDPH has contracted with a vendor for traditional health information exchange (HIE) as well as providing advanced tools that go far beyond traditional exchanges. The IHIN provides both a core and optional package of services. The core package includes 1) Direct Secure Messaging, 2) Patient Look-Up, and 3) Patient Personal Health Record (PHR).

- Direct Secure Messaging, which is much like email, offers a secure means for providers to "push" electronic patient information to other connected providers via the internet.

- The Patient Look-Up service enables connected providers to search for patient-specific electronic health data and "pull" it back for use and consumption during treatment of patients.
- Patient Personal Health Record provides every patient with their own personal electronic health record storage location or PHR. This unique and specific health record storage is managed and controlled completely by that patient and only available to healthcare providers when specifically authorized by the patient.

The IHIN also facilitates data transfer from providers to registries and other databases in appropriate state agencies as required by law. For example, the IDPH immunization registry and the clinical record storage created for the Iowa Medicaid Enterprise (IME) Health Home payment program are both recipients of data through the IHIN. Other payer organizations will contract with eHealth to utilize additional tools to facilitate similar storage needs related to their management of claims and clinical data. These HIE connections between provider organizations, referral organizations, pharmacies, other supporting healthcare organizations, and state and federal agency systems enable all authorized participants connected to the IHIN or to the national HIE network to submit and retrieve appropriate structured healthcare information.

The Direct Secure Messaging function was offered in Iowa beginning in August 2012. As of March 2013, more than 45 organizations and 550 healthcare providers are connected and utilizing Direct Secure Messaging. More participants continue to enroll in this core service. The Iowa Medicaid Enterprise is building Direct Secure Messaging into its workflow and automation as a means by which providers and their computer systems will more efficiently communicate with IME staff and systems. The Patient Look-Up service continues to be under development and is being pilot tested by several "early adopter" systems, including the University of Iowa Hospitals and Clinics, Iowa Health System, and Mercy-Trinity Health System.

Additional optional services that may be available in the future include: 1) Provider Portals - which provide increased access to tools enabling the development of quality of care reporting, 2) Patient Alerting Tools- for connection to provider organizations, 3) Pharmacy Networks – for more complete medication information, and 4) Admit Discharge Transfer - notifications to those monitoring the patient's healthcare conditions.

A single page diagram has been provided in Appendix B further describing the connections between healthcare providers, patients, EHRs, and the IHIN.

Findings for Potential Uses of the IHIN for Research

The potential applications of aggregated clinical data to healthcare research are numerous. Often, clinical data are used for cancer or other disease specific research purposes in small research data applications to contain the costs of robust data collection to a limited sample of patients. When larger clinical studies are undertaken, costs of data collection can be substantial due to creating specialized data collection systems to capture these additional, detailed data elements. What the IHIN offers is the potential to use this newly established data collection system to enable the use of this more robust clinical data collection effort to more cost-effectively supply important, accurate health data to drive additional research opportunities aimed at improving population-based health. Care must also be taken to utilize this new tool within the framework of HIPAA, patient privacy, and informed consent from

the patient to also ensure that patient rights are afforded appropriate and necessary protections prior to any inclusion or exclusion from any research project.

The Committee generally evaluated potential uses for these data for purposes of surveillance, and for research to drive improvements at the point of care. The types of research that may benefit from this type of clinical data can be categorized as clinical practice research, patient-centered outcomes research, healthcare informatics research, population healthcare initiatives, and clinical trials. Examples include:

1) Clinical practice research – determining which interventions or medications work best in lowering cholesterol, or improving disease prevention with better intervention strategies.
2) Patient-centered outcomes research – evaluating what types of healthcare interventions best support weight loss.
3) Healthcare informatics research or translational research– differences in outcomes for emergency department patients visiting facilities with or without access to the IHIN.
4) Population-based healthcare initiatives – estimating population prevalence of juvenile diabetes to better target interventions and diagnostic efforts.
5) Clinical trials – access to specific test results and clinical findings before and after specific treatments to assist research investigators to determine best health outcomes.

Legal Considerations of Research Use of eHealth Data

Various federal and state laws address the confidentiality of patient health information, including the federal Health Insurance Portability and Accountability Act of 1996 (HIPAA). The IHIN is a business associate of its participating providers and is legally and contractually required to comply with HIPAA and other more stringent Iowa laws relating to the privacy and security of the information it maintains. HIPAA allows for research under specific circumstances. Iowa does not currently have a law governing the use of the IHIN data for research purposes. Therefore, any use of the IHIN data for research purposes would be governed by HIPAA. HIPAA would allow IHIN data to be used for research purposes in a variety of circumstances. Prior to opening the IHIN to use for research purposes, there should be a discussion of whether a state law is needed to further limit the situations in which the IHIN can be used for research purposes and any safeguards that should be implemented in such legislation. Issues which need to be addressed include who would approve the research and what criteria would be used. Further thought should also be given to the potential liability and risks to the IHIN and the State of Iowa for allowing data to be used and accessed for research purposes. More information regarding the federal and state laws relating to use of patient data for research purposes is attached in Appendix C.

Maintenance of high ethical standards in handling patient data for research purposes will also be a paramount concern. Several widely adopted ethical standards exist for this purpose. Appendix D contains the statement from the Association of Clinical Research Professionals and the Academy of Physicians in Clinical Research as an example.

Examples from Other States Allowing Data Sharing with Researchers through Health Information Exchanges

Committee members determined that other states' practices could provide some insightful examples of how HIE information across the country is being managed for research-related

purposes. The Committee was able to identify a limited number of states which have ventured into the research use of HIE data. These limited examples are likely due to both the still-early development and use of HIEs nationally, and an indication of the significant number of complex technical, legal, and financial issues surrounding the topic.

Montana

The most comprehensive example of how other states are using HIE for research purposes is Healthshare Montana. Healthshare Montana originally started with a repository model for HIE purposes, but found that competing interests and privacy concerns made utilizing the data for analytics and research difficult. In 2011, Healthshare Montana received a $1.4 million Challenge Grant Award through the Office of the National Coordinator for Theme 5: Fostering Population Level Analytics.

The analytics repository built in Montana with the grant money "sits beside" the HIE. As data is pushed and pulled through the HIE, i2b2 software (Informatics for Integrating Biology and the Bedside) pulls the data into the research repository, automatically de-identifying the data. i2b2 software is an open source analytic program primarily utilized by university medical centers for purposes of translational research. Healthshare Montana is one of the first non-profit organizations to utilize this program.

Layered on top of the health data in the analytics repository are pharmacy data, payer data, geographic information systems (GIS) data, in addition to other information, in order to give a complete picture and provide all data in one location. Although the data are de-identified in the repository, it is possible to back engineer patient identity for approved purposes or legal necessity.

Healthshare Montana intends to provide a number of services with the data available in the repository. A primary goal is to help smaller, rural providers increase their revenues and returns on investment by identifying missed or incorrect diagnoses and identifying clinical trial eligibility. Additionally, Healthshare Montana is using these data to build accountable care organizations (ACOs) based on analytics, and has partnered with Blue Cross Blue Shield of Montana to build a patient-centered medical home system. The State of Montana will be able to track the origination of Lyme disease, and other reportable diseases, in real time.

The data in the Healthshare Montana analytics database is tightly controlled. In order to obtain access to the data, an application must be completed and approved by a governing body. At the time of approval, requisite data sufficient to answer the research question are extracted from the repository and provided to the researcher by Healthshare Montana. Researchers are not given access to the repository.

Healthshare Montana has ten full-time staff in addition to the subcontractors and vendors responsible for the development and technical oversight of the system. Of the ten staff, four are dedicated to the analytics data repository.

Indiana

The Regenstrief Institute in Indiana is an informatics and healthcare research organization, pioneering the use of electronic medical records and health information exchange. Over thirty years ago, Regenstrief began developing the Regenstrief Medical Record System (RMRS), which in 1994 was extended to the Indiana Network for Patient Care (INPC). The INPC is a city-wide clinical informatics network. It supports health information exchange

for five hospital systems which includes eleven hospitals and over one hundred clinics and surgery centers. The INPC is a data repository. Upon receipt, all clinical data are standardized. Patients with multiple medical record numbers are linked. Information from all institutions is presented as one medical record.

Using data from the INPC, the study "Facilitating clinical research through Health Information Exchange: Lipid Control as an Example" (see reference list for the specific citation) demonstrated that health outcomes and clinical effectiveness research can be performed through a HIE. Additionally, the HIE can be used to develop systemic approaches to measuring patient adherence to treatment. This particular study suggested that the focus of a HIE and research efforts should be on leveraging this readily available information into clinical practice to improve patient outcomes. The primary benefit cited in the study is that large HIE databases provide speed of data acquisition at a lower cost and can impact real world decisions with knowledge comparative to clinical trials regarding chronic conditions.

Comparative Databases in Use in Iowa

Iowa All-Payer Database Report

In 2011, the Iowa Department of Human Services issued a legislatively-required report titled "Analysis of All Payer Claims Database for the State of Iowa". In the report, the Department recaps both the history of Iowa's efforts in developing and operating a claims database, practices in other states, as well as the potential use of the IHIN for purposes of developing an Iowa All Payer Claims Database (APCD). Typical APCD, like that of Iowa's Statewide Hospital Inpatient Database, authorized by Iowa Code Section 135.166, do contain data on all insurance-related claims but may miss information on claims paid through self-insurance programs – a growing component of employer-sponsored insurance over the past many years. Additionally, these claims databases utilize ICD-9 coding to describe health problems encountered, which can be less robust than data found in a more clinically-geared data collection effort.

Iowa Statewide Hospital Inpatient Data

The Iowa Statewide Hospital Inpatient Database, captured by the Iowa Hospital Association on behalf of the Iowa Department of Public Health as authorized in Iowa Code Section 135.166, is comprised of all patient visits to all Iowa hospitals. Data available in this database spans from 1988 through 2012. The Committee reviewed this database, as the Iowa data system most similar to IHIN, to understand its composition, data collection methods, Iowa Administrative Code authority, data sharing agreements, research and non-research use, and how it is used to determine if similar practices could be applied to the use of e-Health data.

Iowa Medicaid Data

The Iowa Medicaid Enterprise (IME) pays upwards of 26 million claims each year for services provided by over 30,000 participating providers. Each claim for service contains a code which identifies the service that has been delivered. Most claims also require a diagnosis code which supports payment of the claim. All paid claims data is kept for approximately 10 years. Data is available for numerous studies that enhance or validate coverage and other policy decisions. In addition, the data is used to develop study groups (similar diagnoses, geography, gender, etc.) and to map expenditures according to defined parameters. Activities such as this allow the IME to submit budget requests that speak to the

needs of the eligible members and allow the suggestion of resources to those areas that may need additional intervention. Because each claim holds a diagnosis there are occasions when research projects are allowed to attempt to define disease prevalence within a specified population and/or geographic area. Some research may also indicate areas where utilization of services falls outside the norm and then may attempt to determine if the cause is availability of providers or due to deficiencies in other support services.

Iowa Regional Patient Record Databases

University of Iowa Health Alliance Data Initiative

The founding members of the University of Iowa Health Alliance have recently initiated a project to utilize a common data analytics system to monitor a small number of clinical data elements in order to better manage the population of patients who receive their care across the Alliance providers. Healthcare reform is expected to drive providers to expand efforts like this to clinically manage patients by evaluating a more comprehensive picture of all the care the patients receive.

Infrastructure Costs

Because few other states currently have the information technology infrastructure in place to manage a central research repository, the Committee was limited in the information available to better understand the nature and cost of the infrastructure needed. As cited earlier in this report, the State of Montana's system, embodied in the Healthshare Montana system, is one model that may apply to Iowa's evaluation of this need. The federal Office of the National Coordinator for Health Information Technology has awarded Healthshare Montana $1.4 million to implement systems to enable the creation of a limited research data repository to enable the collection of information to support population-based research. Ongoing costs of managing this type of system for research, including staff support expenses relating to evaluating requests, dissemination of data, and oversight of researchers' stewardship of this data, would need to be further accommodated with a specific budget.

The Department of Public Health's Research and Ethics Review Committee (RERC) process was presented to the Committee as one method of managing access to public data for current research purposes. The RERC has a well-established application for researchers seeking data as well as process for evaluation of the requests against legal protections, and standard agreements in place to govern both distribution of the data, safekeeping, as well as eventual return or destruction of the data. Policies, procedures and staff support for this similar function relating to researcher access to IHIN data would be critical to safeguard appropriate access, use and stewardship of this information.

Of course while infrastructure will require additional resources to establish, opportunities exist for research to drive cost savings which, at a global, system level, may provide cost savings in the long run.

The following statements represent a consensus of the Committee's findings and recommendations:

Findings

1. Enrollment and use of IHIN is the top priority. Use of the IHIN for research purposes is premised on the IHIN being fully operational, experiencing high participation among providers, and also high patient participation in the system. For the next several years, IHIN staff and efforts must be focused on these enrollment and utilization initiatives. Opening the IHIN to research purposes prematurely may jeopardize complete enrollment and utilization of the IHIN, further jeopardizing accomplishment of its primary purpose to improve patient treatment and outcomes. Emphases at the current time for enrollment and utilization for patient treatment will result in high confidence among patients and providers that the system can accomplish these primary tasks. This high level of confidence on this primary task can result, we believe, in opportunities to expand use of the IHIN for research purposes at a future time. Additionally, higher enrollment and use of the IHIN will more likely ensure its financial success.
2. The legal authority for the release of data from the IHIN for the purpose of research must be thoroughly evaluated and recommendations made to address any gaps. Once a determination is made proposing a level of access to IHIN data for research purposes, and capabilities have been evaluated for data compilation, authority and accountability, dissemination of data and oversight, an evaluation of legal authority necessary to enable this level of access and protections should be conducted. Because system capabilities, governance and oversight will require the investment of additional resources – see the two following findings – evaluating legal authorities as a follow-on step will enable legal protections to be identified and enacted to take greatest advantage of the knowledge of this infrastructure to ensure appropriate patient information protections are afforded. Protection of patient rights, consent models, and governance of appropriate use and release of data must be determined along with appropriate codification within Iowa law.
3. Additional system capabilities will need to be developed and financed to enable data to be queried. Because the IHIN has been developed without a central data repository, additional programming will be necessary to enable access to population-based data from the IHIN. This additional database architecture to support the complexities and uniqueness to acquire data sets from EHR systems, determine valid and cost-efficient query processing, and programming for analysis and reporting options, as well as additional equipment and data storage capacity, will incur both one-time and ongoing additional costs for which no revenue source currently exists.
4. Sufficient infrastructure to manage and oversee research will need to be developed and financed to ensure appropriate stewardship of the data. Processes governing submission and disposition of data requests and release, as well as monitoring use and compliance with contractual requirements, need to be established in order to ensure the appropriate stewardship of the data used for research purposes.

Recommendations

There are many opportunities to better the health of Iowans by use of statewide e-Health data. However, there are barriers that must be overcome before these data can be used in a

consistent, appropriate, ethical, and legal manner. The following recommendations outline what must be accomplished before meaningful, appropriate use can occur:

1. Significant potential exists to better assess healthcare utilization, community health, tracking of medical treatments and interventions, the burden of disease, as well as to support substantial improvements in healthcare and in identifying cost-effective treatments through the use of data available through the IHIN. The state of Iowa should continue its evaluation of using IHIN data for these purposes, looking to health informatics research for cost –efficient structures and experiences in other states as a way of taking greatest advantage of other states currently leading these efforts. Monitoring the experiences of research efforts among states like Montana and Indiana will allow Iowa's efforts to build a best practice model for access to IHIN data for research.
2. In the next several years, efforts should be focused on enrollment in the IHIN and use of IHIN data for purposes of improving clinical healthcare for individual Iowans. Additionally, communication should be provided to the public on the benefits and functions of the IHIN to ensure the original purpose of the system is realized.
3. In the meantime, stakeholders and policymakers should monitor the use of the IHIN data for clinical improvement of healthcare at both the system and community level to ensure that the system is positively contributing to population-based improvements in the local delivery healthcare delivery system. These improvement efforts are not considered research and providers should need no special authorization to use data for their own healthcare improvement initiatives. Because future payments for medical care will be based on quality and performance outcomes, healthcare providers have a strong interest in gathering data to analyze and improve their own performance. Regional efforts are already underway within the state's boundaries to enable this community and system-level analysis and improvement to occur. Allowing time for these regional efforts to mature will provide a useful and lowest-cost method of early experimentation with healthcare data and analysis to ensure that a statewide effort will yield positive return on investment.
4. Once the IHIN approaches a completely functioning exchange with a sufficient majority of the State's population and providers invested in the technology, system, and processes, policymakers should conduct a thorough evaluation of the feasibility of developing either a centralized query or repository system to enable access to IHIN data for research , and the costs associated with its development and ongoing operation. Included in this evaluation should be an assessment of personnel and information technology resources required, funding necessary (both capital and sustaining), and identification of the potential legal requirements to enable access to the data for research. New laws will likely be needed to enable the IHIN to provide access to this patient data in the most secure, effective way possible. It must also be mindful of the impact creating a data repository may have on the ongoing, primary mission of the IHIN-clinical data exchange. This evaluation will be critical to ensuring that the network can provide appropriate stewardship of the data released for research purposes.

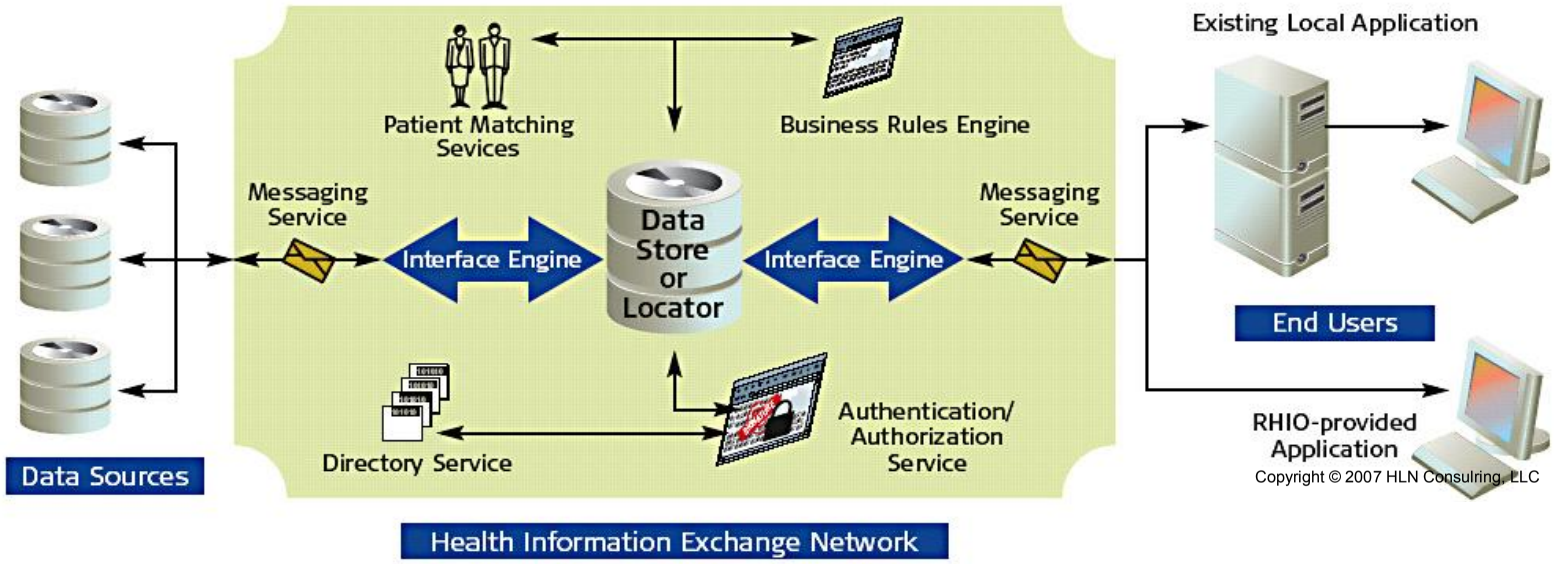
Appendix A

Public Health Director Dr. Mariannette Miller-Meeks appointed the eHealth Research Committee, comprised of the following members:

Name	Representing
Patricia Quinlisk	Iowa Department of Public Health – Committee Chair
Jane Brokel	University of Iowa
Lee Carmen	University of Iowa Hospitals and Clinics
Cindy Eoriatti	Wellmark
Susan Freed	Davis Brown Law Firm
Joan Gilchrist	Iowa Health System
Dennis Janssen	Iowa Department of Human Services – Iowa Medicaid Enterprise
Don Nelson	Iowa Medical Society
Roy Park	Consumer
Kari Prescott	Webster County Public Health
Kendall Reed	Des Moines University
Ed Rivers	Scott County Public Health
Paul Romitti	University of Iowa
Dana Shaffer	Iowa Osteopathic Medical Association
Jim Thomson	Consumer
Matt Wille	Dallas County Hospital

Attributes of a Health Information Exchange (HIE) Network

IHIN
Iowa Health Information Network



Appendix C HIPPA/Applicable Iowa State Laws and Regulations Regarding Patient Protection and Use of Health Information in Research

HIPAA PRIVACY RULE & RESEARCH

HIPAA sets a minimum standard for protecting the privacy of individually identifiable health information maintained by covered entities. It also provides individuals with certain rights relating to their protected health information, such as the right to access such information or request that it be amended.

HIPAA only applies to covered entities which include health care providers, health plans and health are clearinghouses and a business associate of a covered entity. A business associate is an individual or entity that provides a service on behalf of the covered entity and whom requires access to health information to perform that service. The IHIN is considered a business associate. Researchers will not be subject to the HIPAA privacy rule unless they are employed by a covered entity or business associate or they are providing a service on behalf of a covered entity or business associate.

While many researchers won't be directly subject to the HIPAA privacy rule, they are obviously impacted as their access to information can be limited. The HIPAA privacy rule recognizes that health information may need to be used/accessed/disclosed for legitimate research purposes and therefore, provides a variety of ways in which researchers can access and use health information from a covered entity or business associate.

Disclosures can be made for research purposes:

- If the information is de-identified which means either removing 18 specific elements outlined by HHS (such as name, birth date, zip code, social security number, etc) or removing some but not all of these 18 elements if an expert certifies that there is a small risk that the information can be used to identify the individual.
- Pursuant to the patient's written authorization. Until recently, the authorization could only apply to the specific research study the patient was participating in and no future uses; however, the recently revised privacy rule does allow a single authorization to be used for multiple purposes and no longer requires the authorization to be study specific.
- If the IRB or Privacy Board waive the authorization requirement.
- A limited data set can be accessed with a data use agreement in place with the researcher. A limited data set removes certain direct identifiers such as names and phone numbers but can include certain other characteristics such as zip code, birth year.
- Regarding decedents if the research is conducted only on decedent health information and there has been documentation of the individual's death. Also, the recent revised privacy rule does provide that HIPAA only applies to decedent health information for 50 years from the date of death.
- For certain preparatory to research functions provided no PHI is removed by the researcher.
- Other uses/disclosures required by law, such as reporting information to public health authorities, adverse event reporting to the FDA, reporting to the Office for Human Research Protections.

Other issues impacting disclosures to researchers:

- Access is limited to the minimum amount necessary to accomplish the purpose unless the disclosure is required by law.
- If there is a breach of PHI, risk assessment must be performed even if the PHI is contained in a limited data set.

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DISCLOSURE OF CONFIDENTIAL DEPARTMENT OF PUBLIC HEALTH DATA FOR RESEARCH PURPOSES

This outline was prepared by Heather L. Adams, Assistant Attorney General, as is current as of January 31, 2013.

I. Early Hearing Detection and Intervention Program

641-3.11(135) Sharing of information and confidentiality.

Reports, records, and other information collected by or provided to the department relating to a child's newborn hearing screening, rescreen, and diagnostic audiologic assessment are confidential records pursuant to Iowa Code section 22.7.

3.11(1) Personnel of the department shall maintain the confidentiality of all information and records used in the review and analysis of newborn hearing screenings, rescreens, and diagnostic audiologic assessments, including information which is confidential under Iowa Code chapter 22 or any other provisions of state law.

3.11(4) Research purposes. All proposals for **research** using the department's data to be conducted by persons other than program staff shall first be submitted to and accepted by the researchers' institutional review board. Proposals shall then be reviewed and approved by the department before **research** can commence.

II. Neonatal Metabolic Screening Program

Center for Congenital and Inherited Disorders

641-4.3(136A) Iowa neonatal metabolic screening program (INMSP).

4.3(7) *Sharing of information and confidentiality.* Reports, records, and other information collected by or provided to the Iowa neonatal metabolic screening program relating to an infant's neonatal metabolic screening results and follow-up information are confidential records pursuant to Iowa Code section 22.7.

a. Personnel of the program shall maintain the confidentiality of all information and records used in the review and analysis of neonatal metabolic screening and follow-up, including information that is confidential under Iowa Code chapter 22 or any other provisions of state law.

b. The program shall not release confidential information except to the following persons and entities, under the following conditions:

(4) A researcher, upon documentation of parental consent obtained by the researcher, and only to the extent that the information is necessary to perform **research** authorized by the department and the state board of health.

4.3(8) *Retention, use and disposition of residual neonatal metabolic screening specimens.*

a. A neonatal metabolic screening specimen collection form consists of a filter paper containing the dried blood spots (DBS) specimen and the attached requisition that contains information about the infant and birthing hospital, birth center, or drawing laboratory. The DBS specimen can be separated from the information contained in the requisition form.

(1) The residual DBS specimen shall be held for five years in a locked area at the UHL.

(2) The residual DBS specimen shall be stored for the first year at -70 degrees C.

(3) After one year, the residual DBS specimen shall be archived for four additional years at room temperature.

(4) The residual DBS specimen shall be incinerated after completion of the retention period.

b. **Research** use.

(1) Investigators shall submit proposals to use residual DBS specimens to the center. Any intent to utilize information associated with the requested specimens as part of the **research** study must be clearly delineated in the proposal.

(2) Before **research** can commence, proposals shall be approved by the researcher's institutional review board, the congenital and inherited disorders advisory committee, and the department.

(3) Personally identifiable residual specimens or records shall not be disclosed without documentation of informed parental consent obtained by the researcher.

(4) **Research** on anonymized or identifiable residual specimens shall be allowed in instances where **research** would further: neonatal metabolic screening activities; the health of an infant or child for whom no other specimens are available or readily attainable; or general medical knowledge for existing public health surveillance activities.

III. Iowa Maternal Prenatal Screening Program

Center for Congenital and Inherited Disorders

641-4.4(136A) Iowa maternal prenatal screening program (IMPSP).

4.4(6) *Sharing of information and confidentiality.* Reports, records, and other information collected by or provided to the IMPSP relating to a patient's maternal prenatal screening results and follow-up information are confidential records pursuant to Iowa Code section 22.7.

a. Personnel of the program shall maintain the confidentiality of all information and records used in the review and analysis of maternal serum

screening and follow-up, including information that is confidential under Iowa Code chapter 22 or any other provisions of state law.

b. The program shall not release confidential information except to the following persons and entities, under the following conditions:

(4) A researcher, upon documentation of patient consent obtained by the researcher, and only to the extent that the information is necessary to perform **research** authorized by the department and the state board of health.

4.4(7) *Retention, use and disposition of residual maternal prenatal screening specimens.*

a. A maternal seruni screening specimen collection consists of laboratory tubes with maternal serum and associated information about the patient, health care provider, or drawing laboratory.

(1) The residual serum specimens shall be held for a specified period of time in a locked area at the UHL in accordance with UHL policy and procedures.

(2) Reserved.

b. **Research** use.

(1) Investigators shall submit proposals to use residual serum specimens to the center. Any intent to utilize information associated with the reql.lested specimens as part of the **research** study must be clearly delineated in the proposal.

(2) Before **research** can commence, proposals shall be approved by the researcher's institutional review board, the congenital and inherited disorders advisory committee, and the department.

(3) Personally identifiable residual specimens or records shall not be disclosed without documentation of informed patient consent obtained by the researcher.

(4) **Research** on anonymized or identifiable residual specimens shall be allowed in instances where **research** would further maternal prenatal screening activities or general medical knowledge for existing public health surveillance activities.

IV. Central Registry for Brain and Spinal Cord Injuries

641-21.6(135) Confidentiality.

21.6(1) The agency shall maintain the confidentiality of all submitted registry reports of traumatic brain and spinal cord injuries and shall not release reports,·or

any information which can be associated with a particular individual, unless the release is in compliance with the provisions of subrule 21.6(2).

21.6(2) A registry report of a traumatic brain or spinal cord injury that is submitted to the agency that can be associated with a particular individual shall be released as follows:

e. To an authorized representative of a study or **research** project that shall be reviewed by a scientific advisory panel and approved by the director of public health. The director of the agency shall appoint a scientific advisory panel of no less than three scientists or public health staff to review **research** proposals for which the release of information that identifies an individual who is reported to have a traumatic brain or spinal cord injury is required.

f The release of information for **research** that identifies individuals with traumatic brain or spinal cord injuries shall be subject to the terms and conditions set by the agency. Such study or **research** project keeps the identifying information confidential and privileged. A formal memorandum of agreement signed by an authorized representative of the agency and the director of the **research** project shall include provisions that the data provided by the agency shall not be copied for retention, resold, or otherwise provided to another person or organization and will be returned to the agency upon completion of the study.

V. Vital Records

641-95.12(144) Disclosure of data.

95.12(3) The state registrar may permit the use of data from vital statistics for **research** purposes subject to conditions the state registrar may impose to ensure the use of the data is limited to such **research** purposes. No data shall be furnished from vital statistics for **research** purposes until the state registrar has prepared in writing the conditions under which the data may be used and has received an agreement signed by a responsible agent of the **research** organization agreeing to meet and conform to such conditions.

VI. Termination of Pregnancy Reporting

Vital Records Registries and Reports

641-100.5(144) Statistical report of termination of pregnancy report.

100.5(5) The department may share information with federal public health officials for the purpose of securing federal funding or conducting public health **research.** However, in sharing the information, the department shall not relinquish control of the information, and any agreement entered into by the department with federal public health officials to share information shall prohibit the use, reproduction, release, or disclosure of the information by federal public health officials in a manner which violates Iowa Code section 144.29A.

VII. Medical Examiner

County Medical Examiners

641-127.3(331,691) Autopsies.

127.3(7) *Retention and disposal of tissues, organs, and bodily fluids.* The office of the state medical examiner shall retain tissues, organs, and bodily fluids as necessary to determine the cause and manner of death or as deemed advisable by the state medical examiner for medical or public health investigation, teaching, or **research.** Tissues, organs, and bodily fluids shall be retained at a minimum for the time periods established by the National Association of Medical Examiners and may be retained for a longer time period at the discretion of the state medical examiner. Tissues, organs, and bodily fluids retained under this subrule shall be disposed of without the specific consent or notification of the legal next of kin and in accordance with applicable federal and state regulations including but not limited to OSHA-recommended biohazard and blood-borne pathogen standards. The anatomical material shall be removed from the laboratory premises through use of a contracted, licensed, and bonded medical waste removal service to a medical waste processing center for final disposition.

VIII. General Provisions

If no other specific provision applies to the disclosure of confidential data for purposes of research, the following rules generally authorize disclosure of confidential Department data[1] to researchers under certain prescribed conditions:

641-175.9(17A,22) Disclosures without the consent of the subject .

175.9(1) The department shall routinely disclose open records without the consent of the subject.

175.9(2) To the extent allowed by law, disclosure of confidential records may occur without the consent of the subject. Following are instances where disclosure, if lawful, will generally occur without notice to the subject:

b. To a recipient who has provided the department with advance written assurance that the record will be used solely as a statistical **research** or reporting record. The department shall not release confidential data or information pursuant to this chapter unless the department and the recipient have executed an agreement which includes the conditions under which the confidential data or information may be used and a restriction on the further disclosure of the data or information.

[1] The administrative rules which authorize release of confidential Department data do not apply to AIDS/HIV data or any information which is confidential pursuant to Iowa Code section 272C.6, including professional licensing board complaint and investigative files. This information cannot be released to researchers in any manner which identifies the subject of the record. Staff with questions regarding the disclosure of confidential data to researchers should contact the Department's Research and Ethics Review Committee.

641-175.10(17A,22) Routine use.

175.10(1) Defined. "Routine use" means the disclosure of a record without the consent of the subject for a purpose which is compatible with the purpose for which the record was collected. "Routine use" includes disclosures required or authorized by statute or rule.

175.10(2) To the extent allowed by law, the following uses are considered routine uses of all department records:

b. Disclosure to employees of federal, state and local agencies and other researchers for purposes of bona fide **research.** The department shall not release data or information pursuant to this paragraph unless the department and the researcher have executed an agreement which includes the conditions under which the confidential data or information may be used and restrictions on further disclosure of the data or information.

Appendix D Ethical Considerations for Research

Association of Clinical Research Professionals:
Code of Ethics & Professional Conduct Code of Ethics & Professional Conduct
The Association of Clinical Research Professionals (ACRP) and the Academy of Physicians in Clinical Research (APCR) are global organizations committed to promoting excellence and professionalism in clinical research and pharmaceutical medicine. ACRP and APCR members are engaged in all aspects of discovery, testing, development and application of drugs, devices and biologics. The scope of their activities encompasses research and medical practice as well as diverse business activities, regulatory affairs, advocacy, education and other professional endeavors.

Members and certificants, those who receive certification from The Academy, affirm their commitment to upholding the highest standards of personal and professional behavior in the conduct of their endeavors. To file a complaint against a Member or certificant, please email ethics@acrpnet.org. Complaints will be addressed according to the Discipline and Complaints Policy developed by the ACRP Ethics Committee.

While pursuing their professional endeavors, all members and certificants shall:

- Be mindful and respectful of the important distinctions between medical practice and research.
- Accept ensuring the safety and welfare of human subjects and patients as their highest goal.
- Execute their work in accordance with standards of scientific objectivity, accountability and professionalism.
- Continue to advance their knowledge and understanding of the profession through education and training.
- Safeguard the quality and credibility of their professional judgment from inappropriate influence.
- Ensure that the principles of respect for persons and the practice of obtaining informed consent are honored at all times, both in spirit and in practice.
- Observe both in spirit and in practice all legal, ethical and regulatory requirements pertaining to confidentiality of identifiable personal information, relevant records and communications.
- Avoid conflicts of interest in their affairs and make full disclosure before undertaking any matter that may be perceived as a conflict of interest.
- Adhere to all relevant ethical standards and practices for responsible conduct of research and medical practice.
- Abide by all applicable laws, regulations and official directives applicable to their professional activities in the legal jurisdiction(s) in which they work and reside, and respect the prevailing ethical and community standards.
- Abide by the laws and ethical codes of their respective disciplines.

In observance of these principles, ACRP and APCR members and certificants shall be mindful of the following explanations and guidelines as may be applicable to specific circumstances and practices:

Distinctions between Medical Practice and Research
Medical practice seeks to benefit individual patients and public health through prevention, diagnosis and treatment of disease. Research seeks to advance knowledge through application of the tools of science and technology. Clinical research depends upon individuals who volunteer to participate as subjects of research studies. Society can benefit from both research and medical practice when conducted responsibly through the acquisition of knowledge and the testing and marketing of new as well as older products.

Clinical research is an endeavor in which roles can be easily confused. Treatment is not the same as investigation. The relationship established between patients and those providing clinical care to them is distinct from that established between a research participant (or subject) and a member of the clinical research team. Accordingly, the terms patient and research participant should not be used indiscriminately or interchangeably. Similarly, steps shall be taken to ensure that the roles and responsibilities of physicians and investigators, especially when they may overlap, remain clear.

Beneficence and Nonmaleficence
Members and certificants shall strive to benefit those with, for and on whose behalf they work, and take care to do no harm. Members and certificants shall respect and safeguard the welfare and rights of all individuals with whom they interact professionally, including but not limited to research subjects. Members and certificants shall act in the best interest of research subjects, patients and society. When conducting research, members and certificants shall ensure that potential risks to research participants are minimized and that these risks are fully evaluated against potential benefits prior to and throughout the research. Members and certificants engaged in the practice of pharmaceutical medicine shall place the interests, safety and well-being of their patients above all other considerations.

Research Standards and Objectivity
Members and certificants shall educate themselves, their students and their colleagues about responsible research practices. Members and certificants shall apply sound ethical values, scientific principles and judgment in the design, conduct and analysis of clinical studies, and in interpretation of their results. Members and certificants shall report research findings accurately and shall not misrepresent, fabricate or falsify results. They shall conduct research in accordance with an approved research protocol. Members and certificants shall make all research data available for verification in accordance with established standards of the profession. Members and certificants shall ensure the dissemination only of scientifically sound information from clinical trials and other investigations, without regard to study outcomes, and shall not withhold information relevant to full evaluation of the safety, efficacy or utility of agents or devices under investigation for the benefit of medicine, patients, science and society.

Competence and Advancement of Knowledge
Clinical research professionals and pharmaceutical physicians are committed to being competent in all of their professional activities, and members and certificants shall strive to achieve the highest level of knowledge, skill and ability within their capacity. Members and certificants shall maintain knowledge of new developments in emerging areas of practice and ethical interpretations through professional education and training, including such activities as reading, courses, professional meetings, peer consultations, supervision and other continuing education opportunities.

Integrity
Members and certificants shall exhibit the highest standards of integrity and be honest, open, objective and accurate in all of their professional activities. Members and certificants shall not lie, steal, cheat or engage in fraud, subterfuge, misrepresentation of fact, or partial or delayed disclosure of information in a misleading manner. Members and certificants shall act honestly and openly in all professional relationships and shall not participate in, condone or be associated with dishonesty, fraud or misrepresentation. Members and certificants shall accurately represent their own and their associates' qualifications, education, experience, competence and affiliations in all spoken, written or printed communications. Members and certificants shall not fabricate data, withhold meaningful relevant data, leave significant errors in published data uncorrected, or present portions of others' work or data as their own.

Informed Consent
Members and certificants shall, as appropriate for the approved research, obtain informed consent from individuals who are research subjects using language that is reasonably understandable and clear, informing research subjects of the purpose of the research, risks and discomforts related to the research, potential benefits of the research to the subject and/or society, the subjects' right to refuse or withdraw consent, the duration of participation and any other information relevant to making an informed decision regarding participation in a study. Members and certificants also shall provide subjects with an opportunity to ask questions, which shall be answered completely and truthfully.

When potential subjects are not literate or have difficulty understanding the primary language used, members and certificants shall take steps to ensure subjects' comprehension, such as providing subjects with a detailed verbal explanation or arranging for a qualified interpreter or translator. Individuals who do not comprehend the information provided and voluntarily agree to participation shall not be enrolled in a study. For persons who are legally incapable of giving informed consent, members and certificants shall nevertheless provide an appropriate explanation, obtain the individual's assent, and obtain appropriate permission from a legally authorized person. When a physician is both researcher and clinician, he/she shall ensure that any patient understands this dual role and is free from coercion or other undue pressure to participate in the research endeavors. Consent must be not only fully informed, but also freely given without restriction.

Privacy and Confidentiality
Members and certificants shall not solicit private information from research participants or patients unless justifiable and appropriate. Members and certificants engaged in the practice of medicine shall recognize that information obtained by caregivers from patients is privileged and they shall respect the privacy of their patients. In medical practice research and business activities, if private information is shared, standards of confidentiality apply. Members and certificants must take reasonable precautions to protect confidential information obtained through or stored in any medium, recognizing that the extent of limits of confidentiality may be regulated by law or established by institutional rules or professional or scientific relationship. Members and certificants may disclose confidential information, when appropriate, only with valid consent or authorization, or if otherwise required by law. In all instances, members and certificants shall disclose the least amount of confidential information necessary to achieve the desired purpose. To the extent that confidential information is disclosed inappropriate scientific or professional circumstances, it shall be disclosed with appropriate protections and only to persons clearly concerned with such matters. Written and electronic records and other sensitive information shall be stored in secure locations and shall not be made available to those who are not authorized to have access.

Conflicts of Interest
At all times, members and certificants shall safeguard the quality and credibility of their professional judgment from inappropriate influence. Members and certificants shall not exploit any professional relationship to further personal, political or business interest at the expense of the best interest of clients, research participants, employers, patients or others. Members and certificants shall avoid dual relationships that could impair professional judgment or increase the risk of harm to others, such as relationships that are familial, social, financial, business or close personal relationships with employees, supervisees, students or research assistants. Members and certificants shall take precautions to avoid conflicts of interests and, when a conflict of interest or the perception of a conflict cannot be eliminated or avoided, take further steps to protect the affected individuals and the clinical research enterprise.

Ethics and Responsible Conduct
Members and certificants are committed to involvement in professional endeavors that enhance knowledge, skill, judgment and intellectual development for the benefit of society. Members and certificants shall be personally committed to and encourage others to engage in safe, sound research practices consistent with the relevant ethical and scientific standards. Members and certificants shall cooperate with other professionals as appropriate and ethical. Members and certificants should consult and advise each other regarding medical, scientific and ethical concerns, and seek external opinions, as appropriate, in the best interests of clinical study participants and patients. Members and certificants shall assist those who enter the profession by helping them to acquire a full understanding of the ethics, responsibilities and needed competencies of their chosen area of research and practice.

Duties to Society and Compliance with the Law
Clinical research professionals and pharmaceutical physicians have a duty to society as a whole. Members and certificants should be aware of their place in society and develop ways to help the profession contribute to the betterment of society. ACRP members and certificants must uphold the profession's responsibility to society by promoting the highest ethical and practice standards in the profession and by supporting measures to maintain accountability. Members and certificants should strive to understand and respect differences in values across cultures and to appropriately adapt behaviors while maintaining ethical principles. Members and certificants shall not participate in criminal or fraudulent activities. If faced with an apparent conflict between abiding by a law or regulation and following an ethical principle, unless in an emergency, members and certificants shall consult with colleagues and seek consensus as to the most ethical course of action in the most responsible, knowledgeable, effective and respectful way to carry it out. Members and certificants shall not advocate, sanction, participate in or cause to be accomplished, or condone any act that is prohibited by this Code of Ethics, unless doing so would be seriously detrimental to the rights and well-being of others.

Duties to Professional Discipline and Beneficiaries of Practice
Whenever members and certificants maintain a medical or clinical license, or otherwise participate in clinical practice, additional laws and ethics that do not pertain to research apply. Members and certificants shall, in addition to adhering to this Code of Ethics, abide by their respective discipline's laws and ethical standards pertaining to their practice so that first priority is always given to the well-being of patients or other beneficiaries who use pharmaceutical products or medical devices, or who receive any other clinical services in a practice setting. Additionally, members and certificants whose efforts indirectly aid the practice of medicine shall ensure that all contributory information is fair, balanced, accurate, comprehensive and easily accessible to all so that well-informed decisions about the use of pharmaceuticals, medical devices or other clinical services can be made by their beneficiaries and their providers.

Appendix E Detailed Examples of Use of HIE Data in Other States

AMIA Annual Symposium Proceedings Archive

AMIA Annu Symp Proc. 2010; 2010: 947–951.
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Facilitating Clinical Research through the Health Information Exchange: Lipid Control as an Example

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Abstract

Go to:

Using data from the Indiana Network of Patient Care (INPC), we analyzed long-term statin adherence patterns and their effects on low-density lipoprotein cholesterol (LDL-C) control among patients with type 2 diabetes. Statin adherence was measured by proportion of days covered (PDC) for a 6-month interval prior to each LDL-C test date. Patient demographic and clinical characteristics were used as covariates for LDL-C control and predictors for statin adherence. From 4,350 eligible subjects, 25,596 6-month PDC and LDL-C level pairs were formed between 2001 and 2009. Rates of suboptimal adherence and suboptimal LDL-C control were 68.5% and 46.6%, respectively. Positive predictors for LDL-C control included adherence to statin (OR: 1.87, p<0.0001) and older age (OR: 1.11, p=0.01). Significant risk factors for non-adherence were young age, female gender, African American race and newly-treated status. This study demonstrated the utility of a health information exchange in health outcome and clinical effectiveness research.

INTRODUCTION

Go to:

One of the challenges for performing health outcome and clinical effectiveness research is assembling the appropriate data particularly when studying a question that involves care in multiple disparate settings. A well-established health information exchange (HIE) supports key components of health outcome research and chronic care management including diabetes.[1] The main features of our HIE infrastructure are as follows: a centrally managed federated data repository; standard medical terminology usage for patient data acquisition; interconnected linkages among different hospitals, laboratories, pharmacies and clinics while maintaining data integrity, quality and security; robust patient matching and patient-centric approaches; capacities augmenting external data resources such as a birth registry and claims data.[2–3] The rich health information and data integration of the HIE enable generating aggregated, complete, accurate and longitudinal patient data across different health care facilities over time. In addition, the nature of multidirectional communication of the HIE ensures easy dissemination with the experience and knowledge gained from research.

Hyperlipidemia has a high prevalence in type 2 diabetes and causes high rates of macrovascular complications. Up to 80% of patients with type 2 diabetes will develop or die of macrovascular diseases.[4] In order to control macrovascular risk factors among patients with type 2 diabetes for both primary and secondary prevention, the American College of Physicians (ACP) recommended widespread statin (3-HYDROXY-3-METHYL-glutaryl coenzyme A [HMG-CoA] reductase inhibitor) use to lower serum cholesterol, with a target low-density lipoprotein cholesterol (LDL-C) level of 100mg/dL.[5]

Despite the known high macrovascular risks and the evidence-based guidelines for vascular protection, suboptimal lipid control is widely observed among patients with type 2 diabetes in clinical settings.[6] Clinical trials have analyzed statin adherence patterns and have found a significant correlation between adherence to statins and LDL-C reduction.[7–8] However, these studies usually follow patient medication taking behavior for only a short time period, while medication adherence changes over time especially for patients with chronic conditions. In addition, patients in a usual-care setting often do not adhere to prescribed treatment regimens and regular LDL-C laboratory tests as closely as those in a clinical trial. Medication non-adherence to statins has been demonstrated to be a barrier for patients in usual care settings to obtain benefits from statins.[9] These discrepancies suggest that a longitudinal study of real-world clinical settings is necessary to compare the magnitude of benefits of statin therapy to that which is demonstrated in clinical trials.

Research on medication adherence and health outcomes fundamentally relies on complete patient data including medication history and laboratory test results. Patients, especially with chronic conditions, often receive care from different health care facilities, and patient data are usually scattered across different "islands". It is impossible to generate complete patient-level data from multiple sources without support of an HIE. In addition, compared with pill counts, self-reporting, and questionnaires, objective and data-driven approaches which can be programmatically established through the HIE are more accurate and becoming increasingly important for research related to medication adherence. Furthermore, the linkage between patient medication data and laboratory records allows investigation of patient behavior and therapeutic effects with easy access and at relatively low cost.[10]

In this present observational study, using longitudinal patient medication and laboratory data from our local operational HIE, we first analyzed the association between patient LDL-C control and statin adherence. We further investigated potential risk factors for non-adherence to statins. We hypothesize that this study will provide insight into medication taking behavior among patients with type 2 diabetes and its effects on lipid control in real-world clinical settings.

METHODS

Go to:

Data Sources and Settings For purposes of this analysis, we extracted information from the Indiana Medicaid data system which contained demographic, diagnosis, and treatment information over time. The prescription records, including refill dates, days of supply, dose, and frequency, were retrieved for all statins. Patient LDL-C test results were retrieved from the Indiana Network of Patient Care (INPC). The INPC is an operational regional clinical informatics network that has served five major hospital systems (55 hospitals and more than 100 geographically distributed clinics) across Indiana for more than ten years. This system delivers medical record information from hospitals, laboratories, imaging centers, pharmacies and physician offices including registration records, laboratory tests, radiology reports, diagnoses, and administrative data.[2–3] Laboratory test results are mapped to LOINC codes, and patients' multiple medical records are linked through a robust linking algorithm. For this study, patient medication information that Regenstrief obtains from Indiana Medicaid was linked to the INPC aggregated patient LDL–C laboratory data. All

patient identifiers were removed before data analysis in order to protect confidentiality. This study was approved by the Institutional Review Board of Indiana University and the INPC Management Committee.

Eligibility Criteria Study subjects were age 18 to 65 years during the time period of 2001 to 2009, and had a diagnosis of type 2 diabetes using the *International Classification of Disease, Ninth Revision, Clinical Modification* (ICD-9_CM) of 250.x0 and 250.x2, and had at least one pharmacy claim for a statin identified by the First DataBank *Standard Therapeutic Code* system (STC: B937, C221, C227, C229) during the same study period. Women with gestational diabetes were excluded. To be included in the cohort, the patient had to have at least one LDL-C test result from the INPC and at least one pharmacy claim for a statin prior to the LDL-C test date.

Measurements We calculated patient statin adherence using a standard measurement: proportion of days covered (PDC). The PDC focuses on persistence or continuation at the time of prescribed treatment. It is defined as the total number of medication covered days divided by the number of days in a certain time period. Claims data, including refill dates, days of supply, dose, and frequency, are used to calculate PDC.[11] To dynamically and accurately reflect the effect of statin adherence on LDL control, we defined the LDL-C test date as the index date and then traced back the patient medication adherence for six months prior to this index date. Since statin medications are considered interchangeable, drug switching or dose changing did not count as a different filled prescription. Using a validated classification cut-off point,[12] adherence to statins was categorized into two levels: 1) Adherent to statins if 6-month PDC was equal or greater than 80%. 2) Non-adherent to statins if 6-month PDC was less than 80%.

Patient serum LDL- C was used as the dependent variable and retrieved from the INPC using a set of standard laboratory test terminologies that were mapped to the LOINC codes 13457-7 and 18262-6. According to standard guidelines, we classified LDL-C results into two categories: controlled (less than 100mg/dL) or not-controlled (equal or greater than 100mg/dL).

Other potential covariates were selected based on previous type 2 diabetes management studies. We extracted patient demographic and clinical information such as age, gender, race and duration of statin treatment. These factors were used to control the possible confounders in the analysis of association between statin adherence and LDL-C control and also were applied as predictors for statin adherence.

Statistical Analysis Descriptive statistics of patient characteristics, adherence to statins, and the average LDL-C level of different subgroups were reported. The associations between statin adherence and dichotomized LDL-C control were examined using logistic regression models. To accommodate the potential correlation of repeated measures of LDL-C laboratory results and statin adherence of one subject, we used the generalized estimating equation (GEE) model with clustered symmetric correlation structures. Odds ratios (OR) were reported to quantify the magnitude of the association. All analyses were implemented using SAS 9.1 (*SAS Institute, Cary, North Carolina*). Statistical significance was set at an accepted alpha of $p<0.05$.

RESULTS

Go to:

A total of 4,350 subjects were identified, and 25,596 of 6-month PDC and LDL-C level pairs were formed across the study period. The LDL-C levels ranged from 50 to 248mg/dL with an average of 108.62 mg/dL (SE: 0.23mg/dL). Across the study period, about 68.5% of the patients had a mean 6 -month PDC of less than 80%, and 46.6% of patients had an average LDL-C greater than 100mg/dL. Patient characteristics are outlined in Table 1. The average entry age of study subjects was 49 years, and 64.7% of the subjects were female. The majority of the subjects were non-Hispanic Whites (66.8%). 56% of the subjects had been treated with statins for three years or less. Compared with non-adherent patients, patients who were adherent to statin therapy had significantly lower average LDL-C levels among different patient subgroups.

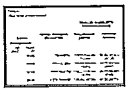

Table 1.
LDL-C levels in study subjects

After controlling for demographic and clinical factors, patients adherent to statins were more likely to achieve optimal LDL control (OR: 1.87 [95% CI: 1.67–2.10], $p<0.0001$). Increased age was also related to better LDL-C control (OR: 1.11 [95%CI: 1.02–1.20], $p=0.01$). Females were less likely to achieve optimal LDL-C control (OR: 0.69 [95% CI: 0.59–0.80], $p<0.0001$). Race and duration of treatment had no effects on LDL-C level (Table 2.).

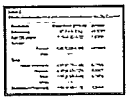

Table 2.
Effects of statin adherence and patient characteristics on LDL-C control

Six predictors of adherence analyzed by the GEE model are shown in Table 3. Four of them achieved statistical significance ($p<0.001$). Older age and duration of statin treatment were positive predictors. Female gender and African American race were negative predictors. The effects of Hispanic or other races on statin adherence could not be assessed.

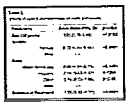

Table 3.
Effects of patient characteristics on statin adherence

DISCUSSION

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Aggregate health data from an HIE offers valuable opportunities for health outcome research.[13] First, data normalization using standard terminologies, one core component of the HIE, enables interoperability of different health data resources and additionally provides rapid information retrieval for population-based studies. Second, observational studies conducted from the large longitudinal HIE databases have many advantages: speed, real-world decisions, and low cost, while providing comparative knowledge to that of clinical trials, especially for research about chronic conditions.[14] Our study is one example.

According to longitudinal data from our local operational HIE, 31.5% of the patients were classified as adherent to statins and 53.4% had optimal LDL levels (less than 100mg/dL) which parallels data from other population-based studies.[15–16] However, these numbers are much lower than results from clinical trials and disease management programs with a rate of up to 96% for statin adherence and 70% for optimal LDL control.[8,17]

Despite the evidence of effectiveness of statins in lowering cholesterol and ultimately reducing vascular complications in trials, lack of statin adherence in real world settings may limit the success of statins in controlling lipid levels.

Our primary analysis showed that patients who adhere to statins are 1.87 times more likely to achieve optimal LDL-C control compared to patients who were non-adherent to statins. This finding is consistent with conclusions from other studies that non-adherent patients are less likely to reach target lipid values and subsequently less likely to achieve benefits from therapy. Young age and female gender are risk factors for uncontrolled LDL-C in our study, which are consistent with findings from other studies. Many studies conclude that African Americans with diabetes are at higher risk of uncontrolled health outcomes including elevated LDL-C. Surprisingly, race was not significantly related to LDL-C control in our study after adjustment for other factors. One prior investigation emphasized that racial disparity in diabetes outcomes is mainly due to sociodemographic factors, while clinical factors, such as body mass index, explained little to no difference.[18] Our study population was composed entirely of Medicaid members, and majority subjects geographically located in the central Indiana. Sociodemographic difference in this population may not be sufficient to detect the difference of patient LDL-C control. Future research on racial disparity and LDL-C control should use resources with more diverse sociodemographic information, such as the existing array of different health care payer data in the INPC.

Our secondary analysis indicates that risk factors for non-adherence to statins are young age, female gender, African American race, and newly-treated status. These risk factors are consistent with the results from most studies of medication adherence. One study found that the hazard of discontinuation of statins was high in the first six months of therapy, but little is known about long-term adherence patterns.[19] Our study found that increased duration of treatment (units in 3 years) is significantly related to optimal adherence to statins, and patient tend to be more adherent if they have been kept statin therapy for a long time period. One similar study confirmed that adherence to statins declines sharply in the first six months of treatment and continually declines more slowly over five years, but then increased slightly at 10 years.[20] Interventions designed to improve adherence to statin should focus on high-risk groups and early initiation.

This study has some limitations. First, the statin dispensing information only came from the Medicaid program, thus the calculated adherence of statins may not be accurate. This is because statin dispensing information from other health insurance plans may not be included. However, because Medicaid covers the cost of prescribed statins, it is likely that few Medicaid members under age 65 use other insurance plans. Second, dispensing claims might not reflect patient medication taking behavior if patients did not actually use these medications. Nevertheless, filling a prescription is usually consistent with taking the medication.[21] Third, we did not study specific statin individually because all statins have the same active chemical ingredient and belong to same therapeutic class. However, adherence and therapeutic effects may vary for different statin types. Since we do have related information available, an additional investigation could be conducted to provide more detailed information to aid provider selection of statins that are effective for LDL-C control and easier patient adherence.

CONCLUSION

Go to:

Using lipid control for patients with type 2 diabetes as an example, the present study demonstrated that health outcome and clinical effectiveness research can be successfully performed through an HIE. This study not only confirmed that better adherence to statins leads to better lipid control for patients with type 2 diabetes, but also identified risk factors for suboptimal LDL-C control and non adherence to statins. Additionally, it provided important information about the discrepancy in findings between research and clinical settings. Since the INPC is incorporating more commercial claims-based and pharmacy dispensing data from large health insurers and pharmacy benefit consortia, more health outcome research can be performed by linking these data resources with laboratory test records from the INPC. Further, the low rates of adherence and LDL-C control observed in our study indicate that there is a great need to develop a systemic approach to ensure patient adherence in routine clinical settings. The HIE provides an excellent platform to develop such a system that can assess patient medication adherence and can encourage providers to monitor patients' ongoing adherence status for diabetes as well as other chronic conditions. Future work will focus on leveraging this information in clinical practices and defining effective interventions for physicians and patients to improve medication adherence and ultimately improve health outcomes.

Acknowledgments

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We would like to thank Roberta Ambuehl (senior data analyst) at Regenstrief Institute, Inc.; the NLM Medical Informatics Fellowship Program (5T15LM007117), Regenstrief Institute, Inc.; and the AHRQ Indiana Health Services Research Training Program (T32 HS017588-02).

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A Statewide Data Repository for Population Analytics

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In December, 2010 the Office of the National Coordinator for Health Information Technology (ONC) released a supplemental Funding Opportunity Announcement (FOA) as part of the Health Information Exchange (HIE) Challenge Program. The FOA encouraged "breakthrough progress for nationwide health information exchange in five challenge areas identified as key needs since Federal and State governments began implementation of the HITECH Act...Breakthrough solutions in these challenge themes will lead to the identification of more effective care delivery strategies, quality reporting, and surveillance for public health risks".

HealthShare Montana (HSM), Montana's state-designated entity for health information exchange (HIE), in collaboration with the Institute of Translational Health Sciences at the University of Washington School of Medicine, Recombinant Data Corporation (RDC) and Covisint (HSM's HIE infrastructure vendor) received an award in response to its proposal for Challenge Theme Five, *Fostering Distributed Population-Level Analytics*. The essence of the HSM Challenge Theme Five proposal is to adapt *Informatics for Integrating Biology and the Bedside* (i2b2)1 to build a research-focused data warehouse and analytic environment that will provide novel access to data in HSM's clinical data repository (CDR); the core element of the statewide HIE. Originally developed to provide a flexible and simple data query tool for researcher-driven translational research projects, i2b2 is a versatile open-source data integration framework that is being increasingly adopted across a wide spectrum of clinical and translational environments to support a range of end-uses associated with clinical data repositories.

The American Health Information Management Association's (AHIMA) e-HIM Workgroup described several clinical data exchange models including a federated model with peer-to-peer exchange and a centralized model.2 The workgroup also suggested that differing HIE goals could best be accomplished by differing clinical data exchange models.3 HSM will use a hybrid model that centralizes the data categories and elements specified in the Healthcare Information Technology Standards Panel C32 Continuity of Care Document (CCD) standard.

The CCD standard uses Extensible Markup Language (XML) to specify the encoding, structure and semantics of a patient summary clinical document for exchange. It contains a core set of the most relevant clinical data about a person's healthcare with associated metadata tags, and includes all of the data categories and elements recommended by the Health Information Technology Expert Panel in its 2008 report.4 A CCD-based model has the advantage of allowing clinical data providers to maintain local control of their operational systems and Service Level Agreements (SLA) while providing a centralized structure to separate and align policy requirements of the HIE with the research practice needs of the analytic research warehouse.

Clinical data from HSM's Mirth CDR5 is provided by Covisint and will be updated regularly in the HSM Clinical Data Trust (Data Trust)6, provided by RDC, and delivered through the i2b2-based research portal. Secondary analytic work of the Data Trust will therefore not affect the vendor SLA between HSM and Covisint. Unifying the systems is an "Honest Broker" environment that will support stewarded access to identifiable data and patient re-contact opportunities based on cohorts identified through the i2b2 HSM-focused analytic tools. This separation of operational data from research specific design and querying will allow effective researcher-focused creation of project-specific datamarts to support a range of secondary reporting and research uses.

In addition to having the HSM CDR as a statewide data source for Montana healthcare data, the Data Trust will serve as a data standardization and integration platform that can accept feeds from multiple other sources of aggregated data, as well as providing a reference platform for collaboration with other research efforts, such as those based on the Observational Medical Outcomes Partnership Common Data Model (OMOP CDM)7. This approach will create an evolving and dynamic analytic environment that will allow researchers to address and contribute to a diverse range of clinical research, patient-centered outcomes research, healthcare informatics research and population healthcare initiatives.

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MASSACHUSETTS GENERAL HOSPITAL

Integrating i2b2 and R to Identify and Evaluate Potential Adverse Drug Reactions Using Secondary Use EMR Data

HARVARD MEDICAL SCHOOL

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Introduction

- FDA drug-approval process has rigorous standards for safety and effectiveness but is unlikely to identify all aspects of a drug's performance once it is in use by a larger and more diverse population.
- Pharmacovigilance efforts at Partners Healthcare aim to identify the relationships between drugs and adverse drug reactions (ADRs) using data available in the electronic medical record (EMR) of more than 4 million patients.
- We have integrated the i2b2 framework with the R statistics package to easily implement and run methods to analyze observational data and identity and evaluate ADR associations.

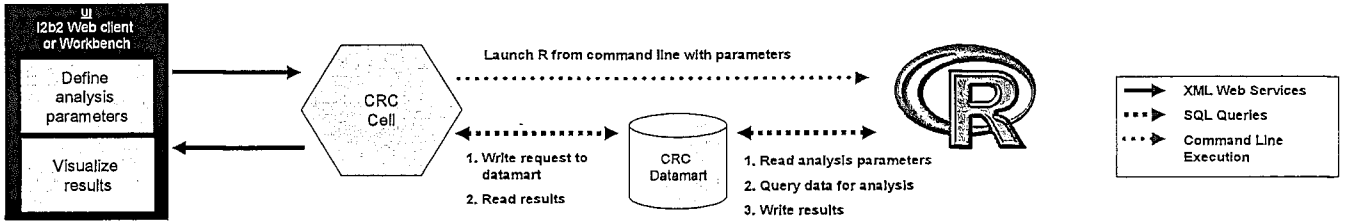
Why i2b2?[1]

- Standardized data model for large health data warehouse
- Efficiently manages standard and local metadata
- Web client and thick client query and analysis interface
- Handles long-running processes (complex queries, analysis)
- Secure and scalable
- Open source
- Implemented at 50+ medical centers globally

Why R?[2]

- Widely-utilized statistical package
- Open source environment for statistical computing and graphics
- Large collection of add-on libraries available
- Ability to run computationally-intensive analyses in parallel
- Can be run in the command line for integration with i2b2

i2b2 R Analysis Plug-in Architecture



Use Case

Identify potential adverse events associated with drug X

For this use case we adapted the High Dimensional Propensity Score (HDPS) method developed by Schneeweiss, et al.[3] HDPS is an adjusted regression model for a observational cohort study where propensity to be on a drug is calculated based on a large number of dimensions in the data.

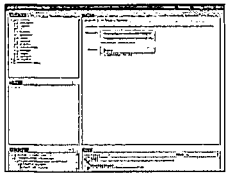
<u>Set up the analysis</u>

Step 1: Create a patient set in i2b2 to define population on Drug X

Step 2: Create a control set of patients on Drug Y for comparison

Step 3: Define the scope of health outcomes to include (i.e. all ICD-9 diagnosis)

Step 4: Set additional parameters specific to the method utilized



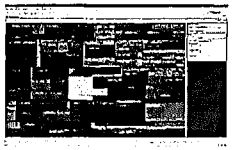
<u>Run the analysis</u>

Step 4: Submit analysis parameters to R analysis plug-in

Step 5: i2b2 framework queues analysis to run based on resource availability

<u>View results</u>

Step 6: Once analysis is complete, view the results in a table or other visualization



Summary

Integrating the i2b2 framework with the expansive statistical functions of R enables:

- Advanced and efficient analyses of secondary use EMR data
- Detection of safety signals for drug safety surveillance across a large health system
- Epidemiologist and clinicians to quickly customize a pharmacovigilance experiment and view results with minimal technical or data management knowledge.

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i2b2

Informatics for Integrating Biology & the Bedside

http://www.i2b2.org/software

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