Colorado Immunization Information System Environmental Scan

A review of the history, background and current state of CIIS

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Prepared for the

Colorado Children's Immunization Coalition

by Health Management Associates, Denver

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The **Colorado Children's Immunization Coalition** (CCIC) is an independent 501 (c)(3) nonprofit whose mission is to strategically mobilize diverse partners and families to advance children's health through immunization. To learn more about CCIC, please visit: www.childrensimmunization.org

The **Colorado Department of Public Health and Environment** (CDPHE) is a state agency whose mission is to protect and improve the health of Colorado's people and the quality of its environment. To learn more about CDPHE, please visit: www.cdphe.state.co.us

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Glossary of Acronyms and Terms

Acronym	Definition
ACIP	Advisory Committee on Immunization Practices
BMI	Body Mass Index
BOH	Board of Health
CCIC	Colorado Children's Immunization Coalition
CDC	Centers for Disease Control and Prevention
CDE	Colorado Department of Education
CDPHE	Colorado Department of Public Health and Environment
CIIS	Colorado Immunization Information System
CORHIO	Colorado Regional Health Information Organization
CRA	Countermeasure and Response Administration
CRISP	Colorado Rural Immunization Services Project
EHR	Electronic Health Record
FERPA	Family Educational Rights and Privacy Act
HCPF	Health Care Policy and Financing (Colorado Department of)
HEDIS	Healthcare Effectiveness Data and Information Set
HIE	Health Information Exchange
NBS	Newborn Screening
NCQA	National Committee for Quality Assurance
OEPR	Office of Emergency Preparedness and Response
OIT	Office of Information Technology
QHN	Quality Health Network
TB	Tuberculosis
UCHSC	University of Colorado Health Sciences Center
VFC	Vaccines for Children
VPD	Vaccine Preventable Disease
VTrckS	CDC's Vaccine for Children vaccine ordering and management system
317	Section 317 of the Public Health Service Act authorizes the federal purchase of vaccines to vaccinate children, adolescents, and adults

Term(s)	Definition
Confidentiality	The obligations of individuals or groups who receive or use information to respect the privacy interests of individuals who are the subjects of the data.
Exemption from Immunizations	From C.R.S. 25-4-903: (2) It is the responsibility of the parent or legal guardian to have his or her child immunized unless the child is exempted pursuant to this section. A student shall be exempted from receiving the required immunizations in the following manner: (a) By submitting to the student's school certification from a licensed physician or advanced practice nurse that the physical condition of the student is such that one or more specified immunizations would endanger his or her life or health or is medically contraindicated due to other medical conditions; or (b) By submitting to the student's school a statement of exemption signed by one parent or guardian or the emancipated student or student eighteen years of age or older that the parent, guardian, or student is an adherent to a religious belief whose teachings are opposed to immunizations or that the parent or guardian or the emancipated student or student eighteen years of age or older has a personal belief that is opposed to immunizations.

Opt-Out from CIIS	From C.R.S. 25-4-2401: (7) An individual or a parent or legal guardian who consents to the immunization of an infant, child, or student pursuant to part 9 or 17 of this article or this part 24 may exclude immunization information from the immunization tracking system. The individual, parent, or legal guardian may remove such immunization information from the immunization tracking system at any time. The department of public health and environment shall ensure that the process to exclude immunization information from the system is readily available and not burdensome. The physician, licensed health care practitioner, clinic, hospital, or county, district, or municipal public health agency shall inform the individual, parent, or legal guardian of the option to exclude such information from such system and the potential benefits of inclusion in such system.
Privacy	The rights of an individual to control how information about the individual is collected, used, and disclosed. The value of privacy derives from ethical principles of autonomy that imply individuals are entitled to some level of control over data, including health data, unique and personal to them.
Security	Technologic, physical, or administrative safeguards or tools designed to protect data, including health data, from unwarranted access or disclosure.

Table of Contents

1. Acknowledgements 2
2. Glossary of Acronyms and Terms 3
3. Executive Summary 6
4. History and Background 7
    a. CIIS at the University of Colorado Health Sciences Center 7
    b. CIIS Transition to the Colorado Department of Public Health and Environment 7
    c. A New Platform with Envision Technology Partners, Inc. 7
5. Impacts of Legislation and Regulations on the CIIS 8
    a. State Statutes and Regulations 8
    b. Additional State/CDPHE Initiatives 8
    c. Centers for Disease Control and Prevention Rules and Requirements 10
    d. Data Confidentiality and Security 11
    e. CIIS Funding Support 12
6. CIIS Functionality 13
    a. Children and Adult Immunization Information 13
    b. Vaccines for Children Program Support 14
    c. Newborn Screening Information 14
    d. Reporting and Research 14
    e. Provider Saturation 15
7. Challenges for Users and Administrators 16
    a. Data 16
    b. Interoperability with Other Systems 16
    c. Resources and Funding 16
    d. Legislation and Policy 17
    e. Competing Priorities and Agendas 17
    f. CIIS 5-year Strategic Plan – 2013 Goals and Milestones 17
8. Next Steps: Defining Common Priorities and Agendas 18

Appendix A - CIIS 5-year Strategic Plan – 2013 Goals and Milestones 19

Appendix B - Vaccine Advisory Committee for Colorado (VACC), Immunization Information Subcommittee Summary Report, 2008 21

Executive Summary

Over its nearly two decades in existence, many factors have shaped the Colorado Immunization Information System (CIIS) into what it is today, including: provider needs, state and federal legislation and rules, available technology, public health disease management measures, and child health advocacy efforts. The result is a statewide, population-based immunization information system that offers a robust set of immunization-related functionality and support services to Colorado healthcare providers, schools and childcare facilities, and public health programs both at the state and local levels.

CIIS originated through a federal grant to the University of Colorado Health Sciences Center (UCHSC) to help improve childhood immunization rates in rural areas of the state. From there it has grown into a key component of the Colorado Department of Public Health and Environment's (CDPHE) Immunization Section programs and services, supporting critical immunization information collection, data sharing, and reporting needs for a variety of stakeholders.

CIIS enjoys strong support among Colorado vaccine providers. It has become a valuable tool for many schools and childcare facilities to track compliance with Board of Health school entry immunization requirements for their students and enrollees. Newer capabilities allow CDPHE to better understand and manage disease outbreaks and support public health vaccine initiatives such as the federal Vaccines for Children (VFC) program. Additionally, using CIIS data, researchers are able to study vaccine-preventable disease rates and impacts in Colorado.

For all its supporters, the CIIS is not without its challenges, many of which result from obstacles most government agencies face such as limited resources and a long list of competing priorities. Some of the biggest obstacles are due to technology issues that require both specialized resources, time to work through complex data sets and structures and increasing requirements from funders (e.g., Centers for Disease Control and Prevention). Anti-immunization and privacy advocates continue to pressure CDPHE and lawmakers on issues of privacy and security.

Yet in spite of these difficulties, stakeholders agree on the value of the CIIS and support CDPHE in seeking opportunities for enhancing and improving its capabilities. This paper presents a high-level overview of the history and development of the CIIS, identifies many of the challenges CIIS users and administrators face, and offers context to support a stakeholder engagement process to create a common agenda and a set of priorities for the future of the CIIS.

History and Background

CIIS at the University of Colorado Health Sciences Center

CIIS originated as a pilot program funded by a Centers for Disease Control and Prevention (CDC) grant to a team at UCHSC looking to improve child immunization rates in rural areas of the state. Launched in 1996, the Colorado Rural Immunization Services Project (CRISP) grant team developed a system that rural providers could use to reference recommended immunization schedules and track vaccines administered to their patients. Over the course of the five-year grant, the system was expanded to be available to all childhood immunization providers in the state and upgraded to a web-based, off-the-shelf application licensed from an immunization information systems vendor.

The vendor declared bankruptcy, leaving the CRISP project with source code but limited resources to manage it. However, by the end of the CRISP grant term in 2002, the team had established support for system programming, maintenance and administration, and had deployed the system statewide across a variety of provider types including local public health agencies, Federally Qualified Community Health Centers, private pediatric practices, family practices, and larger providers such as Denver Health, Children's Hospital Colorado and Kaiser Permanente Colorado.

In 2001, CDPHE contracted with UCHSC to administer CIIS as the statewide immunization registry for Colorado. CIIS was funded through CDC monies and some grant dollars – but no state general funds.

CIIS Transition to the Colorado Department of Public Health and Environment

With the start of Governor Bill Ritter's term in 2007, improving children's health, including increasing immunization rates in Colorado, became a high priority for his policy agenda. Immunization and child health advocates saw this as an opportunity to pass legislation to secure general funds to support and manage CIIS on an ongoing basis. CIIS made its physical and operational transition from UCHSC to CDPHE in December 2008.

A New Platform with Envision Technology Partners, Inc.

It was not long after the CIIS transition to CDPHE that the H1N1 pandemic hit the United States. While the 2009-2010 H1N1 pandemic was a stressful time for the Immunization Section at CDPHE, it did contain a silver lining for the CIIS Program. CDPHE was able to leverage federal dollars originally awarded to its Office of Emergency Preparedness and Response (OEPR) for the H1N1 response to purchase a new immunization information system platform. Through a competitive Request for Proposal (RFP) procurement process, CDPHE selected the WebIZ product developed by Envision Technology Partners, Inc. (Envision). At the time of selection, WebIZ was fully operational in several other sites across the nation. The WebIZ registry product also included a Countermeasure and Response Administration (CRA) module which could be used during such disease outbreaks as the H1N1 pandemic.

Upgrading to the WebIZ product in 2011 was a major effort at CDPHE and took over a year to fully accomplish. While the WebIZ product had nearly 80 percent of the needed functionality already built into it right out of the box, CDPHE quickly identified the system customizations necessary to make

WebIZ work for the unique needs of Colorado providers. The Registry Replacement Project included 20 individual work streams and helped the CIIS Program formalize its testing processes, revamp its training methods to include computer-based trainings and webinars, and re-energize its communication and outreach to providers.

Impacts of Legislation and Regulations on the CIIS

State Statutes and Regulations

Colorado has had legislation since the early 1990s authorizing the collection of immunization information.[1] This statute includes a provision allowing parents/legal guardians to "exclude immunization information from the immunization tracking system." Providers are required by law to notify patients of their right to opt out and the potential benefits of inclusion in such a system[2]. Individuals must notify CDPHE directly if they do not want their or their child's immunization information in CIIS.

Like many states, Colorado has a long history with anti-immunization and privacy advocates whose objections range from the safety of vaccines in general to concerns about the privacy of individuals' information in public health information systems. Similarly, privacy advocates consistently express concerns about public health information systems like CIIS and who has access to the information in them. Immunization registry advocates tried on a number of occasions prior to 2007 to secure funding and authority for CDPHE to administer CIIS; but their efforts were consistently fought by these opponents and were not approved by the state legislature. However in 2007, immunization registry advocates were finally able to muster the support needed to get state funding to house and manage the CIIS at CDPHE and give the Department some additional authority for collecting and sharing immunization data for individuals of all ages, as well as for making newborn screening data accessible to providers through CIIS. [3]

Additional State/CDPHE Initiatives

Vaccine Advisory Committee for Colorado – Immunization Information System Subcommittee

In late 2007, Governor Ritter established a Vaccine Advisory Committee for Colorado (VACC) to look broadly at vaccine-related issues across the state. There was an Immunization Information System subcommittee that developed a set of recommendations around five key areas of immunization information: outcome measures, provider/user initiatives (school, childcare, parent), recall initiatives, incentives for participation, and integration with other public health programs (*see* Appendix B for the Subcommittee report).

[1] *C.R.S. 25-4-1705*
[2] *C.R.S. 25-4-2401(7)*

[3] *C.R.S. 25-4-1705, C.R.S. 25-4-2401*

Colorado's Personal Belief Exemption Policy Stakeholder Engagement Processes

Colorado also has a relatively open vaccine exemption law, allowing parents/guardians to choose not to have their children immunized as required for day care and school enrollment due to a personal belief or religious or medical reason[4]. These exemptions can be tracked in CIIS. CDPHE, along with CCIC, recently embarked on a collaborative process to better understand the current childhood immunization landscape in Colorado. Data has shown an increase in vaccine-preventable diseases as well as an increase in personal belief exemptions signed by parents and guardians. CDPHE and CCIC partnered with The Keystone Center (Keystone) to develop a six-month, two-fold process to achieve the following:

- Outcome 1: Stakeholders will gain a better understanding of the current state of personal belief exemption attitudes and opinions in Colorado based on reviewing a background report developed from sector-specific focus groups of healthcare providers, parents, school administrators, school nurses and public health officials.
- Outcome 2: Stakeholders will meaningfully participate in facilitated in-depth discussions on current personal belief exemption policies and practices in Colorado.
- Outcome 3: Stakeholders will generate potential policy and/or rule changes to the personal belief exemption system.
- Outcome 4: Stakeholders will make final recommendations on Colorado's personal belief exemption system to be formally submitted to CDPHE in a written report.

Keystone facilitated eight sector-specific focus group meetings, multiple key informant interviews, and three stakeholder meetings in support of this process. Throughout each step, each sector and group voiced common themes which provided groundwork for the final recommendations: education, informed consent, accurate and timely data, administrative processes, personal choice, and collaboration of state agencies. A final report with prioritized recommendations will be submitted to CDPHE at the end of October 2013 and shared with members of Colorado's General Assembly and the Board of Health. Funding and support for this stakeholder engagement process came from the CDC and The Colorado Trust's Convening for Colorado Program.

SB 13-222 Improving Access to Childhood Immunizations

In May 2013, the Colorado General Assembly passed Senate Bill 13-222 (SB 222), which aims to improve access to childhood immunizations by addressing the current challenges in vaccine delivery and financing. Signed by Governor John Hickenlooper, SB 222 directs CDPHE to convene a diverse coalition of stakeholders to take a comprehensive look at Colorado's current financing and delivery system, consider options, and make recommendations for a more efficient and cost-effective approach.

To that end, SB 222 does the following:

- Enables CDPHE to establish a vaccine purchase system.
- Creates an immunization fund for the purpose of purchasing vaccines, supporting users of the immunization tracking system, and other immunization activities.

[4] *C.R.S. 25-4-903 (2)*

- Authorizes CDPHE to convene a Task Force to examine options for maximizing federal vaccine funds and improving statewide purchase, distribution and delivery of vaccines to insured, underinsured, and uninsured individuals.
- Permits CDPHE to purchase recommended vaccines through a vaccine purchasing system, if such a system is developed.

SB 222 established a process for stakeholders to examine existing and potential options that would achieve the goal of improving access to childhood immunizations. SB 222 does not mandate a specific approach, but rather directs CDPHE to convene a coalition of stakeholders to examine potential models and make recommendations to CDPHE. The Task Force can consider a wide range of methods for vaccine financing, ordering and delivery, including: public-private models, just-in-time delivery, inventory management, continuation of current models, and others. SB 222 removed a statutory prohibition against a vaccine purchase system and authorized CDPHE to purchase vaccines through such a system, should one be developed as a result of the stakeholder process. Provider participation in a vaccine purchasing system would be voluntary.

In August 2013, more than 130 interested stakeholders participated in a Task Force kick-off meeting to begin to formalize the task force structure, identify "core" members of the Task Force (as defined in the legislation), and identify next steps. In September 2013, the stakeholders met for the first time to begin formalizing the structure and function of the Task Force and define success. The Task Force will continue to meet through the end of 2013 and into 2014 with the goal of making recommendations to the Board of Health in May 2014.

Centers for Disease Control and Prevention (CDC) Rules and Requirements

CIIS also has had to navigate changes and updates in federal requirements for immunization information systems. For example, in 2012 the Immunization Information Systems Support Branch of CDC updated the Immunization Information System (IIS) Functional Standards for 2013-2017 with which CDC-funded IIS are to comply. The standards were established by CDC with input from a variety of stakeholders and IIS experts across the country and were designed in part to help immunization information systems better interface with the "broader Health Information Technology landscape" and replaced the existing standards that had been adopted by the National Vaccine Advisory Committee in 2001. [5] While CIIS currently meets 90 percent of the new IIS Functional Standards, there are several that will require system enhancements.

In addition to these functional standards, CDC is requiring greater accountability from VFC programs and 317 vaccine funding programs. CDC now ties VFC funding to dose-level accountability reporting requirements. These reporting requirements include documenting the VFC eligibility status of children receiving VFC and 317 vaccines, the vaccine funding source of administered doses, and the doses administered. CDPHE has had to adapt and upgrade CIIS to meet these standards and requirements both

[5] Immunization Information System (IIS) Functional Standards for 2013-2017, December 2012, CDC

to stay current with technology and to continue to maintain funding to support the immunization programs it manages.

Data Confidentiality and Security

Confidentiality

One of the major issues that challenged earlier efforts among immunization registry advocates in getting CIIS funded and supported at CDPHE was the considerable outcry from privacy groups. Confidentiality of information in CIIS is protected by statutes and policies which apply to all individually identifiable information in all formats, including paper-based and electronic records. Information in CIIS is strictly confidential and can only be released under the following circumstances[6]:

- The individual or parent/guardian of the individual
- The individual's healthcare provider
- A school, childcare center or university where the individual is enrolled
- A managed care organization or health insurer where the individual is enrolled if the insurer covers immunizations
- Hospitals
- Persons or entities who have an agreement with the state for immunizations
- The Colorado Department of Health Care Policy and Financing for individuals eligible for Medicaid
- Medical and epidemiological information can be released in a manner so that no individual person can be identified
- To the extent necessary for the treatment, control, investigation, and prevention of vaccine preventable diseases in the minimum amount necessary

Authorized individuals can access immunization information in CIIS only for clinical (including data entry), quality assurance, public health or school entry law purposes (*see* Reporting and Research below for health plan and research access). All individuals accessing CIIS are required to treat all information in CIIS as confidential. Any person who releases or makes confidential immunization records public in any unauthorized manner commits a Class 1 Misdemeanor and can be sentenced up to 18 months in jail or fined $500 to $5,000, or both. Each unauthorized release of a record is considered a separate offense and therefore subject to the same penalty.

Security

In addition to CDPHE security policies and procedures, CIIS also complies with additional security policies and procedures from several other agencies, including the U.S. Department of Health and Human Services, Standards for Privacy of Individually Identifiable Health Information, the International Organization for Standardization, the American National Standards Institute, the National Institute of Standards and Technology, and the National Infrastructure Protection Center.

[6] *C.R.S. 25-4-2403 (3)*

There is an initiative within the Disease Control and Environmental Epidemiology Division (DCEED) at CDPHE to create an overarching Confidentiality Policy for its programs, including the immunization program. CDPHE also intends to update its Security Policy per Office of Information Technology (OIT) standards.

In spite of these efforts, there are still privacy and security advocates that continue to press for greater scrutiny and reduced access to health information and registries like CIIS. For instance, a recent paper by the Citizen's Council for Health Freedom focuses on the dangers of computerized medical records in general – including registries such as CIIS. The paper looks at a variety of systems across all 50 states, documenting what it identifies as significant privacy and security gaps.[7] This is but one example of numerous such articles and reports decrying public and private electronic health information registries and records of every kind.

CIIS Funding Support

CDPHE receives approximately $1,500,000 of state general fund dollars every year to support the entire Immunization Section. A portion of this Section-wide funding pays for annual maintenance and support agreements with Envision, an annual maintenance and support agreement with eTegrity (the Health Level 7, or HL7, messaging gateway vendor for CIIS), operations, travel and payroll for CIIS staff not covered by other grants. However, these funds do not fully cover CIIS costs, particularly those associated with increasing interoperability between CIIS and providers' electronic health records (EHRs). In addition to the general fund dollars, CDPHE had been awarded one-time, competitive funding through the following sources to support CIIS staff, operations and specific projects:

- Prevention and Public Health Fund, *Capacity Building Assistance to Strengthen Public Health Immunization Infrastructure and Performance* grant from CDC in the amount of $720,000 to support development of a Vaccine Ordering Module (VOM) in CIIS that interfaces with CDC's VTrckS Vaccine Ordering and Management System. The budget period for this grant runs from 9/1/2011 through 8/31/2014 to complete the full implementation of the VOM in CIIS and pay for new module functionality, project management for the rollout of implementation plan, and personnel expenses for several staff working on the project.
- Prevention and Public Health Fund, *Capacity Building Assistance to Strengthen Public Health Immunization Infrastructure and Performance, Enhancing Interoperability between Electronic Health Records and Immunization Information Systems and Reception of HL7 Standard Messages in IIS* grant from CDC in the amount of $799,959. The budget period for this grant is 9/30/2012 through 9/30/2014. CDPHE is using this funding for: an in-depth analysis of its current HL7 Messaging Gateway; the implementation of a new transport solution to support easier bidirectional messaging capability for immunization providers in Colorado; the purchase and implementation of the iSIIS Vision software product that includes an automated HL7 testing tool

[7] **Patient Privacy and Public Trust: How Health Surveillance Systems Are Undermining Both,** *Twila Brase,* President, Citizens' Council for Health Freedom, August 2013, © 2013 CCHF *(updated)*161 St. Anthony Ave, Ste 923,, St. Paul, MN 55103

for providers and EHR vendors to use; and personnel expenses for staff working on these projects.

- University of Colorado Denver, subcontract of approximately $55,000 (each year) for collaboration on a research study involving a group randomized trial at the county level comparing collaborative centralized reminder/recall and practice-based reminder/recall for 19-35 month olds in 16 Colorado counties. This study is funded between 2011 and 2014. These funds are from the Agency for Healthcare Research and Quality (AHRQ) and cover a percentage of payroll for Immunization Section staff involved in the project.
- Colorado Health Foundation grant with approximately $26,000 remaining from a larger grant that assisted the virtual and physical migration of CIIS from UCHSC to CDPHE. These remaining funds are used on virtual server migration, server monitoring software and IT staff training.
- The University of Colorado Denver recently received the notice of award for another research grant in which CIIS will play a part. This also will be AHRQ funding with a grant period of 9/30/2013 through 9/29/2018; the CIIS budget has yet to be developed.

Without these additional funding sources, it would not be possible for CIIS to support the full range of systems and programs for CDPHE's purposes or those of its many users and stakeholders. This is particularly true for establishing connectivity to an ever-increasing number of provider EHRs. Establishing connections with external systems is not easy as there are many different products that have been adopted by providers in Colorado. Even when they are on the same system, providers may define data and information in those systems differently, resulting in connectivity becoming a "one off" process for each provider. This is time-consuming and requires specialized resources to accomplish. A portion of the non-state funding CDPHE receives for CIIS supports the efforts to work through the backlog of providers waiting for connectivity. As of October 1, 2013, there are approximately 450 provider groups on the wait list for connecting to CIIS.

CIIS Functionality

Childhood and Adult Immunization Information

Although it originally was created to track and report on children's immunizations, CIIS was authorized to maintain immunization records for both children and adults in 2007. The latter is increasingly important for helping CDPHE to better manage outbreaks of diseases such as influenza, pertussis and measles.

Data is tracked on an individual basis, which means even if an individual gets vaccinations from multiple providers or at various locations, each participating provider can view and update the individual's record. CIIS uses the most recent Advisory Committee on Immunization Practices (ACIP) vaccine recommendations and can help providers identify the vaccines an individual needs, as well as when they should be given. Providers can also record parent/guardian information, address, phone number, email address, age, date of birth, gender, eligibility status for the VFC program, and the specific clinic where each shot is given.

CIIS uses role-based access. Different types of users have different types of access; for example, providers have read/write access, schools have read/write access, child-care centers have read-only access. While the majority of school users use CIIS for immunization status verification, very few of them have been able to take advantage of advanced CIIS functionality due to resource limitations and time constraints.

Vaccines for Children Program Support

CDPHE administers the federal VFC program in Colorado, through which participating providers can give free vaccines to qualified children. Colorado VFC providers can use CIIS to help track and report their VFC inventory, doses administered, children who are eligible/not eligible, and create reports.

Providers that participate in the VFC program are required to screen patients for VFC eligibility at each immunization encounter. VFC eligibility can be documented for a patient within the Demographics screen in CIIS. VFC storage and documentation requirements can be complex and burdensome for providers, and the CDC has recently put even more emphasis on dose-level accountability. CIIS allows participating providers to document: (1) VFC eligibility at the patient demographic level, and (2) vaccine funding source at the immunization level. These two items are needed in order to demonstrate that a VFC provider is using their VFC vaccine correctly.

The CIIS and VFC Programs at CDPHE are working collaboratively on the implementation of an online Vaccine Ordering Module in CIIS that will allow VFC providers to order their VFC vaccine directly through CIIS. Currently, VFC providers order their vaccine through VTrckS (the CDC system). The new Vaccine Ordering Module will interface with VTrckS so that Colorado providers can manage their inventory, track doses administered and order their VFC vaccine all through CIIS.

Newborn Screening Information

The Newborn Screening Module is still in the testing phase and has not yet been rolled out to any providers in Colorado. CDPHE is building a web service between CIIS and the Newborn Screening (NBS) Program's database (also housed at CDPHE) that will allow providers with the appropriate permissions in CIIS to query the NBS database in real-time. If a match is found in the query, CIIS will display any metabolic and hearing screening results for the requested newborn to the authorized provider within the registry in a read-only format.

Reporting and Research

In addition to supporting immunization providers, schools and childcare facilities with the clinical information they need about an individual's immunization status, CIIS also makes data available to CDPHE and authorized researchers. For example, health plans with letters of agreement who participate with CIIS can get annual Healthcare Effectiveness Data and Information Set (HEDIS) immunization reports on their membership – information they are required to track to show they meet certain quality standards for the National Committee for Quality Assurance (NCQA) certification. CDPHE will make CIIS information available for legitimate research that has been approved by an Institutional Review Board on the treatment, control, investigation, and prevention of diseases and conditions hazardous to the

public's health. However, researchers must meet specific data security and confidentiality requirements before they are allowed to use CIIS data.

Provider Saturation

Provider Enrollment in CIIS

CIIS users can access the system via the Internet 24-hours a day, seven days a week; so there is no requirement for them to purchase or maintain expensive software. A large variety of immunization-providing sites and non-clinical sites (e.g., schools and childcares) are currently enrolled in CIIS. Enrollment in CIIS, however, does not necessarily equate to active reporting of immunization information to the system. For immunization-providing sites, participation in CIIS is defined by reporting data to CIIS (either manually or electronically) within the last six months. For non-clinical sites (e.g., schools, childcares, etc.), participation is CIIS is defined as having logged into the system within the past 90 days.

Per Colorado's 2012 Immunization Information System Annual Report to the CDC:

- 66 percent of enrolled public provider sites reported data to CIIS from July 1 – December 31, 2012
- 41 percent of enrolled private provider sites reported data to CIIS from July 1 – December 31, 2012
- 76 percent of enrolled VFC provider sites (regardless of private/public designation) reported data to CIIS from July 1 – December 31, 2012

Challenges for Users and Administrators

Data

Key informants agree that ongoing attention and resources are required to ensure that CIIS data are complete and accurate. There are a number of individual providers, practices, and other entities that give vaccinations who do not report their immunization data to CIIS. Additionally, while the majority of providers giving vaccinations, particularly pediatricians, family practice providers, and public health providers are enrolled in CIIS, there can be gaps in the data they provide. Mobility of patients, the relative ease of taking immunization exemptions, and the backlog of providers on the CIIS interface waiting list all affect the quality of the data in CIIS.

Interoperability with Other Systems

As noted earlier, with so many providers now using their own EHRs, one significant challenge for CDPHE has been to get providers who want to participate with CIIS connected electronically to the system. The backlog of providers occurred in part because of Meaningful Use EHR incentive payments for providers, which prompted a large number of providers to request connectivity all at the same time.

One of the biggest problems in getting all these providers connected is a limitation of resources available to do the required skilled programming. Cross-walking data from one system to another is not an easy or quick prospect. The fact that virtually no two EHRs are alike compounds the time and effort necessary to make the connections operational in a way that is viable for both CIIS and the providers. With more than 450 provider groups on a wait list to get connectivity, this is a high priority for CIIS.

Similar to connectivity issues with providers, CIIS also faces challenges connecting to larger Health Information Systems. Currently CIIS has a connection to the Colorado Regional Health Information Organization (CORHIO), but scaling this effort and exploring ways to interface with the Quality Health Network (QHN) on the Western Slope and other systems are required. CORHIO and QHN are non-profit organizations building secure, electronic Health Information Exchanges (HIE) in the state of Colorado.

Resources and Funding

Although CIIS has an annual funding source through state general funds that supports basic systems and program operation needs, as discussed above, that funding is not adequate to allow CDPHE to achieve the optimal capabilities of CIIS as quickly as it, or other stakeholders might like. It is important for CDPHE to continue to receive funding from sources outside of state general funds to allow it to meet current and future expectations and needs both within the Department and from users and stakeholders.

With the federal government facing increasingly difficult budget battles, it is likely there will be less funding available going forward or that it will be more difficult to obtain and come with even more stringent and cumbersome documentation requirements. The state is confronting similar budget strains, and there is always the possibility that current funding levels could be cut. As government funding tightens, competition for private dollars through foundations also increases, making it more difficult to obtain grants to build and maintain any new functionality or programs.

Legislation and Policy

Key informants note that many individuals today are getting immunizations at non-traditional places such as grocery/drug store pharmacies and special immunization "fairs," and immunization information is potentially missing that could be captured if there were stronger reporting requirements. The mobility of patients and the relatively high rates of personal vaccine exemptions can also complicate the issue and make it more difficult to see complete information for an individual. While providers do sign Letters of Agreement that stipulate reporting requirements regarding timeliness of data entry, CDPHE has no resources to ensure they consistently report in a timely manner.

Tightening CDC VFC and 317 vaccine requirements, particularly related to tracking eligibility to receive these public vaccines, have been difficult for both CDPHE and providers to meet. As federal budgets continue to constrict, there is likely to be even greater scrutiny on ensuring only eligible individuals receive publicly-funded vaccines. This will require more sophisticated eligibility data tracking and sharing among various agencies, including between CDPHE and HCPF for Medicaid clients, as well as tracking children who churn on and off new qualified health plans, which now under the Affordable Care Act are required to cover vaccines.

There is considerable frustration among key informants regarding the sharing of immunization data with schools and childcare centers. The Colorado Department of Education (CDE) has strictly interpreted the Family Educational Rights and Privacy Act (FERPA) requirements, which limits schools' ability to share data with CIIS.

Competing Priorities and Agendas

Finally, coordination among state departments such as CDPHE, HCPF, CDE and the OIT around immunization issues and opportunities is not always a priority. Each of these state agencies has a full agenda of priorities it must meet as part of its own mandates. Those agendas do not align well and in some instances can be at odds. Navigating the political and budget realities has been difficult and often disheartening for immunization and CIIS advocates and staff in each agency.

CIIS 5-year Strategic Plan – 2013 Goals and Milestones

The Immunization Section and CIIS staff at CDPHE developed a five-year strategic plan for CIIS that establishes goals and milestones for additional functionality they plan to achieve by 2017. They already have made significant progress in meeting many of the milestones related to their 2013 goals, as can be seen in Appendix A. Most of these goals reflect their efforts to address and mitigate the challenges reflected above.

Next Steps: Defining Common Priorities and Agendas

There have been a variety of discussions across the immunization stakeholder and child health advocacy communities over the past several years about opportunities for improving Colorado's childhood and adult immunization rates, creating a more efficient immunization registry, and ensuring that immunization providers, as well as schools, childcare centers, and parents have access to appropriate immunization information. While there are many competing agendas and priorities among these groups, there is one thing upon which almost all CIIS staff, CDPHE leadership and immunization advocates agree: the collective immunization community needs to leverage common goals to target resources and focus on a shared agenda.

Many common themes for a CIIS "wish list" were identified during the interviews for this environmental scan. They included a number of ideas and opportunities for addressing the above noted challenges, as well as for enhancing CIIS in other ways. Over the course of the next several months, the series of CIIS stakeholder discussions are designed to identify those goals common to all or most stakeholders that the collective agrees it can put its energy toward achieving. Each meeting will be an opportunity for participants to engage in a "no holds barred" creative visioning process to brainstorm new ideas and identify ways to improve existing functions.

Once the creative visioning process is complete, stakeholders will then have a chance to prioritize their recommendations based on a defined set of criteria such as feasibility, cost, and policies and/or regulations. The process is designed to give all stakeholders a role in bringing their expertise and

interests to the table and to leverage that collective knowledge and experience into a plan to optimize and enhance CIIS for the long term.

Appendix A

CIIS 5-year Strategic Plan – 2013 Goals and Milestones

1.1.1	**Goal: Maintain and increase electronic data sharing, including EHR interoperability**	
	By June 30, 2013, contract with eTegrity to upgrade Colorado Immunization Gateway to process inbound/outbound HL7 2.5.1 messages	Met
	By June 30, 2013, develop a local HL7 2.5.1 messaging specifications guide and educate EHR vendors on local requirements	Not Started
	By August 31, 2013, develop, test and implement unidirectional HL7 interface with CORHIO	Met
	By December 31, 2013, develop, test and implement unidirectional HL7 interface with QHN	Not Started
	By December 31, 2013, establish real-time, bidirectional HL7 messaging with Indian Health Services	Not Started
	By December 31, 2013, implement an additional 20 unidirectional batch HL7 interfaces for provider offices on CIIS interface waiting list	Met
	By August 31, 2013, assess CIIS progress toward meeting new NVAC functional standards of operations and identify any unmet standards	Met
1.1.2	**Goal: Maintain and increase the percentage of public and private provider sites participating in CIIS and the timeliness, accuracy and completeness of data submitted**	
	By August 31, 2013, utilize data (if provided) collected from vaccine manufacturers to identify all immunizing providers in Colorado and categorize them into specialties	Met
	By August 31, 2013, 90% of local public health, community health and rural health provider sites will submit immunization events to CIIS on children under 6 years of age	Met
	By August 31, 2013, 90% of school districts in Colorado will participate in CIIS	In Progress
	By August 31, 2013, 80% of pediatric and family practice sites will submit immunization events to CIIS on children under 6 years of age	In Progress
	By August 31, 2013, 20% of licensed childcare centers will be contacted for participation in CIIS	In Progress
	By June 30, 2013, incorporate select components of the AIRA Data Quality MIROW document (pre-certification criteria) into the CIIS Pre-Certification Data Validation procedure	Met
	By August 31, 2013, a canned Data Quality report will be developed and made available to providers within CIIS to assist them in measuring the timeliness and completeness of the data they submit to the registry	Met
	By August 31, 2013, finalize and share criteria and guidance for county-level coverage assessments with local public health agencies	Met
	By December 31, 2013 and in collaboration with the University of Colorado Denver, conduct at least three geographic recalls for 19-35 month olds for the 4:3:1:3:3:1:4 series	On Going
	By August 31, 2013, CIIS Recommender forecasting algorithm will be validated and updated in accordance with ACIP recommendations and CDC's CDS workgroup protocol	On Going
1.1.3	**Goal: Incorporate dose-level accountability into CIIS functionality so that information can be received and stored within immunization registry**	
	By December 31, 2012, assess and update CIIS HL7 and Flat File specification documents so that all data fields necessary for dose-level accountability are indicated as "Required" fields.	Met
	By December 31, 2012, update incoming data processes so that VFC Eligibility Status and Funding Source are correctly mapped to the dose level.	Met
	By June 30, 2013, VFC Eligibility Status and Funding Source data fields will be incorporated into canned Data Quality report to facilitate the assessment and monitoring of eligibility tracking and reporting.	Met
	By December 31, 2013, educate EHR vendors on the VFC eligibility screening requirements in order to build functionality into their EHR systems to capture VFC Eligibility Status and Funding Source.	On Going

1.1.4	**Goal: Assure provider participation in online vaccine ordering and inventory management via CIIS that communicates with VTrckS using the CDC-compliant interface**	
	By June 30, 2013, develop, implement and monitor progress for completing a plan for transitioning VFC providers to electronic submission of inventory and vaccine orders through CIIS.	Met
	By August 31, 2013, develop a computer-based training module for VFC providers ordering vaccine through CIIS.	On Going
	By August 31, 2013, a plan for ensuring that new VFC providers have access to and training for entering orders and inventory using CIIS will be developed and implemented.	Met
	By December 31, 2013, educate VFC providers on vaccine ordering policies, including CDC's inventory on-hand requirement and other documentation requirements for vaccine orders.	On Going
	By August 31, 2014, 85% of VFC providers will be trained to use CIIS for inventory management and vaccine order entry.	Not Started
	By August 31, 2014, 85% of VFC providers submitting inventory and orders electronically will use CIIS to do so.	Not Started
1.1.5	**Goal: Explore feasibility and stakeholder support for expanding CIIS to collect additional health indicators**	
	By December 31, 2013, evaluate the opportunities, feasibility, support and risks for using CIIS to collect additional health indicators (e.g., BMI, oral health data, TB results, etc.).	On Going
1.1.6	**Goal: Explore feasibility and stakeholder support for expanding CIIS to collect additional health indicators**	
	By March 31st of each year, five-year strategic plan (2013-2017) will be updated with specific activities and measures for that year.	Met
1.1.7	**Goal: Explore feasibility and stakeholder support for expanding CIIS to collect additional health indicators**	
	By August 31, 2013, implement Newborn Screening Module in CIIS test environment.	Met
	By October 31, 2013, complete regression testing on Newborn Screening Module in CIIS test environment.	On Going
	By December 31, 2013, integrate newborn screening data into CIIS production environment and pilot new module with a subset of provider sites.	Not Started
	By December 31, 2013, integrate WIC client demographic data and increase CIIS access to WIC clinics.	On Going (Planning Phase)

Appendix B

Vaccine Advisory Committee Summary Report

Immunization Information System VACC Sub-Committee Report
2008

Recommendations

The committee reviewed and discussed the following issues related to the Colorado Immunization Information System (CIIS): outcome measures, provider/user initiatives (school, child-care, parent), recall initiatives, incentives for participation, and integration with other public health programs. The committee's recommendations to the Vaccine Advisory Committee for each of these areas is presented below.

Outcome measures

The committee recommends that CDPHE have clearly stated and measurable outcome measures that will document how we are doing as a state in immunizing our children at a single point in time as well as trends over time. Vaccine preventable disease rates tracked by CEDARS, the state epidemiology division, and analysis of state hospitalization data can also be useful in documenting the effectiveness of the state immunization program in preventing vaccine associated disease. In addition outcome measures that document how well the information system is functioning will be useful to improve the effectiveness and efficiency of the system.

The committee therefore recommends to that Vaccine Advisory Committee that the state have the capacity to track the measures in several different ways in addition to CIIS such as NIS, school based surveys, HEDIS rates, and provider audits. (See appendix A) The subcommittee had extensive discussions about valid doses and whether it would be preferable to report UTD rates based on a 6 month time interval between the 3rd and 4th DTaP or a 4 month time interval that a repeat DTaP is not required. When considering population based data useful in documenting coverage and identifying pockets of under-immunization the 4 month interval for a valid dose seems reasonable. However when doing provider based analysis and AFIX education the recommended 6 month interval obtained with COCASA for a valid may be preferable. CIIS can provide both measures. However the use of different measures for different types of surveys creates confusion. For example NIS only uses counts rather than valid doses and if school surveys use one measure for valid doses and CIIS reports another measure it will be more difficult to compare the 2 measures. The sub-committee recommends that a work group that has broad representation of stakeholders be established to look at the issues around valid doses.

Recommendations for outcome measures:

- Antigen specific total counts of administered doses and UTD rates based on valid doses according to the ACIP schedule.

- Combination series total counts of administered doses and UTD rates based on valid doses by the ACIP schedule. The combinations for children under 4 should include the basic series without varicella and conjugate pneumoccocal antigens, the basic series with these antigens, and 2 more that include hepatitis A with and without rotavirus.
- The counts and UTD rates should be tracked at the following ages: 9-12 months, 19-20 months, 19-35 months, 5-6 years, 6-7 years, 12-13 years, and 13-15 years. Additional adult ages should be added if and when there is sufficient adult participation in CIIS.
- In order to compare CIIS data with other data sources there must be an accepted definition of MOGE (moved and gone elsewhere).
- CDPHE should develop a pilot demonstration to document the usefulness of CIIS to assess vulnerable and at risk populations using the outcome measures recommended. This pilot should assess county level data to identify counties that have UTD rates for specific antigens and combinations significantly below the state average. Geographic and socio-demographic characteristics that warrant evaluation include zip code mapping, insurance status, race/ethnicity, primary language and Site of care – CHC, PH, school, private practice. Based on the information the state immunization program may develop and implement intervention programs specifically targeted to the populations and communities with under-immunized populations.

Provider/User Initiatives (School, Child Care, Parent)

Rollout of access to CIIS by schools is underway and all school districts should have the capacity and training to access CIIS by the end of 2009. Schools can access the official school form for individual children populated with immunization data in CIIS. Federal restrictions on information sharing by schools limits the bi-directional flow of information between schools and health departments and immunization information systems throughout the country. For example Colorado schools cannot now provide the CIIS with a list of enrolled students so that CIIS can return to the schools a list of those children needing immunizations. National efforts are currently underway to address this problem. If these efforts are not successful it may be worthwhile to establish a working group with the State Board of Education to address this issue at a state level.

The committee established a work group to make recommendations for child care facilities and individual/parent access CIIS. Current CIIS practice is to refer parents to the provider of last service and/or the appropriate local public health agency for records in CIIS. This policy allows the provider and/or local public health agency for records in CIIS. This policy allows the provider and/or local public health agency to authenticate and determine that the person requesting the access is entitled to see the information. The work group determined that CIIS should maintain its current practice for parent/individual CIIS access. The work group recommended that child care facilities be provided the same access as schools, i.e. the official school form for individual children. The work group felt that there are sufficient resources available for child care facilities to determine if the immunizations recorded on the school form meet the Colorado Board of Health requirements. The estimated cost to roll out this access to child care facilities is 1.5 to 2 FTE in addition to current CIIS staff. The work group recommended that CDPHE prioritize this roll out as appropriate within available resources.

Recall Initiatives

The committee recommends that CIIS continue to explore the relative feasibility and effectiveness of geographic based recall through the Sentinel Sites grant and other opportunities. In addition CIIS should continue to promote and assist in carrying out recall with providers, health plans, health networks, and when possible, Medicaid and schools.

The committee recommends that a work group be established to better integrate EPSDT outreach workers and other public health resources into local recall activities.

The committee recommends that the highest priority age groups for recall be children 9-12 months and 19-35 months because these children have the highest risk for vaccine preventable disease, but that community partners such as providers, health plans, and health networks be given the opportunity to select alternative acceptable age.

The committee recommends that recall at 19-35 months should be done for the basic series plus conjugate pneumococcal vaccine and varicella. Community based partners can at their own discretion add hepatitis A. Geographic based recall will only include hepatitis A at this time if >70% of providers who care for >70% of children agree that hepatitis A should be included in the recall. Likewise, for older children, partners will have the discretion to include hepatitis A and HPV in their recall, and the same 70% rule will apply to these vaccines for recall in older children and adolescents.

The committee recommends that CDPHE plan a statewide coordinated recall effort once a year to coincide with immunization month to maximize the benefit of TV and radio advertising and counteract the anti-vaccine propaganda machine and growing rate of personal exemptions.

Incentives for CIIS Participation

The committee recommends that CDPHE facilitate a meeting with primary care physicians (AAP and AFP) with health plans to discuss methods of increasing CIIS participation and recall and benefits to plans, providers and patients.

The committee recommends that CDPHE facilitate a meeting with primary care physicians (AAP and AFP) with Medicaid/CHP to discuss methods of increasing CIIS participation and recall and benefits to plans, providers and patients.

The committee recommends that a working group explore methods of providing practices with external support for recall based activities: office orientation, data quality checks, MOGE processes, and data clean-up including entry of historical data and financial incentives for recall participation. In addition, this working group should seek to have AAP and CAFP give practices doing recall QI credit for recertification and ERS credit points with malpractice insurers such a COPIC.

The committee recommends that CDPHE establish a method to identify and reward outstanding practices, networks and health plans.

Appendix A from the Vaccine Advisory Committee Summary Report Immunization Information System VACC Sub-Committee Report

The committee reviewed the various methodologies for measuring immunization rates before deciding on the recommendation below. The committee recognizes that there is confusion among consumers and providers regarding the immunizations rates and that the methodologies do not always align. A recommendation of the committee is that the methodology and the data sources be included in various reports to define results accurately. For the purpose of this committee the following methodologies were reviewed:

1. National Immunization Survey- The National Immunization Survey (NIS) is conducted annually by the National Immunization Program and the National Center for Health Statistics, Centers for Disease Control and Prevention. The NIS is used to obtain national, state, and selected urban area estimates of vaccination coverage rates for U.S. children between the ages of 19 and 35 months. The NIS uses a national sample size of 30,000 children. The data source for the NIS is a random digit dialing telephone survey of households with age-eligible children followed by a mail survey of the children's vaccination providers to validate immunization information. Parents are asked to report the children's immunization status from the individual 'shot record" The results are reported to state health departments.

2. Vaccine For Children Program Immunization Measurement
   Immunization programs that receive Vaccine For Children (VFC) funds are required to implement ACIP-recommended vaccines schedules. As part of compliance procedures; immunization rates are measured annually at participating clinics using the CDC Comprehensive Clinic Assessment Software Application (CoCASA). The denominator is children ages 19-35 months. A sample of 70 charts is used as the data source. The antigens measured include the basic series including varicella. The recommended ACIP intervals are applied to the rate calculation. The results are reported to the CDC.

3. Uniform Data Systems Immunization Measurement
   Immunization rates are one of series of outcome measures that each FQHC reports annually to the Bureau of Primary Health Care. The denominator is the are the number of children who turned 2 years old in the measurement year and who have been seen in a FQHC at least twice before their second birthday. If the FQHC uses electronic health records, all children meeting the specifications are measured; if the FQHC does not have electronic records a sample of 70 charts are reviewed. The antigens measured include the basic series, varicella and pnuemococcal. ACIP intervals are not applied.

4. NCQA measurement
   The Healthcare Effectiveness Data and Information Set (HEDIS) is a tool used by than health plans including Medicaid and Medicaid Managed Care to measure performance on important dimensions of care and service. The immunization rate of children ages 19-35 months, are measured using a hybrid method. The hybrid method includes the use of claims data and a sampling of patient charts.

Colorado Children's Immunization Coalition

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Immunization Section

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