

GE Centricity Users Group Real Time Immunization Support

ICE Integration through iMMtelligence Form

Integrated Immunization Decision Support by ICE using standards based rule engine

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Presentation Agenda

- ▶ Introduction
- ▶ The challenge: Real time vaccine decision support
- ▶ Overview of ICE (Immunization Calculation Engine)
- ▶ Integrating ICE with Centricity
- ▶ Practice Perspective
- ▶ Live Demo
- ▶ Q/A

About the Presenters

- ▶ Jennifer Monahan - Health One Technologies
 - ▶ Partner Health 1 Technologies
 - ▶ Experience in the medical and technology sectors
 - ▶ 15+ Years of Experience implementing and optimizing EHRs in physician offices, hospitals, and specialty clinics.
 - ▶ Thought leader and innovator focusing on leveraging technology to improve patient and provider experience.

About the Presenters

▶ Michael J. Suralik - HLN

- ▶ Senior Project Manager at HLN Consulting, LLC
- ▶ ICE (Immunization Calculation Engine)
Customer Engagement Manager
- ▶ 16+ years experience in Healthcare
Interoperability including HIE, IIS, and EHRs

About the Presenters

- ▶ Dr. Stewart Samuel - Allied Physicians Group
 - ▶ Practicing Pediatrician in a suburban setting for 20+ years
 - ▶ Chair, Information Technology Steering Committee
 - ▶ 35 practices, 150 providers, 150000 patients, 600 users - Predominantly Pediatrics

Practice Perspective

Dr. Stewart Samuel - Allied Physicians Group



Allied Physicians Group of New York

Single-specialty Pediatric group built on a philosophy of independent like-minded physicians

Dr. Stewart Samuel Intro to Allied Physician Group

- ▶ 35 practices, 150 providers, 150,000 patients, 600 users
- ▶ Mostly pediatricians (1 Ped All/Pulm office, 1 mental health)
- ▶ All on same Electronic solutions
 - ▶ EMR/CPS, including customized form sets
 - ▶ 3rd party integration- patient engagement (check in, patient reminders, portal)



Importance of Immunizations to APG

- ▶ Year to date 220,000 vaccines given
- ▶ Zero tolerance for errors
- ▶ Multiple advantages to everyone by increasing vaccination rates
 - ▶ Missed opportunities reduced
 - ▶ Patients health protected
 - ▶ Multiple Quality/HEDIS measures satisfied = \$\$
 - ▶ Office efficiencies improved

The Challenge:

Vaccine Schedule Challenges specific to Practices/Providers

- ▶ Growing Complexity of vaccination schedules
- ▶ Non-MDs managing schedules
- ▶ Patient Factors
 - ▶ Vaccine hesitancy, Illness in patient, Transfer from another practice (especially from other countries)
- ▶ Manufacturing issues
 - ▶ Shortages (Heb B and Adult Hep A)
 - ▶ Delays
- ▶ School and Government Policies and their abilities to evaluate vaccination histories

Solving The Challenge:

Provide Real-time immunization decision support at the point of care in GE Centricity by integrating the 3rd party ICE (Immunization Calculation Engine) to custom encounter forms.

- ▶ Where do we start?
 - ▶ Begin with an existing immunization formset already in production for many Health 1 clients.
 - ▶ Formset already allows management of vaccines, preloading, and other features clients have developed over the years.

Solving The Challenge:

Provide Real-time immunization decision support at the point of care in GE Centricity by integrating the 3rd party ICE (Immunization Calculation Engine) to custom encounter forms.

- ▶ Why ICE?
 - ▶ Allied Pediatrics, a Health 1 customer, introduces ICE and asks if it can be integrated.
 - ▶ ICE is an existing framework for the decision support we need.
 - ▶ The rules are established, and tested
 - ▶ ICE is open source
 - ▶ The ICE team is eager to assist with integration to new products

Overview of ICE

Michael J. Suralik - HLN Consulting, LLC



Introduction to ICE

Create an immunization decision support system that:

Objective	Achievement
Supports routinely administered vaccine groups	<ul style="list-style-type: none">• Supports 15 vaccine groups from birth through adulthood
Promotes clinical best practices	<ul style="list-style-type: none">• Follows ACIP recommendations• Informed by CDC's CDSi project
Adapts to changing requirements	<ul style="list-style-type: none">• Rule editing GUI tool for non-technical SMEs• Automated testing tool w/ 2,700 test cases
Easily integrates with IIS and other health systems	<ul style="list-style-type: none">• Standards-based, web service interface• Variety of deployment options
Freely available	<ul style="list-style-type: none">• Standard open-source license• Downloadable from public website

Inputs to ICE

- ▶ Patient parameters
 - ▶ Date of birth
 - ▶ Gender
 - ▶ Immunization history (vaccine and admin date)
 - ▶ Disease immunity
 - ▶ Proof of immunity
 - ▶ History of disease
- ▶ Situational parameters
 - ▶ Immunization schedule identifier
 - ▶ Date of evaluation

Outputs from ICE

- ▶ Evaluation - of each Dose
 - ▶ Evaluation = {Valid, Invalid, or Accepted}
 - ▶ Invalid Reason(s), for each Invalid dose
- ▶ Recommendation - for each Vaccine Group
 - ▶ Recommendation = {Recommended, Future recommended, Conditional, or Not recommended}
 - ▶ Reason
 - ▶ Dates
 - ▶ Earliest Date
 - ▶ Recommended Date
 - ▶ Overdue Date

Pre-Configured Support for Vaccines in these Vaccine Groups

1. DTP
2. H1N1
3. Hep A
4. Hep B
5. Hib
6. HPV
7. Influenza
8. Meningococcal ACWY
9. Meningococcal B
10. MMR
11. Pneumococcal
12. Polio
13. Rotavirus
14. Varicella
15. Zoster

ICE Wiki

www.cdsframework.org



What is ICE?

The Immunization Calculation Engine (ICE) is a free, open-source immunization forecasting software system that has two major components. The core component is the **ICE Web Service**, which evaluates a patient's immunization history and generates the appropriate immunization recommendations for the patient. The ICE Web Service runs in **OpenCDS** which is a third-party platform that may be used to build decision support services for any clinical domain. The second component is the **Clinical Decision Support Administration Tool (CAT)**, a web-based GUI tool that enables clinically-oriented subject matter experts to manage ICE with little or no intervention from software developers.

ICE comes initially configured with a **default immunization schedule** that supports all routine childhood, adolescent, and adult immunizations - based on the recommendations of the **Advisory Committee on Immunization Practices (ACIP)**. Furthermore, any organization that deploys ICE may use CAT to configure ICE to suit its own needs, to support non-routine vaccines, to support new vaccines as they come to market, and to incorporate periodic changes to the ACIP recommendations.

The ICE software system has been developed and configured by a collaborative partnership of public health experts and information technology experts from the organizations listed below and has been released under a **standard open-source license**:

Subscribe to receive ICE Announcements!



ICE Wins a 2017 Upshot Award from the National Vaccine Program Office (NVPO)



On June 6, 2017, HLN was awarded the 2017 Upshot Award for Excellence in Vaccine Supply, Access, and Use by the National Vaccine Program Office (NVPO) for its ICE Open Source Immunization Forecaster. In the letter of award, Dr. Jewel Mullen, Principal Deputy Assistant Secretary for Health commented that,

"HLN Consulting's efforts on the Immunization Calculation Engine (ICE) are impressive. This powerful tool-including its open-source nature and seamless integration into clinical workflows-holds great promise for improving clinical

General Rules

This page contains general rules that apply to all vaccine groups. If there is an exception, a reference will be provided to the vaccine group that does not follow the general rule.

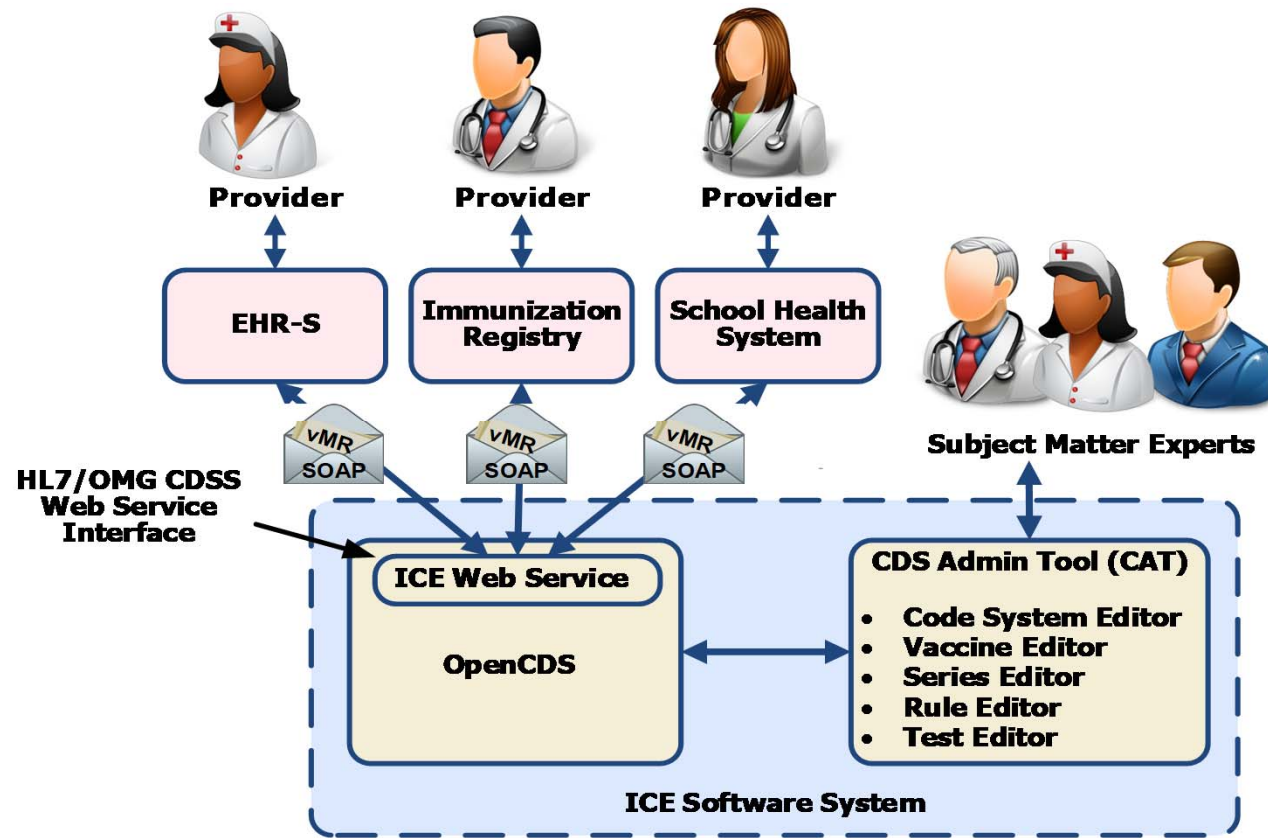
	Rule Name	Rule Details
1	Recommended Interval - Unit of Measure	<p>Generally, an interval recommendation less than 4 months will be listed in days (weeks) while an interval recommendation of 4 months or greater will be listed in calendar months.</p> <p>The recommended interval between the first dose and the last dose will use the same unit of measure as the recommended interval between each consecutive dose in the series. For example, if the recommended interval between dose 1 and dose 2 is in days, and the recommended interval between dose 2 and dose 3 is in days, then the recommended interval between dose 1 and dose 3 (the final dose) will also be in days.</p>
2	Recommended Age - Unit of Measure	<p>Generally, a recommended age of less than 1 month will be listed in days (weeks) while a recommended age of 1 month or greater will be listed in calendar months or years, (e.g., 6 months, 18 months, 19 years, etc.).</p>

Minimum & Routine Ages DTAP 5-Dose Series

Dose	Series Name	Absolute Minimum Age	Minimum Age	Routine Age	Latest Recommended Age (less than)	Valid CVX Code(s) per Dose for this Series	Invalid CVX Code(s) per Dose for this Series
1	DTP 5-dose	38 days	42 days (6 weeks)	2 months	3 months + 4 weeks	01, 20, 28, 106, 107, 115*, 09*, 113*, 138*, 139*, 22, 50, 102, 110, 120, 130, 132, 146	
2	DTP 5-dose	66 days	70 days (10 weeks)	4 months	5 months + 4 weeks	01, 20, 28, 106, 107, 115*, 09*, 113*, 138*, 139*, 22, 50, 102, 110, 120, 130, 132, 146	
3	DTP 5-dose	94 days	98 days (14 weeks)	6 months	7 months + 4 weeks	01, 20, 28, 106, 107, 115*, 09*, 113*, 138*, 139*, 22, 50, 102, 110, 120, 130, 132, 146	
4	DTP 5-dose	361 days	15 months	15 months	19 months + 4 weeks	01, 20, 28, 106, 107, 115, 09, 113, 138, 139, 22, 50, 102, 110, 120, 130, 132, 146	
5	DTP 5-dose	4 years - 4 days	4 years	4 years	7 years	01, 20, 28, 106, 107, 115, 09, 113, 138, 139, 22, 50, 102, 110, 120, 130, 132, 146	

*Note: Td/Tdap vaccines will be Evaluated as Invalid (with a reason code of INSUFFICIENT_ANTIGEN) if administered as dose 1, 2 or 3 to a patient who is < 7 years - 4 days old. See CVX Code Minimum Age Rules.

Sample ICE Deployment



Integrating ICE with GE Centricity

Jennifer Monahan - Health 1 Technologies



Technical Implementation

- ▶ How do we get Centricity to talk to ICE?
 - ▶ This is accomplished by creating a helper service that accepts a text file input from Centricity, and translates the evaluations back out in a text file output from ICE
- ▶ Use MEL expressions to write patient immunization information and demographics to a file, and then read ICE output file for evaluations.
 - ▶ Early integrations required a button push to request evaluations, and a second button push to retrieve them.
- ▶ How do we make this process as invisible to the user as possible?
 - ▶ Later integrations handle this via watchers and actions 'behind the scenes' to remove the need for user to click.

User Experience

- ▶ Add a 'Forecast' section to the existing Immunization form.
 - ▶ Forecast will provide in visit feedback as determined by the ICE Engine
 - ▶ Need to display information concisely, but provide deeper feedback when necessary (e.g. a vaccine that is not accepted - why?)
 - ▶ Accomplished via an 'Evaluations' button that provides detail where overview is not enough.
 - ▶ Need to provide easy ordering ability for vaccines that are due
 - ▶ Accomplished via an order button on vaccines that are due
 - ▶ How do we handle vaccines where the data is ambiguous and therefore feedback is undetermined?

Technical Challenges

- ▶ Ordering Preferences
 - ▶ How do we deal with ordering items that are part of a Combo-Vax or where multiple orders could relate to one recommendation?
- ▶ Data Inconsistencies
 - ▶ The evaluations are only as good as the data in the system.
 - ▶ Some clients had data such as 'birth dose' in their Hep B obsterms, this caused the status of the vaccine to be unknown following a GE immunization migration which in turn led to 'undetermined' status on ICE Evaluations.

Practice Experience

Dr. Stewart Samuel - Allied Physicians Group



Implementation & Challenges

- ▶ Initial reception was positive
- ▶ Technical issues
- ▶ Testing form in test
- ▶ Connectivity speed
- ▶ Form functionality/UI
- ▶ Errors- Obs term- Vaccine table reconciliation
- ▶ Custom needs (Vaccines given within an accepted range, but earlier than CDC recommendation and error notification- TDAP, HPV, 4th Polio as part of combo vaccine)

Allied - Current Implementation Status

Current Status

- ▶ Select Providers and staff using the iMMtelligence form in live environment
- ▶ Compiling “exceptions” specific to our organization's practices
- ▶ Reconciling vaccine table errors

Future Plans

- ▶ General Use of iMMtelligence form with all site/providers
- ▶ Continued Patient education/Communication
- ▶ Ongoing Population management

Live Demo

Jennifer Monahan - Health 1 Technologies



Health One Technologies - Jennifer Monahan

iMMtelligence Form - Live Demonstration

Orders Medications Problems Medication Problem

Review/Order Give Vacc Give Vacc 2 TB-PPD Safety Preload Edit/Adv React Text

Dillon Peds **DOB: 06/05/2011 - 6 Years & 10 Months OI**

Vacc. ord. by: Figueroa ; Catherine | provider click enter name Vaccine Counselling by Provider

VFC Status: Not VFC Eligible V01 verify Last updated: 04/23/2018 LOC: H1N

Pediatric Adult (18 years and older) Travel/Other iMMtelligence

Vax Group	Recommendations	Due Date	Age	Evaluations
Hepatitis B	Due Now - Recommended	08/05/2011		<input type="button" value="Evaluations"/>
DTP	Due Now - Recommended	08/05/2011		<input type="button" value="Evaluations"/>
Polio	Due Now - Recommended	08/05/2011		<input type="button" value="Evaluations"/>
Hib	High Risk - Conditionally Recommended			<input type="button" value="Evaluations"/>
Rotavirus	Too Old - Not Recommended			<input type="button" value="Evaluations"/>
MMR	Due Now - Recommended	06/05/2012	1	<input type="button" value="Evaluations"/>
Varicella	Due Now - Recommended	06/05/2012	1	<input type="button" value="Evaluations"/>
Hepatitis A	Due Now - Recommended	06/05/2012	1	<input type="button" value="Evaluations"/>
Pneumo PCV	High Risk - Conditionally Recommended			<input type="button" value="Evaluations"/>
Influenza	Due Now - Recommended	08/01/2017	6	<input type="button" value="Evaluations"/>
MCV4	Due in the Future - Recommended in the Future	06/05/2022	11	<input type="button" value="Evaluations"/>
Mening B	Below Minimum Age for High Risk Series - Not Rec			<input type="button" value="Evaluations"/>
HPV	Due in the Future - Recommended in the Future	06/05/2022	11	<input type="button" value="Evaluations"/>

Turn Off Notifications

Vaccine Review

Vaccines reviewed - up to date
 Vaccines reviewed - update today
 Vaccines reviewed - patient/parent declines

Comments:

Links

Questions & Answers

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