CDSi: Assessing Its Use and Forging New Directions

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Agenda

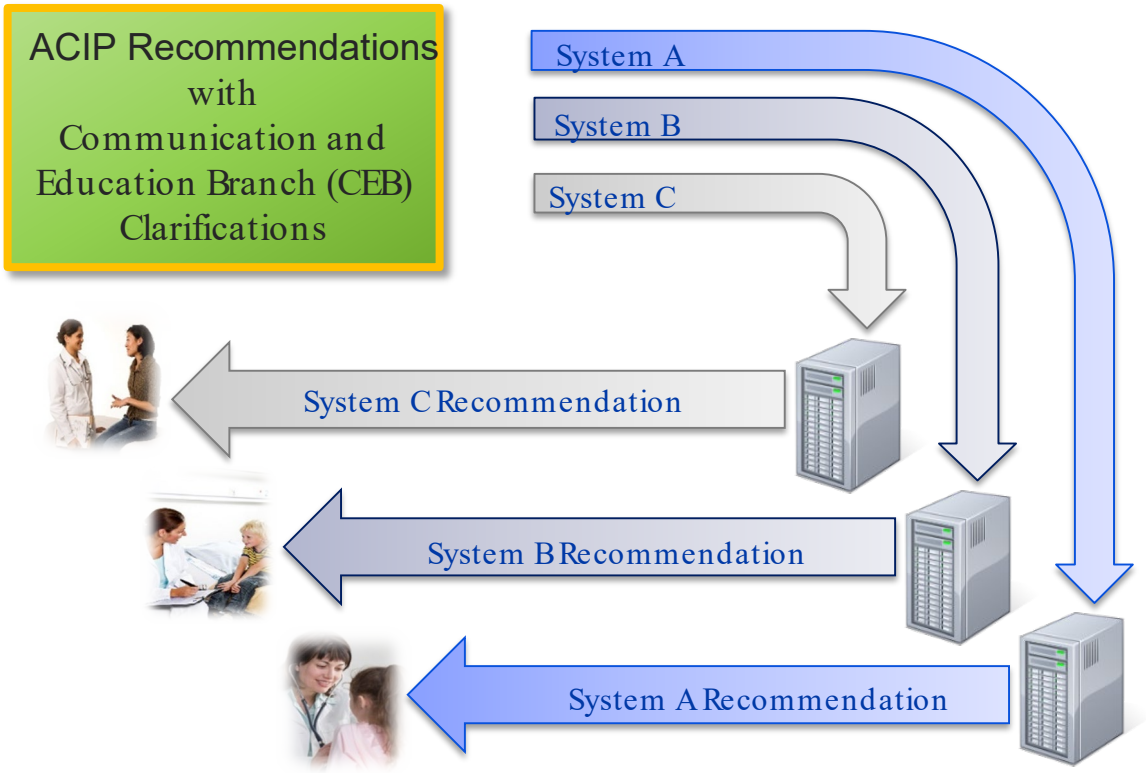
- Overview of CDSi
- Recent Enhancements to CDSi
- Recent ACIP Votes
- Future Directions for CDSi
- Use and impact of CDSi resources
- Question and Discussion

Overview of CDSi

CDSi

- CDSi = Clinical Decision Support for Immunization
- CDC created and managed set of resources
- Designed to map ACIP recommendations into IT-friendly resources
- Goal = Consistent implementations aligned with ACIP recommendations

Before CDSi



Individual Interpretation And Implementation

With CDSi

Workgroup Interpretation and Documentation

ACIP Recommendations with Communication and Education Branch (CEB) Clarifications

CDSi Resources

Individual Implementation

Consistent System Recommendations

The CDSi resources translate clinical recommendations into technical information

The complete suite of CDSi resources comprises:

Logic Specification	Supporting Data	Test Cases
– Vocabulary – Business Rules – Decision Tables – Processing Definitions – Domain Model	– Excel Format – XML Format – Release Notes	– Excel Format – XML Format – Test Case Management Tool
Training Materials	– Brochure – Quick Guides	– Practice Exercise – Quiz	– Videos

Recent Enhancements to CDSi

Version 4.0

- Released in February 2019
- Includes updated Logic Specification, Supporting Data, and Test Cases
- Primary enhancements focused on
  - Introduction of historical recommendations
  - Improved control when skipping doses
- Also included miscellaneous updates in Logic Spec business rules, Supporting Data updates, and test case iterations

Primary Enhancements

Historical Recommendations

- Allows Begin and End Dates on Ages, Intervals, etc. to apply ACIP recommendations as they evolve over time.
- This enables the ability to evaluate patients based on the recommendations in place at the time they were vaccinated.

Improved Dose Skipping

- Dose Skipping is now able to applied to just the evaluation process, just the forecasting process, or both processes.
- This enables more granular control of the grace period and situations which might only impact one process.

Future Directions

CDSi and Risk Recommendations

The “Easy"

- **Routine Recommendations**
  - Flu
  - Zoster
  - Td(ap)
  - Pneumococcal
- **Increased Risk Dosing Schedules**
  - Simple intervals
  - No concept of catch-up

The “Not-so-Easy”

- Varied language across MMWRs
- Risks not captured in IT systems
- Vague phrases
- Mapping ACIP risks to IT codes

Varied MMWR Language

Vaccine	Recommendation Language
Pneumococcal	“Chronic renal failure”
HepB	“Personswith end-stage renal disease”
Influenza	“Renaldisorder”

Vaccine	Recommendation Language
Pneumococcal	“Chronic liver disease (including cirrhosis)”
HepA and HepB	“Persons with chronic liver disease”
Influenza	“Hepatic disorder”

Does this represent meaningful variation?
Is cirrhosis included in HepA and HepB?

Concepts Not Known to EHR/IIS

- It may not be reasonable for a patient's record to include certain information

- Examples:
  - "Not in a long-term, mutually monogamous relationship"
  - "Close contact with an international adoptee during the first 60 days"
  - "Travel to country with a Yellow Fever vaccination entry requirement"
  - "Microbiologists routinely exposed to Neisseria meningitides"
  - "Household contact with a pregnant woman"

What happens in Vagueness, stays in Vagueness

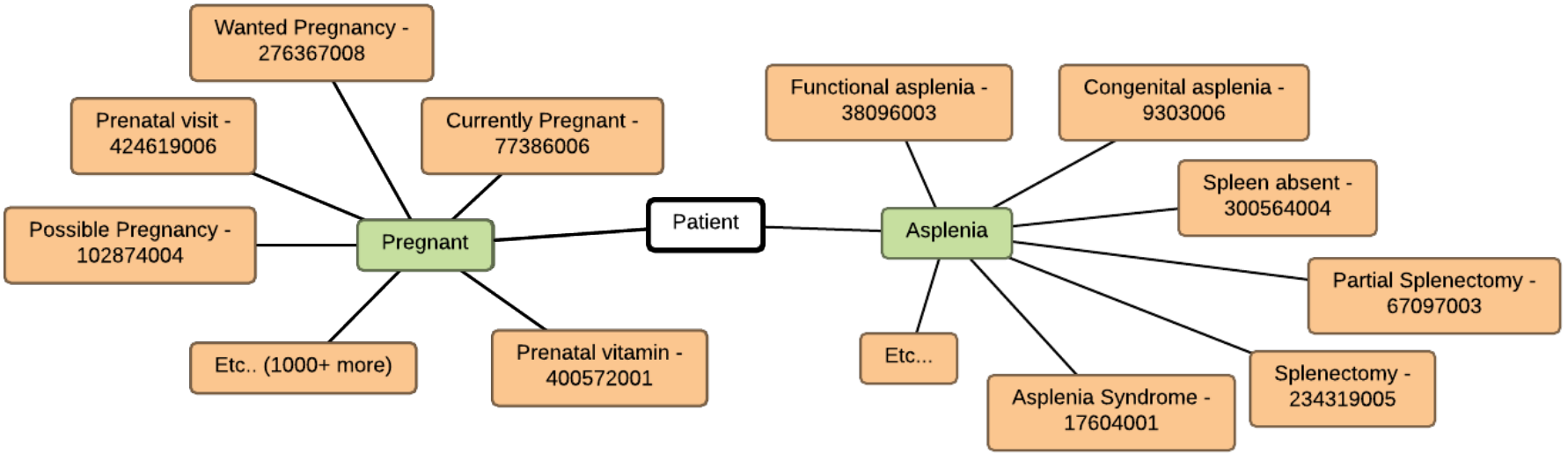
Vaccine	Recommendation Language
Various	“Health care personnel”
• Does this include anyone working in a health care facility? • Clinicians only? • Lab staff? • Front end staff?	
HepB	“Public safety worker exposed to blood or infectious body fluids”
• What is the definition of "public safety worker"? • First responders? • Police? • Social workers?	
Meningococcal	“Persons at risk during an outbreak”
• Does this refer to classes of people (e.g. first responders, clinicians) or activities or environmental conditions?	

Forward Movement: Vocabulary Clarity

- Beginning work with ACIP work group leads at CDC on terminology definition
- Will allow better mapping to SNOMED or ICD terminologies
- End result will enable more computable ACIP recommendations related to indications and contraindications

Term	Proposed Standardized Definition	Conditions Included	Conditions Not Included
Diabetes Mellitus	An inherited or acquired metabolic disease characterized by a deficiency in insulin production from the pancreas and/or insulin resistance, diagnosed based on criteria established by the American Diabetes Association.	• Type I diabetes • Type 2 diabetes • Monogenic diabetes • Cystic fibrosis related diabetes	• Gestational diabetes • Impaired fasting glucose (IFG) • Impaired glucose tolerance (IGT)

Mapping ACIP Risks to IT Codes (SNOMED/ICD)



New ACIP Recommendation Type:

Shared Clinical Decision Making

- Human Papillomavirus (HPV) Vaccine
  - ACIP recommends vaccination based on *shared clinical decision making* for individuals ages 27 through 45 years who are not adequately vaccinated. HPV vaccines are not licensed for use in adults older than age 45 years.
- Pneumococcal Vaccines
  - ACIP recommends PCV13 based on *shared clinical decision making* for adults 65 years or older who do not have an immunocompromising condition and who have not previously received PCV13. All adults 65 years or older should receive a dose of PPSV23.

PCV13 in Adults: An Evolution of Recommendations

Year	ACIP Recommendation	CDSi Action
< 2014	No routine recommendation for PCV13 in Adults aged 65 years and older	No evaluation or forecast for age-based PCV13 in adults aged 65 years and older
2014-2019	Routine recommendation for PCV13 in Adults aged 65 years and older	Evaluate and forecast PCV13 in adults aged 65 years and older
2019 and foreword	Shared Clinical Decision Making for PCV13 in Adults age 65 years and older	?

Forward Movement: Shared Clinical Decision Making

What we know

- Shared Clinical Decision Making is a broad healthcare term being leveraged by ACIP
- For now, it can be thought of as akin to Category B recommendations
- Guidance and Educational Material is being developed by the Education Branch at CDC
- This will most likely require development work by all implementers

What we don't know (yet)

- Should providers be informed of shared clinical decision making recommendations in every forecast?
- Do IIS need to collect the shared decision to not vaccinate so it can update the forecast?
- If the decision is to not vaccinate, is there a waiting period before recommending the shared decision for reconsideration?
- How will this impact HL7?
- And many more things…

Getting Recommendations into Practice

2019/20 Flu Recommendations Timeline

From ACIP Vote to Clinical Workflow

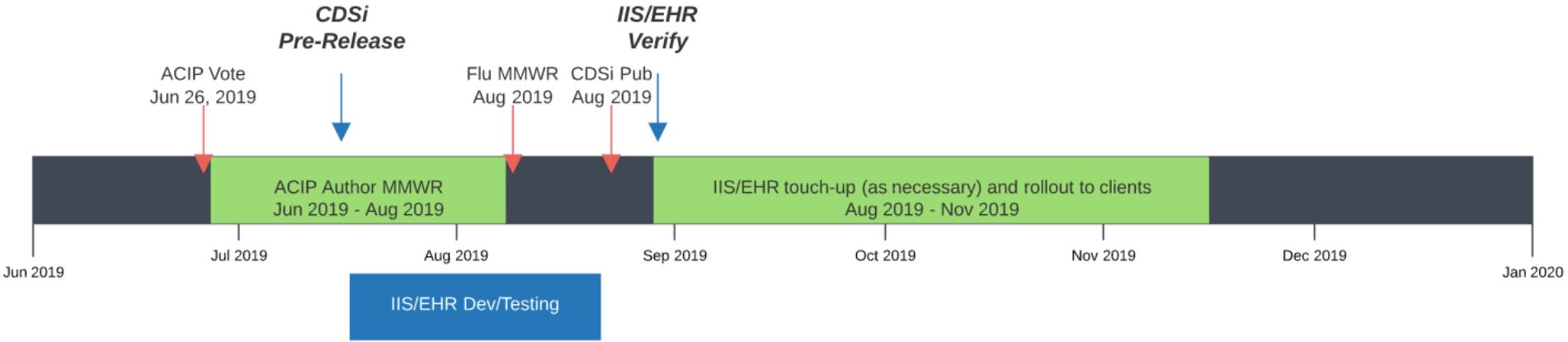
Forward Movement: CDSi Pre-Release

- Develop and release CDSi material for flu prior to the publication of the MMWR.
- This will allow initial development by IIS and EHRs to begin sooner than normal.
- First Pre-Release materials (Supporting Data and Test Cases) are now on the CDSi web page.
  https://www.cdc.gov/vaccines/programs/iis/cdsi.html
- Final CDSi release will be per normal schedule, following the MMWR.

Getting Recommendations into Practice

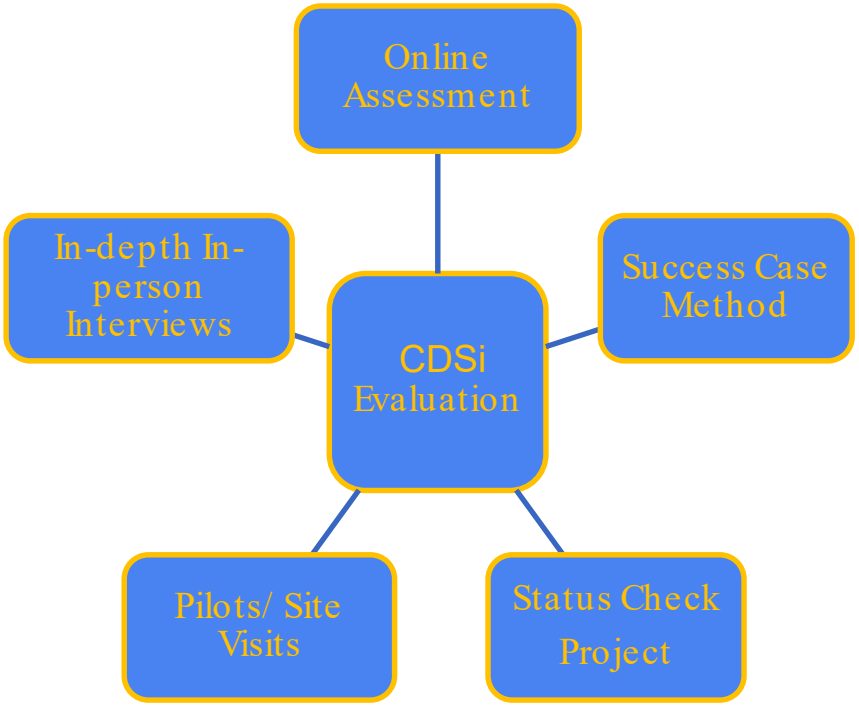
2019/20 Flu Recommendations Timeline

From ACIP Vote to Clinical Workflow



CDSi Evaluation

CDSi Evaluation

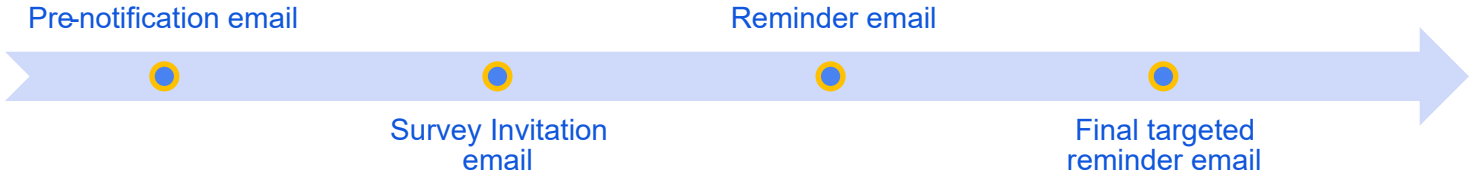


Online Assessment Survey Methods

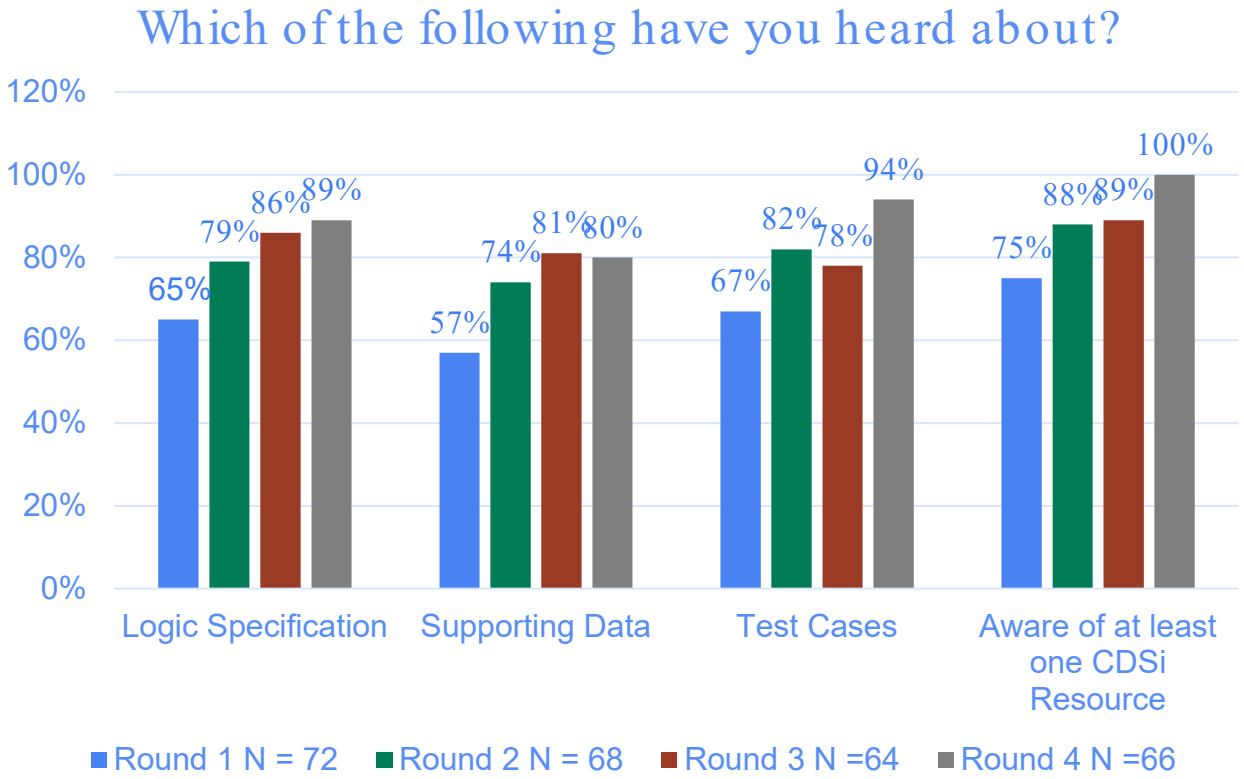
- Round 1 January 2015
- Round 2 January 2016
- Round 3 January 2018
- Round 4 January 2019
- Respondents
  - IIS grantees
  - IIS vendors, EHR vendors,
  - and independent consultants

Year	Grantees Response Rate	Vendor Response Rate
Round 1 – 2015	81%	53%
Round 2 – 2016	75%	47%
Round 3 – 2018	89%	53%
Round 4 – 2019	86%	50%

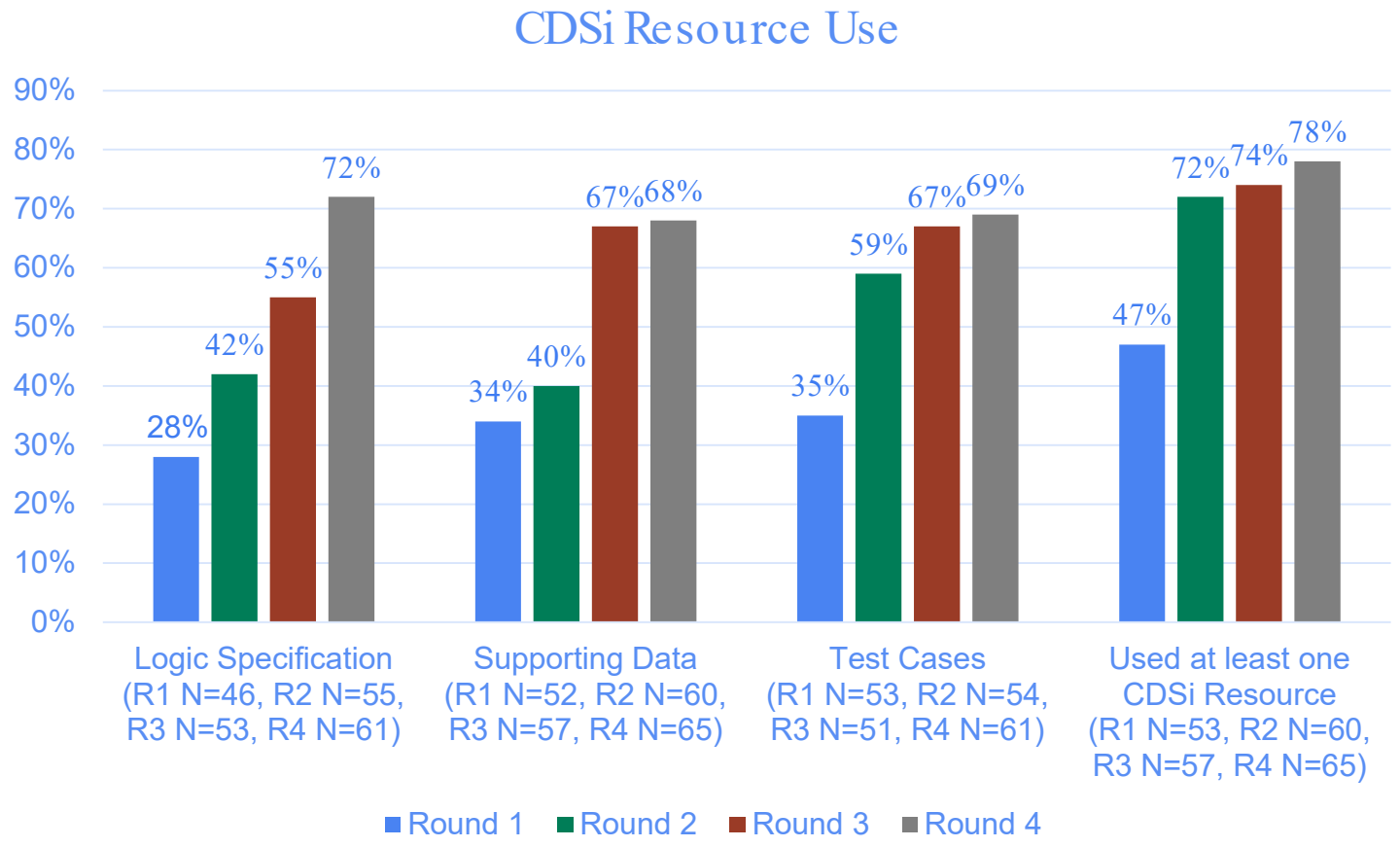
- Survey Methods



Online Assessment: CDSi Awareness



Use of CDSi Resources



Overall Results – Online Assessments

- Awareness and use increased from Round 1 to Round 4 across all resources
- Across Round 1, Round 2, and Round 4, satisfaction was high among users
  - About 80% or more respondents reported they were very or somewhat satisfied with the resources
- Across Round 1 and Round 2, impact was high among users
  - Over 80% of respondents reported a very or somewhat positive impact
  - None of the users reported a negative impact

How Online Assessment Data Has and Will Be Used for Improvement

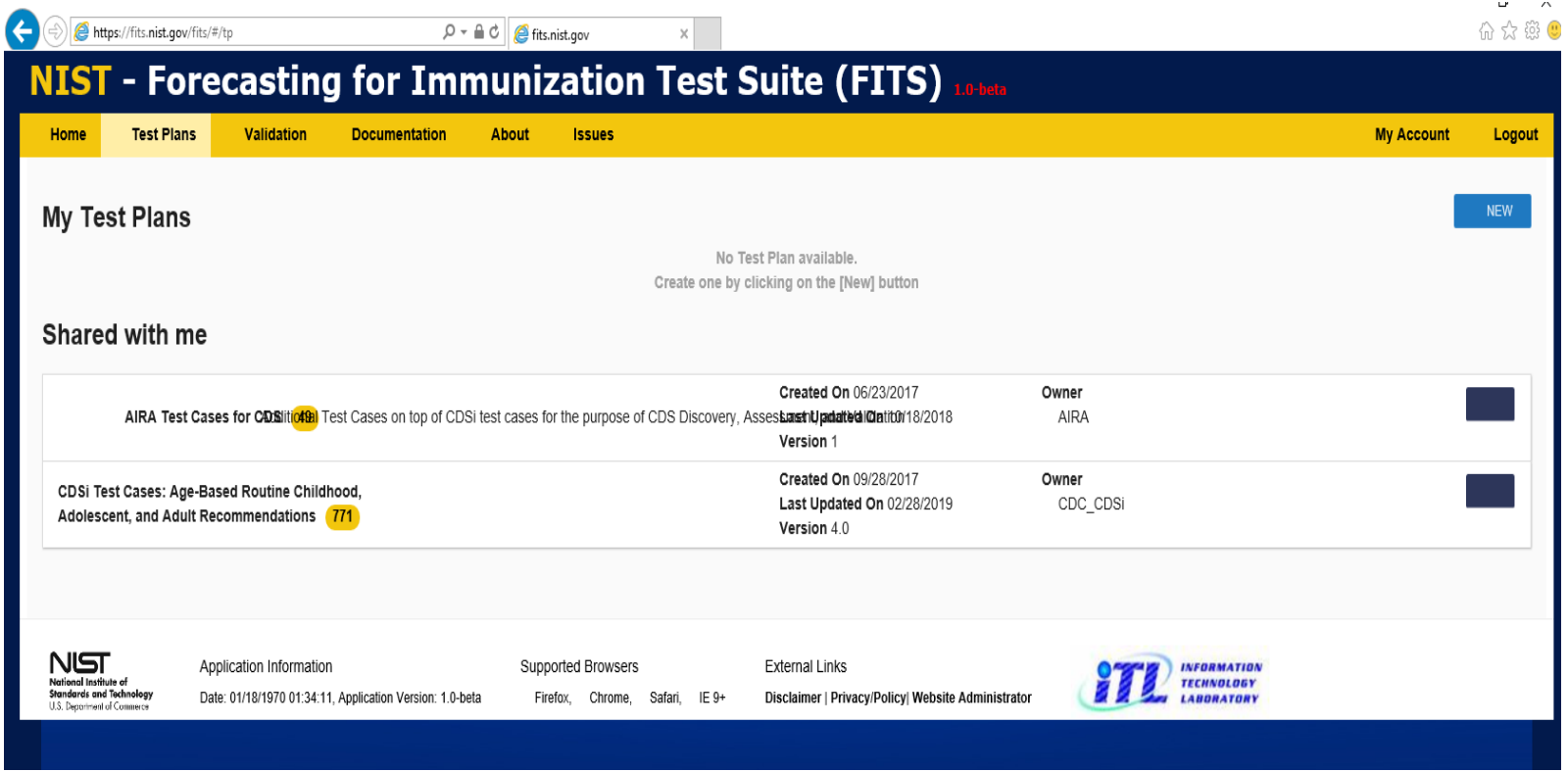
- Track awareness and use of CDSi resources
  - Improve communication and promotion
  - Improve training and learning resources

- Improve CDSi Resources

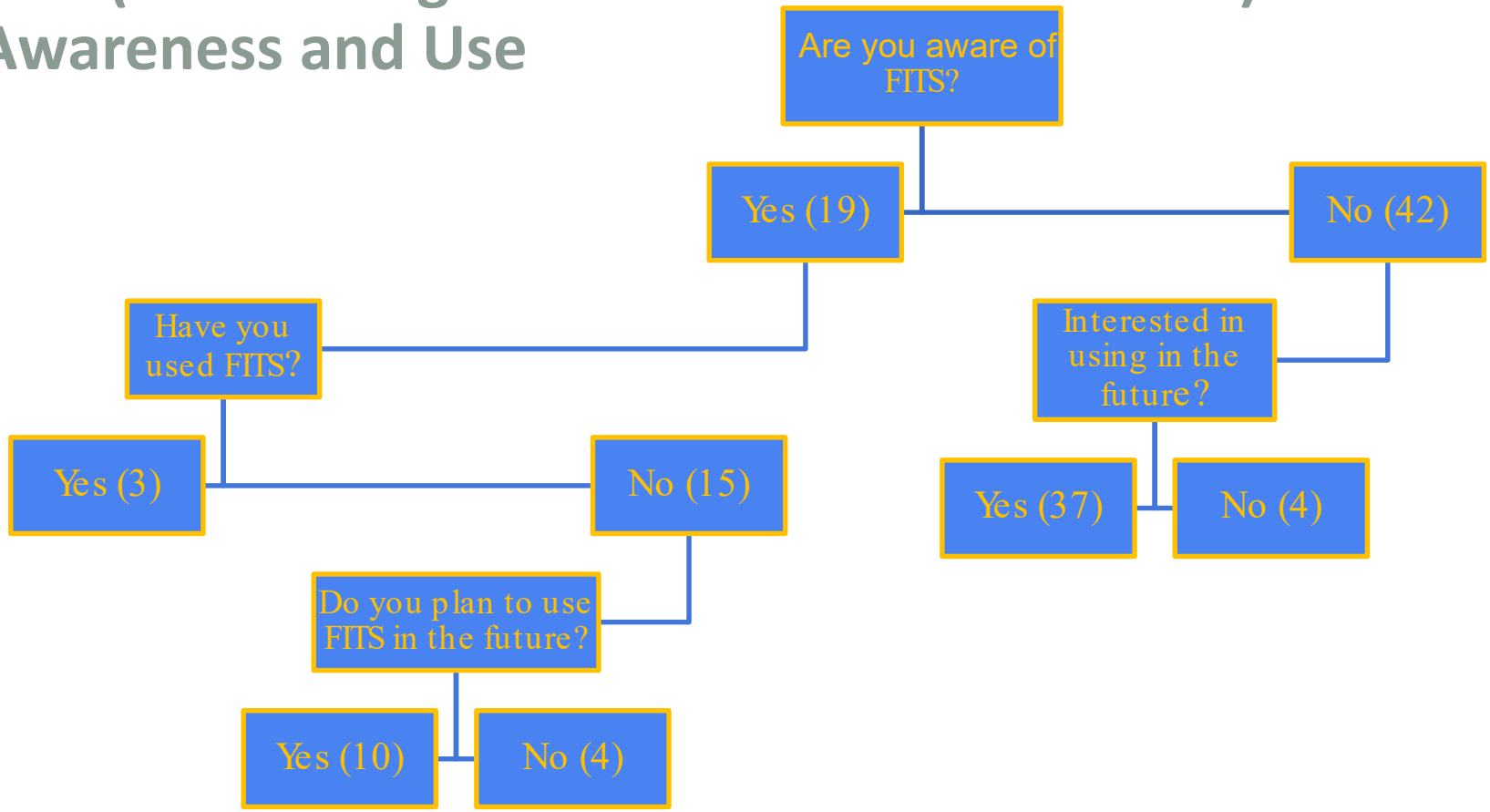
- Guide CDSi Resources future directions

FITS (Forecasting for Immunization Test Suite)

https://fits.nist.gov/fits



FITS (Forecasting for Immunization Test Suite) Awareness and Use



Success Case Method Interviews

Success Case Method Evaluation: Stages

- Focus/Plan the Success Case study
- Create Impact Model
- Design/Implement survey
- Interview/Document success cases
  - 4 IIS vendors
  - 2 IIS grantees
  - 2 EHR vendors
- Analyze/Integrate interview data
- Communicate findings/conclusions/recommendations

Success Case Method Overall Results

- Success Case Method Impact
  - Improved accuracy and consistency of immunization evaluation and forecasting
  - Reduced complexity and increased ease of use in verifying ACIP recommendations
  - Increased confidence and credibility in forecasting products

What They Used

- Among our success cases, the CDSi resources are used **extensively and often**

- Our success cases were **early adopters** of CDSi, most using them since they were first released or within a year of their release

- Most used **all three** of the CDSi Resources

What Helped and What Did Not: Suggestions

- All Success Cases mentioned the CDSi Support Team and the support they provide as helpful
- Suggested releasing the CDSi resources as soon as possible after ACIP changes are released
- While one suggested that the spreadsheet data should be reformatted as tabular data, most others suggested keeping the resources in the same format to allow for automation of the CDSi resources within their systems
- More test cases would be helpful
- Historic doses are not accurate since schedules have changed

Thank You!

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Reference Material

ACIP Votes Since Last AIRA Meeting

ACIP Votes Since Last AIRA National Meeting

October 2018

- Hepatitis A
  - Voted to routinely recommend Hepatitis A vaccination for individuals who are homeless.
- 2019 Childhood/Adolescent and Adult Harmonized Schedules
  - Voted to approve yearly schedules.

February 2019

- Japanese Encephalitis
  - For adults ages 18 to < 65 years, the primary vaccination schedule is now 0 days and 7-28 days. (Previously was 0 and 28 days)
  - Other age groups (< 18 and ≥ 65) remain on a 0 and 28 day primary schedule.
  - For all age groups, a booster dose (i.e. a third dose) should be given at ≥ 1 year after completion of the primary series, if on-going exposure (or re-exposure) is expected.
- Anthrax
  - A booster dose may be given every 3 years to persons not currently at high risk to exposure, but have been previously primed with AVA and wish to maintain protection.
  - Anthrax is currently not included in CDSi.

June 2019

- Human Papillomavirus (HPV) Vaccine
  - ACIP recommends catch-up vaccination for all persons through age 26 years who are not adequately vaccinated and do not have contraindications.
  - ACIP recommends vaccination based on *shared clinical decision* making for individuals ages 27 through 45 years who are not adequately vaccinated. HPV vaccines are not licensed for use in adults older than age 45 years.
- Pneumococcal Vaccines
  - ACIP recommends PCV13 based on *shared clinical decision* making for adults 65 years or older who do not have an immunocompromising condition and who have not previously received PCV13. All adults 65 years or older should receive a dose of PPSV23.

June 2019 (Cont'd)

- Influenza Vaccines
  - ACIP recommends annual influenza vaccination for all persons ages 6 months and older who do not have contraindications.
- Hepatitis A Vaccines
  - ACIP recommends that all children and adolescents ages 2 through 18 years who have not previously received Hepatitis A vaccine be vaccinated routinely at any age (i.e. children and adolescents are recommended for catch-up vaccination).
  - ACIP recommends all persons with HIV ages 1 year and older be routinely vaccinated with Hepatitis A vaccine.

June 2019 (Cont'd)

- Meningococcal Vaccines
  - For persons ages 10 years and older with complement deficiency, complement inhibitor use, asplenia, or who are microbiologists:
    - ACIP recommends a MenB booster dose 1 year following completion of a MenB primary series, followed by MenB booster doses every 2–3 years thereafter, for as long as increased risk remains.
  - For persons ages 10 years and older determined by public health officials to be at increased risk during an outbreak:
    - ACIP recommends a one-time booster dose if it has been more than one year since completion of a MenB primary series.
    - A booster dose interval of at least 6 months may be considered by public health officials depending on the specific outbreak, vaccination strategy, and projected duration of elevated risk.