STRUCTURING CARE RECOMMENDATIONS FOR CLINICAL DECISION SUPPORT

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Thomson Reuters
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BACKDROP AND DRIVERS FOR THE eRECOMMENDATIONS PROJECT

- AHRQ HIT Portfolio
- Federal CDS portfolio
- Federal CDS Collaboratory

SESSION OVERVIEW

- eRec Project Context: Improving Care through HIT
- eRec Project Overview:
  - Engage stakeholders
  - Develop template, eRecs, and how-to guide
  - Vet deliverables for potential use
- Next Steps:
  - Engage more stakeholders
  - Vet and refine eRecs
  - Test drive eRecs

eREC PROJECT CONTEXT

PRESSING HEALTH CARE CHALLENGES

Cost and Efficiency

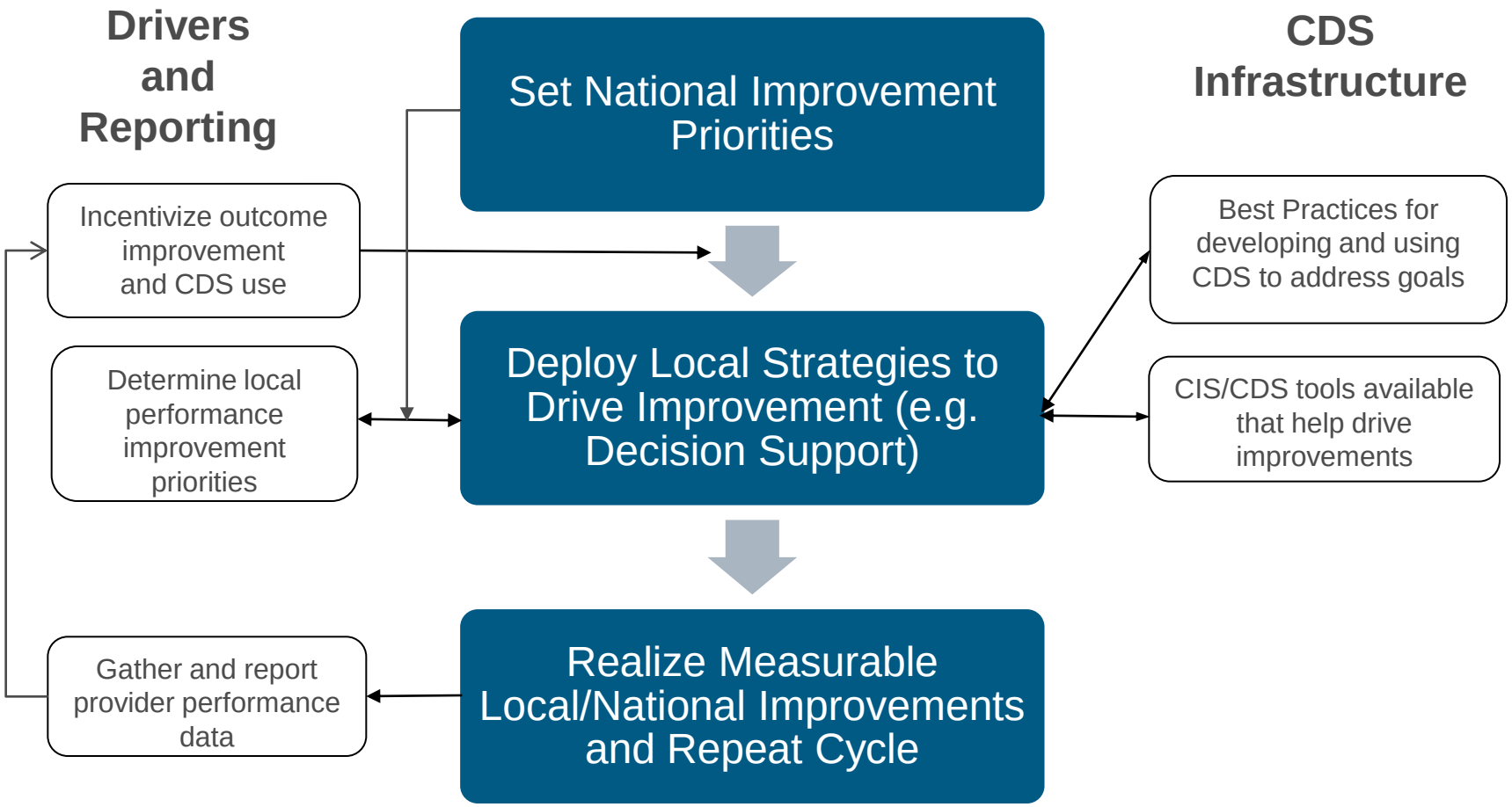
- Health spending =16% of GDP; > any other nation; $2.3 trillion; $7,600/person
- Rising 6.9%/year (more than twice the inflation rate)
- 14% of U.S. population is uninsured
- $700 Billion in waste

Quality and Safety

- 44,000-98,000 preventable inpatient deaths/year
- Patients have only 55% chance of appropriate care
- Anticipate 17 years before effective treatment routine

Sources: **OECD Health Data, Thomson Reuters, Frost and Sullivan, IOM, Forbes, PwC Health Research Institute, Balas/IMIA, CITL, National Coalition on Healthcare**

NATIONAL FRAMEWORK FOR PERFORMANCE IMPROVEMENT

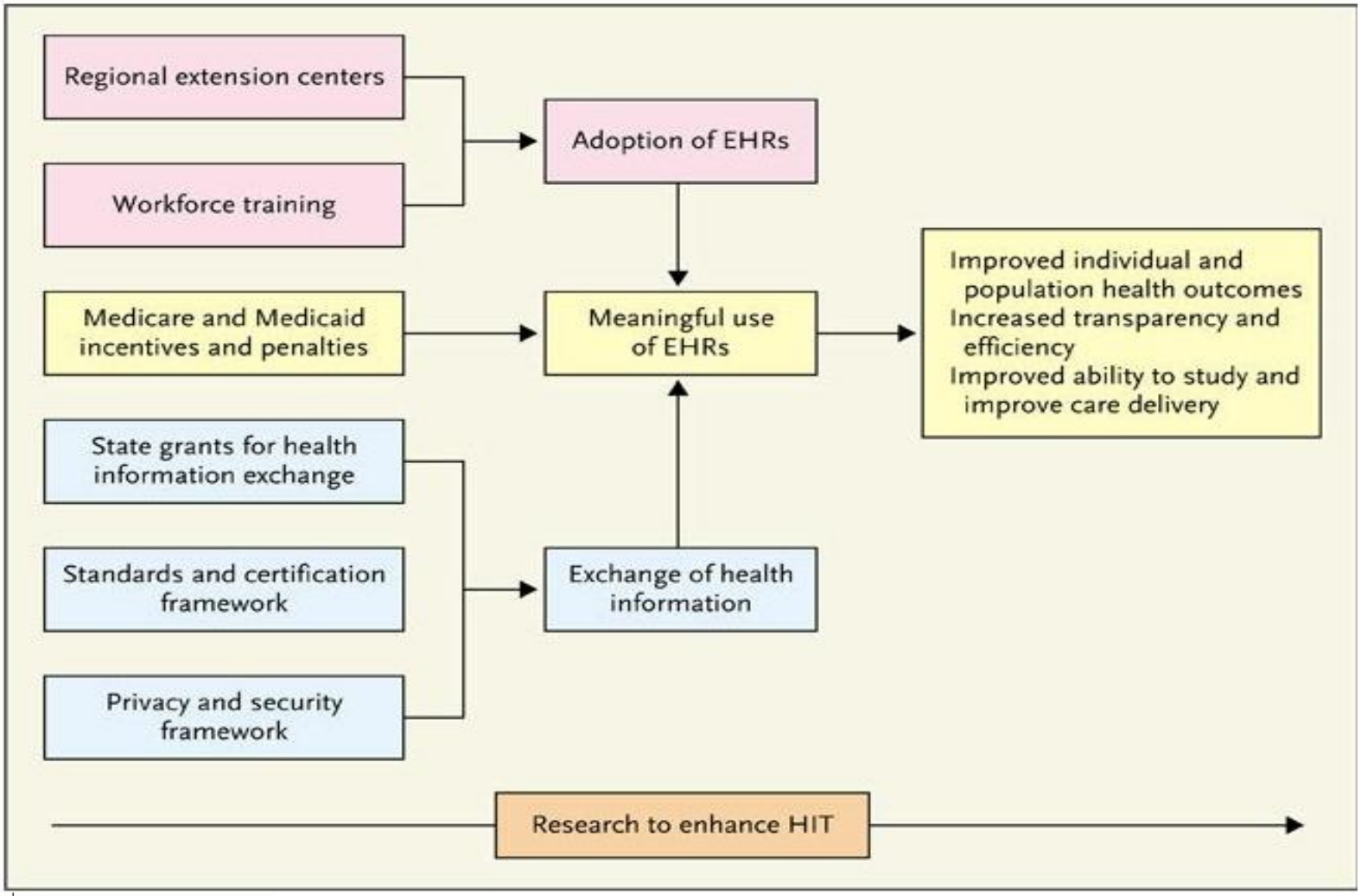


MEANINGFUL USE → BETTER HEALTHCARE

"By focusing on 'meaningful use,' we recognize that **better health care** does not come solely from the adoption of technology itself, but through the exchange and use of health information to **best inform clinical decisions at the point of care**."

– David Blumenthal, 10/1/09

GOVERNMENT ROLE: HITECH ACT



Blumenthal D. N Engl J Med 2009;10.1056/NEJMp0912825

HIT / EHR / CDS TO THE RESCUE!

- BUT…

OUTPATIENT: IT'S JUST NOT THAT EASY!

Conclusion: As implemented, EHRs were not associated with better quality ambulatory care.

Electronic Health Record Use and the Quality of Ambulatory Care in the United States

Jeffrey A. Linder, MD, MPH; Jun Ma, MD, RD, PhD; David W. Bates, MD, MSc; Blackford Middleton, MD, MPH, MSc; Randall S. Stafford, MD, PhD

Arch Intern Med. 2007;167(13):1400-1405

INPATIENT: NOT EASY HERE EITHER!

Arch Intern Med. 2005;165:1111-1116

ORIGINAL INVESTIGATION

High Rates of Adverse Drug Events in a Highly Computerized Hospital

Jonathan R. Nebeker, MS, MD; Jennifer M. Hoffman, PharmD; Charlene R. Weir, RN, PhD; Charles L. Bennett, MD, PhD, MPP; John F. Hurdle, MD, PhD

- ✓Advanced clinical systems with CDS

BUT…

- ¼ of admissions with at least 1 ADE; 9% serious harm
- Problems with drug dosing, selection, monitoring

WHAT DO WE MEAN BY CDS?

"…**provide** persons involved in care processes with general and person-specific **information**, intelligently filtered and organized, at appropriate times, **to enhance health and health care**"

- Includes and builds on current processes…
- **NOT** just rules and alerts…

CDS STAKEHOLDERS WORK IN RELATIVE ISOLATION ON VERY DIFFICULT PROBLEMS

COLLABORATIVE EFFORT ON NATIONAL CDS STRATEGY

Journal of the American Medical Informatics Association Volume 14 Number 2 Mar / Apr 2007 141

Perspectives on JAMIA Informatics

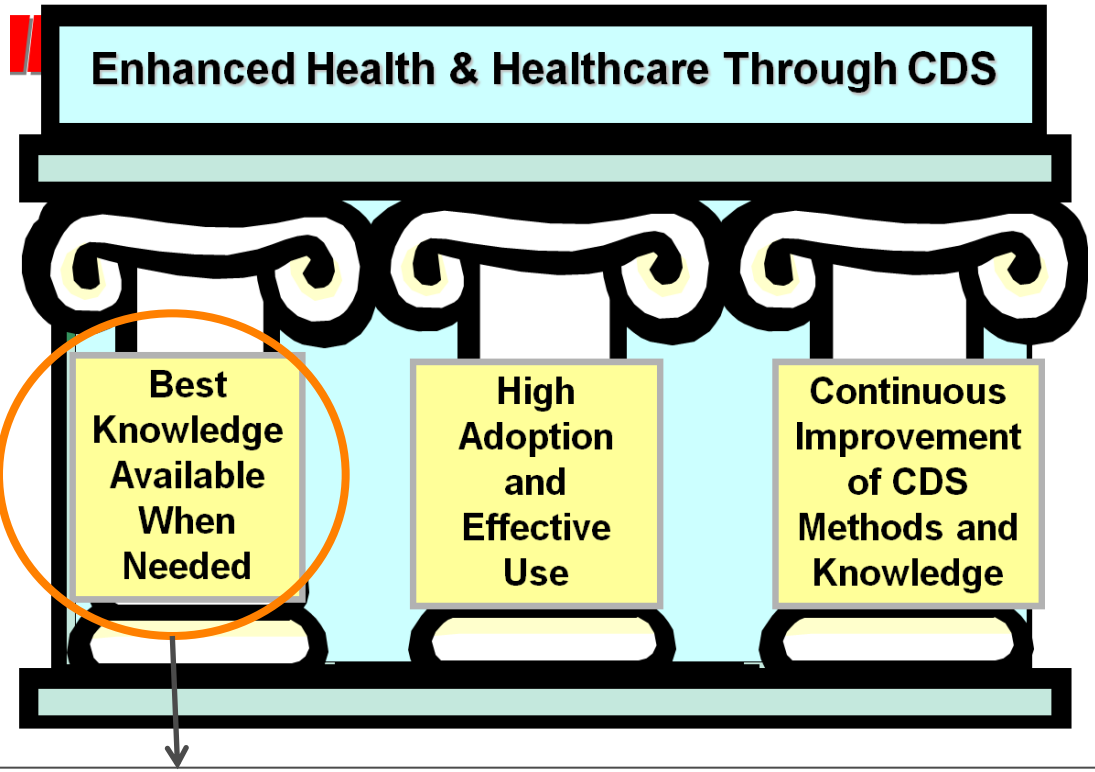
White Paper ■

A Roadmap for National Action on Clinical Decision Support

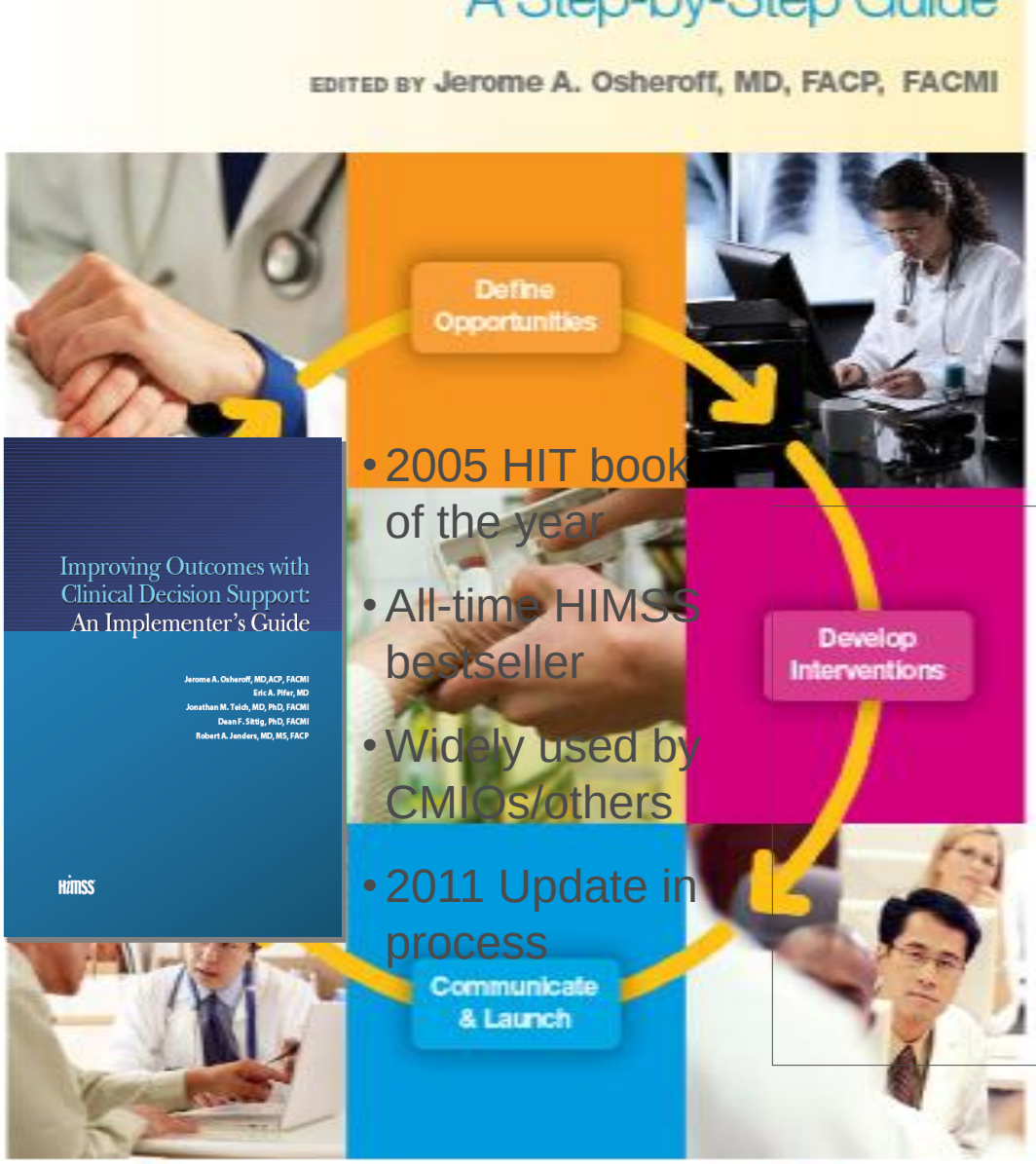
Jerome A. Osheroff, MD, Jonathan M. Teich, MD, PhD, Blackford Middleton, MD, MPH, MSc, Elaine B. Steen, MA, Adam Wright, Don E. Detmer, MD, MA

http://www.jamia.org/cgi/content/abstract/14/2/141

CDS ROADMAP PILLARS



Strategic Objective A: Represent clinical knowledge and CDS interventions in standardized formats (both human and machine-interpretable), so that a variety of knowledge developers can produce this information in a way that knowledge users can readily understand, assess, and apply it.



- 2005 HIT book of the year
- All-time HIMSS bestseller
- Widely used by CMIOs/others
- 2011 Update in process

S

iders:

- Co-published by leading societies
- Over100 contributors
- 2009 HIT book of the year
- Co-sponsors: AHRQ, 3 CIS vendors,…
- "This is not just a book" – ongoing collaboration

A FORMULA FOR SUCCESS: THE CDS FIVE RIGHTS

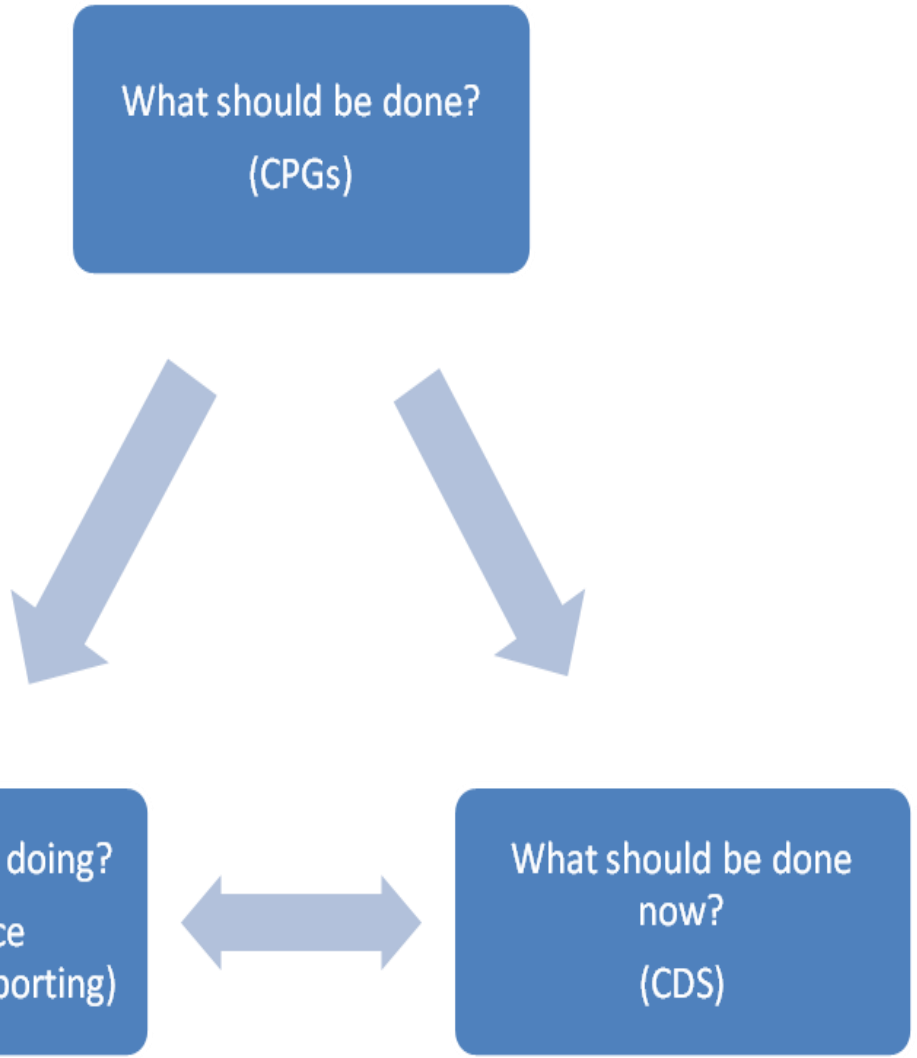
To improve care outcomes with CDS, you must provide:

- the Right Information
  - Evidence-based, useful for guiding action and answering questions
- to the Right Stakeholder
  - Both clinicians and patients
- in the Right Format
  - Alerts, order sets, answers, etc.
- through the Right Channel
  - Internet, mobile devices, clinical information systems
- at the Right Point in the Workflow
  - To influence key decisions/actions

SOME SOURCES FOR 'THE RIGHT INFORMATION'

Clinical and outcomes research

(What works?)



GETTING THE 'RIGHT INFORMATION' INTO CLINICAL PRACTICE

IN THEORY, STRAIGHTFORWARD:

- Evidence → Guidelines
- Guidelines → Changes in clinical practice
- Changes in practice → **Improved quality of care**

GETTING THE 'RIGHT INFORMATION' INTO CLINICAL PRACTICE

IN PRACTICE, BARRIERS ARE WIDESPREAD:

- Evidence basis has gaps and inconsistencies
- Physicians disagree with guidelines or patients may not comply
- Inertia exists; incentives to change are lacking; disincentives exist
- Volume of guideline content is large and hard to track; accessible content at right time in care process is missing
- Difficulty of implementing guidelines (in information systems):
  - Guidelines have free-text format, ambiguous terminology, lack of data elements/data schema in published guidelines
  - Implementation is complex and site-specific (e.g., workflow)

eREC PROJECT OVERVIEW

eREC PROJECT GOAL

To accelerate widespread uptake of well-accepted, evidence-based patient care recommendations into clinical information systems:

- by developing a formal method for translating narrative into *structured, coded logic* statements
- useful for further *local* processing into CDS rules.

AHRQ eREC PROJECT TEAM

- Contractors
  - Thomson Reuters
    - Project Director: Jerry Osheroff, MD
    - Susan Raetzman, Rosanna Coffey, Andriana Hohlbauch and others
  - Technical Lead: Robert Greenes, Arizona State University
  - eRec Developer: Margarita Sordo, Mass Gen Hosp, Harvard Med
  - Advisors:
    - Peter Haug, Intermountain Health Care
    - Aziz Boxwala, University of California at San Diego
    - Ted Shortliffe, American Medical Informatics Association
- Key Collaborators
    - Jacob Reider, Electronic Health Records Association
    - Floyd Eisenberg, National Quality Forum
    - William Bria and select AMDIS members

eREC PROJECT ACTIVITIES

1. **Needs and prior work:** Synthesize stakeholder needs and related efforts
2. **eRec Format:** Develop format for converting guideline recommendations into structured logic statements
3. **eRecs Applied:** Convert 47 recommendations into the structured logic format:
   - 45 “A and B” USPSTF recommendations
   - 2 clinically relevant Meaningful Use criteria
4. **Dissemination:**
   - Processes and lessons – so others can replicate and learn
   - Disseminate results – so CDS implementation accelerates

FOCUS OF NEEDS AND PRIOR WORK

Stakeholders	Issues
CDS vendors and implementers	What will make eRec products most useful in process of translating guidelines into machine rules?
Providers of care	What works well or is problematic in CDS products and processes?
Standards setting organizations	How can existing standards be used in new format for translating care recommendations?
Quality improvement organizations	Can performance measurement momentum be leveraged? Can eMeasures inform eRecs?
Guideline developers	Can the development of care guidelines be improved/informed by using eRec format?

NEEDS AND PRIOR WORK: FINDINGS

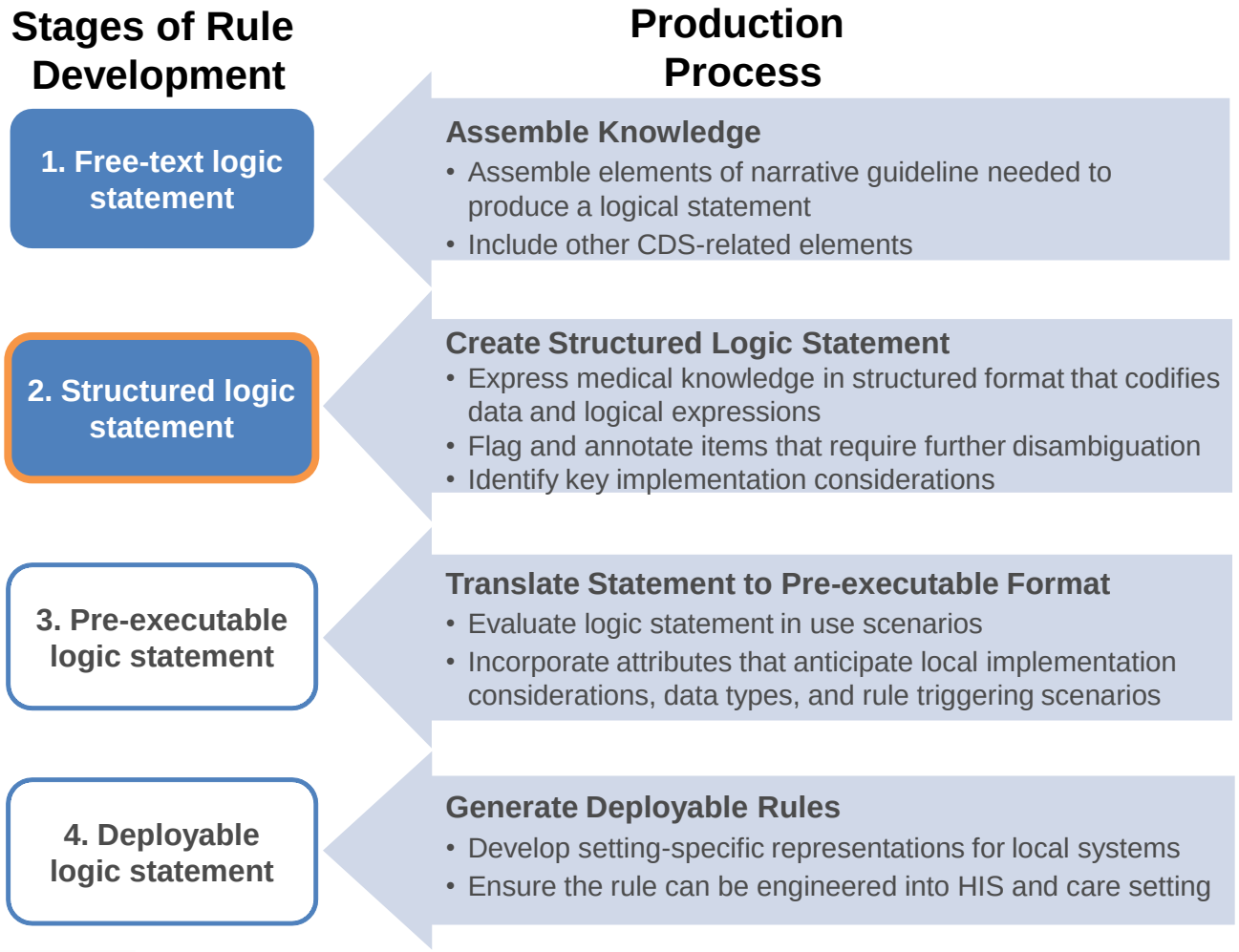
Build on knowledge-sharing collaboratives

- Translation is multi-step process
- Other formalisms exist (HL7 RIM, GEM, etc.)

Lessons:

- Create a semi-structured formalism
- Leverage other formalisms as appropriate

eREC PROJECT IN CDS CONTEXT: STAGE 2



NEEDS AND PRIOR WORK: FINDINGS (cont'd)

Common needs vs. setting specific needs

- Substantial effort and duplication for translation
- Clinical assumptions are not always explicit
- Implementers want disambiguated logic statements and clearly defined and coded data elements
- Workflow considerations are highly local; tension over specificity in addressing these

Lessons:

- Provide data definitions and codes where possible
- Include "Implementation Considerations": Less specificity of workflow considerations in logic increases portability and allows local tailoring

IMPORTANCE OF THE LOCAL CONTEXT FOR APPLYING CDS

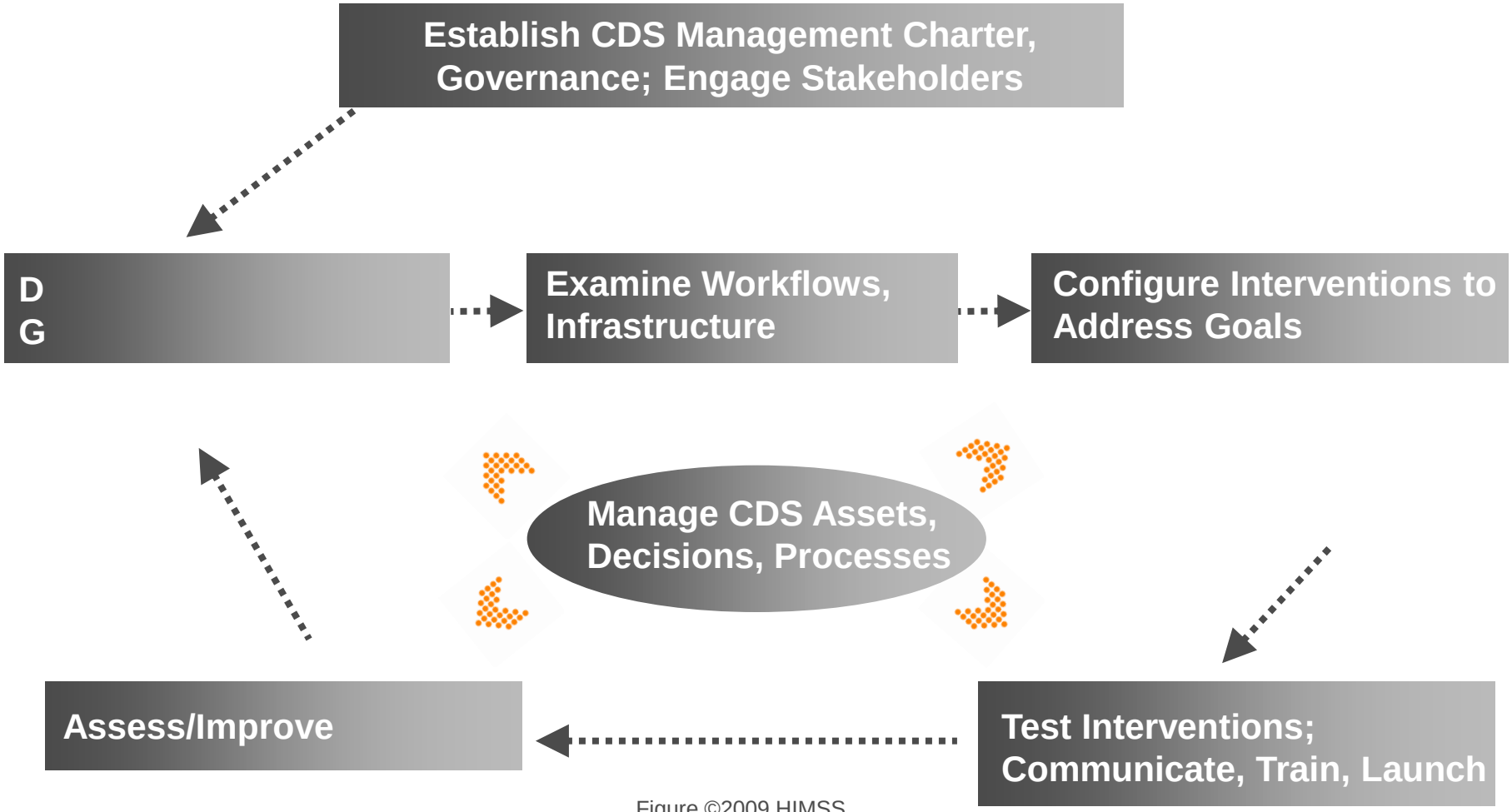


Figure ©2009 HIMSS

NEEDS AND PRIOR WORK: FINDINGS (cont'd)

Quality improvement efforts:

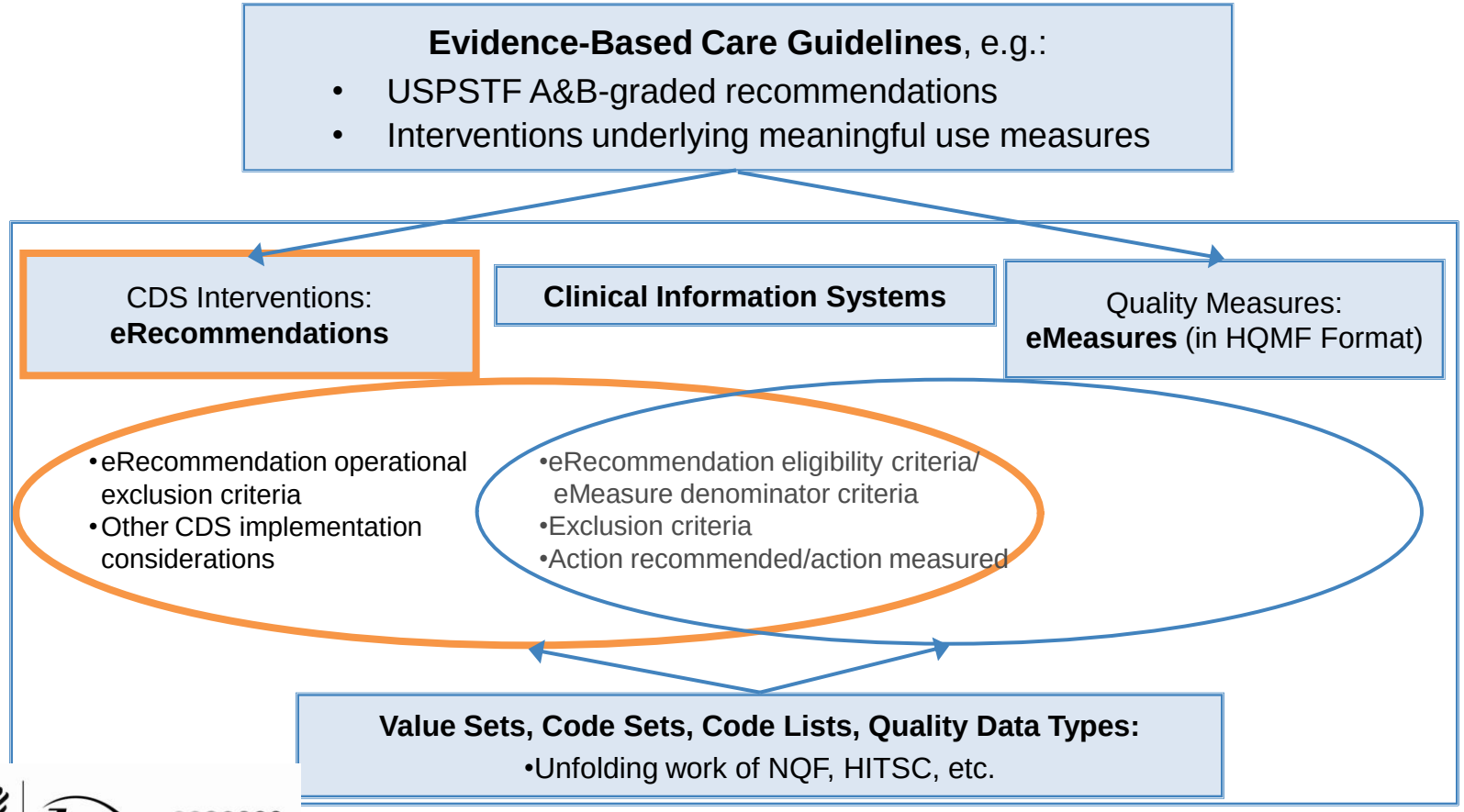
- National push for Meaningful Use of HIT
- Health Quality Measures Format (HQMF): standard for expressing quality measure in format for EHR integration, i.e., eMeasure
- NQF Quality Data Set (QDS): Common language for information in quality measures, e.g., data elements, code lists, care setting attributes

Lessons:

- Desirable to leverage momentum and related tools
- eRecs related in concept and content to HQMF and eMeasure
- Some adjustments needed: Performance measures are population based; CDS based on patient-provider encounter

eREC PROJECT CONCEPTUAL APPROACH

Leveraging Quality Measurement Standards and EHR Integration to Support Widely Useful Structured Recommendations for CDS Rules



eREC FORMAT

- Three main parts to eRecommendation format
  - Header – information describing eRec and underlying clinical care recommendations
  - Data Definition and Logic Specification – identifies data elements, code sets, and values needed to express logic; provides logic statement for identifying patients who satisfy criteria for care recommendation
  - Implementation Considerations – lists other issues that care providers and vendors should consider when implementing for local settings

eREC FORMAT: HEADER SECTION

	A B C D E	F
1	eRec template elements from	MU eRec for COLORECTAL CANCER SCREENING (based on eMeasure NQF 0034):
2		
3	***HEADER***	
4	*eRecommendation Name*	COLORECTAL CANCER SCREENING (based on eMeasure NQF 0034)
5	*eRecommendation ID*	COLOCANC-MU
6	*eRecommendation Part*	1 of 1: General Population
7	*eRecommendation Version Date/Number*	6/14/2010
8	*eRecommendation Template Version*	8/19/10 V1.2
9	*Related eMeasure(s)*	
10	*eRecommendation Author*	Thomson Reuters/Margarita Sordo
11	*eRecommendation Verified by*	
12	*eRecommendation Maintained by*	Responsibility for maintenance not yet assigned
13	*Recommendation Set*	Meaningful Use clinical measures
14	*Recommendation Set ID*	STAGE 1 MU eRECS
15	*Recommendation Version Date/Number*	Clinical Quality Measure Set 2011-2012 / June 2010
16	*Recommendation classification*	Preventive Services: Screening
17	*Recommendation Description/Purpose*	To optimize performance when measuring the percentage of adults 50-75 years of age who had appropriate screening for colorectal cancer.
18	*Recommendation Text from Source: Summary Statement*	The United States Preventive Services Task Force : • The USPSTF recommends screening for colorectal cancer using fecal occult blood testing, sigmoidoscopy, or colonoscopy in adults, beginning at age 50 years and continuing until age 75 years (A recommendation). • The USPSTF concludes that the evidence is insufficient to assess the benefits and harms of computed tomographic (CT) colonography and fecal DNA testing as screening modalities for colorectal cancer (I statement). The American Cancer Society, The American College of Radiology, and the U.S. Multi-Society Task Force on Colorectal Cancer: Tests that Detect Adenomatous Polyps and Cancer • Colonoscopy (every 10 yrs) • Flexible sigmoidoscopy (every 5 yrs) • Fecal occult blood tests (FOBT) (A) • Double contrast barium enema (DCBE) (every 5 yrs) • Computed tomographic colonography (CTC) (every 5 years) Tests that Primarily Detect Cancer: • gFOBT with high sensitivity for cancer (annually) • FIT with high sensitivity for cancer (annually) • sDNA with high sensitivity for cancer (interval uncertain) Modalities not approved: • Single digital rectal examination FOBT has a poor sensitivity for CRC and should not be performed as a primary screening method (A) • Studies evaluating virtual colonoscopy and fecal DNA testing for CRC screening have yielded conflicting results and therefore cannot be recommended (A)
19	*Recommendation Text from Source:*	Not available in eMeasure
20	*Setting (if specified by Source)*	Outpatient setting defined by encounter type in denominator
	Rationale	**Rationale** This measure assess the percentage of patients in a specified age demographic who receive appropriate screening for colorectal cancer. Colorectal cancer is the third leading casuse of cancer-related deaths in the United States for both men and women, and was

eREC FORMAT:
DATA AND LOGIC SECTION

	A	B	C	D	E	F
24						
25	***DATA AND LOGIC SPECIFICATION***					
26						
27	***DATA DEFINITIONS***					
28	***Eligibility/Inclusion-related data***					
29		*Inclusion data 1*				target age low limit = 50
30		*Inclusion data 2*				target age high limit = 75
31		*Comments Relating Inclusion Criteria*				target age low ≥ 50 and high ≤ 75 as defined in the Description and Initial Patient Population.
32						
33		***Inclusion criteria-related data***				
34		*Value set name*				Person Date of Birth
35		*Quality data type*				Patient Characteristic
36		*Code set*				Date of Birth
37		*Code list*				
38						
39	***Intervention interval***					
40		*Interveni*				

	A	B	C	D	E	F
71						
72	***LOGIC STATEMENT***					If [eligibility/inclusion criteria] AND NOT [exclusion critera] AND NOT [operational exclusion criteria] then [action]
73	***Eligibility/inclusion criteria***					
74						
75		*Subclause*				
76		*Condition*				(*current date* - Patient Characteristic. Person Date of Birth) > or = target age low limit
77		*Boolean operator*				AND
78		*Condition*				(current date - Patient Characteristic. Person Date of Birth) < or = target age high limit
79		*Boolean operator*				
80		*Condition*				
81		*EndSubclause*				
82						
83	***Exclusion criteria***					
84		***Patients for whom a different intervention***				
85			*Subclause*			
86			*Condition*			"Total colectomy" = non-null --> Exist(Procedure.Type= {Code list: CPT codes= {44150, 44151, 44152, 44153, 44155, 44156, 44157, 44158, 44210, 44211, 44212}; ICD-9_CM codes={45.8, 45.81, 45.82, 45.83}; SNOMED-CT codes={174067002, 235331003, 23968004, 26390003, 265393006, 307666008, 307667004, 307669001, 427816007, 456004, 80294005}} AND Procedure.Tense = NULL)
					tor	OR

eREC FORMAT: IMPLEMENTATION CONSIDERATIONS SECTION

	A	B	C	D	E	F
109						
110	***IMPLEMENTATION CONSIDERATIONS***					
111	***Optimizing Rule Specificity***					
112		***Operational Data***				
113			*Notification fired*			
114			*Acknowledgment*			
115			*Screening interval*			• Target interval FOBT: **NOT DEFINED IN DOCUMENT** High-sensitivity fecal occult blood testing (FOBT), although clinical recommendation statement mentions an annual screening • Target interval sigmoidoscopy: Sigmoidoscopy every 5 years • Target interval colonoscopy: Colonoscopy every 10 years • eMeasurementStartDate and EndDate are needed for meaningful use evaluation interval. • The logic focuses on the clinical goals underlying the MU measure topic. It considers target age between 50 and 75 years of age as defined in the Description and Initial Patient Population in the NQF 0034. • Measurement periods for MU purposes can be incorporated into the logic as needed. • Measurement periods are defined in terms of calendar years. This may require implementers to adjust patient age limits for measurement.
116				*Alerting interval*		
117		***Operational Exclusion Criteria Data***				
118				*Tests for diagnosis or problem in*		
119					*By history*	• Patient already screened somewhere else
					By data	• Fecal occult blood tests completed and noted in patient record • Fecal occult blood tests already ordered or scheduled but not yet completed <Value Set: evidence of the screening tests or related tests having been done>: Fecal occult blood tests > **• Quality data type: Laboratory Test Ordered or Performed** • Code set: (CPT, HCPCS, ICD-9-CM, LOINC, SNOMED-CT) • Code list: CPT codes={82270, 82274}; HCPCS codes={G0328, G0394}; ICD-9-CM codes={V76.51}; LOINC codes={12503-9, 12504-7, 14563-1, 14564-9, 14565-6, 2335-8, 27396-1, 27401-9, 27925-7, 27926-5, 29771-3}; SNOMED-CT codes={252156002, 441579003, 441626002, 442067009, 442516004, 442554004, 442563002, 442722005, 61788003} > • Completed sigmoidoscopy encounter: Notation of previous encounter for a sigmoidoscopy billing for sigmoidoscopy procedure/interpretation • Sigmoidoscopy completed: sigmoidoscopy noted in patient record • Sigmoidoscopy already ordered or scheduled but not yet completed <Value Set: evidence of the screening procedure or related procedures having been done>: <Sigmoidoscopy> **• Quality data type: Diagnostic Study Ordered or Performed** • Code set: (CPT, HCPCS, ICD-9-CM, SNOMED-CT) • Code list: CPT codes={45330, 45331, 45332, 45333, 45334, 45335, 45337, 45338, 45339, 45340, 45341, 45342, 45345}; HCPCS codes={G0104}; ICD-9-CM codes={45.24}; SNOMED-CT codes={112870002, 174222002, 21423008, 235153008, 265409002, 32414000, 396225009, 396226005, 425634007, 44441009} > • Completed colonoscopy encounter: Notation of previous encounter for a colonoscopy, billing for colonoscopy procedure/interpretation

Colorectal MU eRec

eREC DISSEMINATION: PRODUCTS AVAILABLE FROM PROJECT

- **Methods Report:** Background, existing approaches, approach for eRecommendations
- **eRec Template:** Format for developers, vendors, implementers
- **eRecs** of two types:
  - 45 A- and B-graded recommendations from the USPSTF
  - 2 Stage 1 Meaningful Use criteria
  - Available on AHRQ/NRC site when final. For Excel example of future eRec, email jerry.osheroff@thomsonreuters.com
- **Standard Operating Procedures (SOPs):** How to apply eRec template to care recommendations

eREC PROJECT IMPACT (TO DATE)

- Stimulating broad conversation among key CDS players (guideline suppliers, CDS implementers)
- Cultivating synergies between CDS and performance measurement (from goals to codes)
- Garnering attention of guideline developers
- Illustrating the concept of formal logic structures to support measurable, CDS-enabled healthcare performance improvement

NEXT STEPS

NEXT STEPS (proposed)

- Pilot eRecs in real world settings (EP/EH)
  - Focus on MU clinical topics
  - Flesh out implementation considerations
- Build ‘value chain community’ to follow and help drive to scale
  - Guideline suppliers, CIS suppliers, implementers, federal stakeholders, etc.
- Develop eRecs for additional MU measures, based on implementer need

VISION BEYOND PROJECT

- eRec as standard for expressing guidelines
- Key guideline developers produce guidelines in eRec format for quick uptake into CDS
- CIS vendors use eRecs as part of CDS capabilities deployment
- Care delivery organizations implementing CDS adopt guidelines rapidly
- Gain insights on and improve guidelines-to-alerts-to-better-outcomes chain of events
- eRecs help drive measurable care improvements

THANK YOU FOR YOUR INTEREST!

For more information:

- Jerry Osheroff, Project Director
  jerry.osheroff@thomsonreuters.com

- Project information on AHRQ National Resource Center on HIT site
  http://healthit.ahrq.gov/portal/server.pt/community/ahrq-funded_projects/654/projectdetails?pubURL=http://wci-pubcontent/publish/communities/a_e/ahrq_funded_projects/projects/structuring_care_recommendations_for_clinical_decision_support.html