A Multi-Stakeholder Roadmap for Care Transformation – the AHRQ evidence-based Care Transformation Support (ACTS) Initiative

S43: Panel
Agenda/Presenters

AHRQ’s Goals, Context and Process for ACTS
• Moderator: Steve Bernstein: AHRQ

Panelists

ACTS Consensus Future Vision and Roadmap for Achieving it
• Jerry Osheroff: ACTS Stakeholder Community, Project Team; TMIT Consulting

How the ACTS LHS-related Goals Align with CDC’s Goals of Improving the Public’s Health
• Maria Michaels: MedMorph, Adapting Clinical Guidelines for the Digital Age; CDC

Using Standards to Realize the ACTS Vision
• Brian Alper: EBM on FHIR, COKA; Computable Publishing

Putting Computable Knowledge Into Action to Achieve the ACTS Vision
• Blackford Middleton: C19 Digital Guidelines Workgroup; Apervita

Please use Q&A tab to enter comments/questions for presenters
AHRQ’s Goals, Context and Process for ACTS

Panel S43: A Multi-Stakeholder Roadmap for Care Transformation – the AHRQ evidence-based Care Transformation Support (ACTS) Initiative

Steve Bernstein
Senior Advisor for Digital Healthcare, Agency for Healthcare Policy and Research (AHRQ)
ACTS Project Officer
Disclosure

I and my spouse have no relevant relationships with commercial interests to disclose.
Panel Goal and Learning Objectives

Goal

- Build on the dialogue and collaboration reflected in the ACTS Initiative to benefit more organizations from this work and accelerate widespread progress toward the future vision.

After participating in this session the learner should be better able to:

- Describe the virtuous learning health system cycle enabled by a robust knowledge ecosystem, and

- Understand how the ACTS Initiative and Roadmap may benefit their organization in transforming care.
AHRQ’s Mission and Challenge

Mission:
• Produce evidence to make health care safer, higher quality, more accessible, equitable, and affordable.
• Work within the US DHHS and with other partners to make sure that the evidence is understood and used.

Challenge:
• AHRQ (and others) produce many valuable, evidence-informed resources to support care delivery and transformation and LHSs
• However, these resources are not used as widely or effectively as they could be by those who could benefit significantly from them -
• Because, they are aren’t findable, accessible, interoperable, re-usable…
ACTS Objectives

• Establish requirements for AHRQ Digital Knowledge Platform; make AHRQ resources more FAIR (*Findable, Accessible, Interoperable, and Reusable*), computable, useful

• Ensure this platform interoperates seamlessly with other public and private knowledge platforms in integrated knowledge ecosystem to improve knowledge creation, interoperability and use at point of need

• Build stakeholder-driven Roadmap to ensure AHRQ Digital Knowledge Platform and knowledge ecosystem support AHRQ mission and priorities, enable learning health systems to achieve quadruple aim
ACTS Context: Problems Addressed

- $ Billions/year spent on care evidence/ guidance/ tools that aren’t optimally accessed/used/useful
- Efforts to address this are fragmented/ siloed and without clear path to a comprehensive solution
- Care Delivery Stakeholders can’t get information when/where and how it’s needed

**Recoverable Waste in the US Health Care System (7)**

<table>
<thead>
<tr>
<th>Healthcare Waste Domain</th>
<th>Savings/Year from Measures to Eliminate Waste</th>
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<tr>
<td>Care Delivery</td>
<td>$44.4 billion to $93.3 billion</td>
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<td>Care Coordination</td>
<td>$29.6 billion to $38.2 billion</td>
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<td>Over-treatment or low-value care</td>
<td>$12.8 billion to $28.6 billion</td>
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</tbody>
</table>

Total = $86.8B-$160.1B/Year

*References*

1. Hung, Healthcare Leadership; 2018 July 15
2. Crosson, Commentary The Commonwealth Fund 2009 April 27
4. Bernardzani, Costs of Care; 2015:504.5
5. Han, ACP Annals of Internal Medicine; 2019 June 4
6. Vajracharya, Physician Burnout: A Public Health Crisis panel; 2018 April 4
ACTS Approach

- Stakeholder Community and Workgroups to produce Roadmap
- Current State vs. Future Vision
- Stakeholder-driven actions AHRQ / others can take
- Volunteer Stakeholder Community Effort
- Coordinated with other related activities
# ACTS Stakeholder Community

(n = 268* as of 10/26/20)

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<th>Care Delivery Organizations (79)</th>
<th>Quality Organizations/ Consultants (38)</th>
<th>HIT/CDS Suppliers (43)</th>
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*Names in parentheses are counted elsewhere; numbers in parentheses are individuals.
## ACTS Stakeholder Community - Continued

*(n = 268* as of 10/26/20)*

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<tr>
<th>Informatics/ Researchers (16)</th>
<th>Specialty Societies (14)</th>
<th>Patient Advocates (3)</th>
<th>Other Govt Agencies (17)</th>
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ACTS Stakeholder Workgroups

Future Vision
Develop Future State Vision grounded by finalizing compelling case examples, or Care Scenarios, focusing on 4 Perspectives:
• Care Delivery
• Care Transformation
• Learning Health System, and
• Resource Development.

Evidence/ Knowledge/ Tools Marketplace
Outline current state of Marketplace(s) & identify gaps. Provide recommendations for how collective assets can be aggregated, organized to achieve future state vision.

Infrastructure/ Standards
Outline current state of Infrastructure/ Standards & identify gaps. Map technology infrastructure needed to achieve future state vision.

Concept Demonstration
Define/refine concept demonstration protocols, activities, tools, etc.
Define high value, potential follow-on pilot implementations.

Roadmap
Create Roadmap template. Create process for continuous integration of feedback from above WGs. Develop and finalize Roadmap to support organizations’ care delivery, care transformation, learning health system and resource developer efforts. Recommend projects, challenge grants, pilots, research agenda, next steps.
Next Steps

• Roadmap Report
• RFI
• ACTS COVID-19 Guidance Collaborative
• Roadmap Status:
  • Drafts under advisement by AHRQ leadership and other public/private organizations
Thank you!

Steve.Bernstein@ahrq.hhs.gov

Digital.AHRQ.gov/ACTS

Digital.AHRQ.gov/COVID-ACTS
ACTS Consensus Future Vision and Roadmap for Achieving it

Panel S43: A Multi-Stakeholder Roadmap for Care Transformation – the AHRQ evidence-based Care Transformation Support (ACTS) Initiative

Jerome A. Osheroff, MD, FACP, FACMI
Principal, TMIT Consulting, LLC
Chair, ACTS Stakeholder Community
Disclosure

I disclose the following relevant relationship with commercial interests:

- TMIT Consulting, LLC
  - consulting to support care transformation, no conflicts of interest with subject matter discussed
Current State: Can’t Get Guidance, Tools When, Where, How Needed

Great attention to Data FAIRness; less focus on rest of cycle
Future Vision - Overview

- Robust stakeholder-driven **Knowledge Ecosystem** =>
- Enables a collaborative, **virtuous improvement cycle** =>
- Where stakeholder **needs are met better** throughout the cycle =>
- and Learning Health Systems (LHSs) **Achieve the Quadruple Aim**
Five Goals to Achieve Future Vision

• Create/use **collaboration mechanisms** to refine/achieve shared goals
• Leverage/enhance the current **knowledge ecosystem**
• Enhance/develop **digital guidance** for care decisions and actions
• Improve **guidance implementation** speed, efficiency, effectiveness, reach
• **Evaluate**/enhance roadmap execution efforts and address research gaps
<table>
<thead>
<tr>
<th>Objectives, Timeline for Roadmap Goals</th>
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<tr>
<td><strong>Create/Use Collaboration Mechanisms</strong></td>
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<tr>
<td>Form RESC, Coordinating Center</td>
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<td>Form PPP, use RESC, Coordinating Center to drive efforts below</td>
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<td>Leverage PPP, RESC, Coordinating Center to drive efforts below</td>
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<tr>
<td>Ensure goals are realized; plan goals and Roadmap for next decade</td>
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<tr>
<td><strong>Enhance/ Leverage Knowledge Ecosystem</strong></td>
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<tr>
<td>Plan interoperable digital knowledge platform pilots</td>
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<td>Execute/evaluate pilots; formalize reference architecture</td>
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<td>Build out (international) interoperable knowledge ecosystem</td>
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<td>Ensure knowledge ecosystem fully addresses future vision</td>
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<td><strong>Enhance/ Develop Digital Guidance</strong></td>
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<td>Select targets for initial focus</td>
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<td>Build content for initial pilot</td>
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<td>Expand content scope to cover many other targets and settings</td>
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<td>Ensure computable content and related tools achieve future vision</td>
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<td><strong>Enhance Guidance Implementation</strong></td>
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<td>Select settings for initial focus</td>
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<td>Execute pilots; develop implementation guides/ learning communities</td>
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<td>Realize initial quad aim benefits; address many targets/settings</td>
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<td>Address key targets/settings to broadly realize future vision</td>
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<td><strong>Evaluate/ Enhance Roadmap Execution</strong></td>
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<td>Develop research/evaluation plan</td>
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<td>Execute plan; leverage pilot learning to accelerate improvements</td>
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<td>Continue evaluation to accelerate progress and research to fill gaps</td>
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<td>Do summative effort/results evaluation; apply to next steps</td>
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<th>Roadmap Goal</th>
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AHRQ Digital Knowledge Platform Aims

- Make AHRQ resources more FAIR, computable, useful
- Interoperate seamlessly with other knowledge sources and platforms
- Speed broad application of evidence into practice to enhance care delivery, improvement and outcomes
Knowledge Ecosystem Structure to Achieve ACTS Future Vision

DKP = Digital Knowledge Platform
Future Knowledge Ecosystem Function

- DKPs provide information, resources and tools that are more FAIR, computable and useful, which
- Makes activities and flow within and between each cycle step more efficient and effective, to
- Create a seamless, virtuous cycle that delivers the Quadruple Aim
Collaborative Goals

- Cross-fertilize / accelerate efforts to develop and deliver to care teams the latest COVID-19 evidence-based guidance - and tools to apply it;
- Measurably improve care / outcomes for COVID-19 patients, care teams in limited settings for selected targets addressed by participants in ways that can be scaled to many other targets and settings;
- Advance tools, standards, and collaborations that seed the digital knowledge platforms (from AHRQ/others), knowledge ecosystem, reference architecture, and public private partnerships.

*see digital.ahrq.gov/covid-acts
ACTS COVID-19 Collaborative Ecosystem Enhancement
Sampling of Where/How Organizations Are Engaged*

- Synthesizing best practice tool and strategy recommendations for optimizing steps/cycle
- Rec Sources = Collaborative participants and their networks
- Participants will use Recs to enhance their efforts, synergies with other efforts
- Generate insights to drive AHRQ DKP requirements (e.g., for EPCs, SRDR, CDS Connect, guidance (USPSTF))

*see Collaborative website for more info
ACTS and Your Efforts

• Your work within knowledge ecosystem is a building block for (potential) Roadmap execution

• Roadmap shared vision and execution efforts could provide context for enhancing your work’s efficiency, reach and value

• Other panelists will model these synergies. They have been centrally involved in ACTS Roadmap development and COVID Collaborative
  
  ▶ Represent federal agencies, health IT vendors, leads on major ecosystem initiatives
  
  ▶ Have addressed mobilizing data, evidence/knowledge standards and interoperability, and making guidance computable
Thank you!

josherooff@tmitconsulting.com
How the ACTS LHS-related Goals Align with CDC’s Goals of Improving the Public’s Health

Panel S43: A Multi-Stakeholder Roadmap for Care Transformation – the AHRQ evidence-based Care Transformation Support (ACTS) Initiative

Maria Michaels
Public Health Advisor, Centers for Disease Control and Prevention
Disclosure

I have no relevant relationships with commercial interests to disclose.
ACTS Future Vision Perspectives

Resource Developers
- Ready access to evidence and information when and how needed, increasingly delivered proactively for resource development, updating

National Learning Health System
- Supportive policies/incentives, effective standards, marketplaces, shared focus and efforts on goals, information (including on costs and outcomes) and available when/where/how needed to optimize decisions/actions/results

Care Delivery/Transformation
- CARE DELIVERY
  - Patients/care team have current tools and resources to develop and implement evidence-informed care plans for all clinical issues, and to address other care needs
- CARE TRANSFORMATION
  - Organization LHS
  - Quality improvement teams use tools/resources informed by best evidence; these address costs, are sensitive to organizational needs, comprehensively support care transformation

Data
- Information/Resources are
  - Findable, Accessible, Interoperable, Reusable (FAIR) and useful
  - Computable and based on widely adopted standards
  - Readily updated

Guidance
- Use Knowledge Tools/Resources in Care and Improvement Efforts

Action
- Improve Health
- Reduce Cost
- Enhance Patient Experience
- Improve Clinician Work Life

Evidence
- Process Evidence into Knowledge Tools/Resources

Quadruple Aim
- Analyze Outcomes from Care and Improvement Efforts
Objectives, Timeline for Roadmap Goals

Create/Use Collaboration Mechanisms
- Form RESC, Coordinating Center
- Form PPP, use RESC/Coordinating Center to drive efforts below
- Leverage PPP, RESC, Coordinating Center to drive efforts below
- Ensure goals are realized; plan goals and Roadmap for next decade

Enhance/Leverage Knowledge Ecosystem
- Plan interoperable digital knowledge platform pilots
- Execute/evaluate pilots; formalize reference architecture
- Build out (international) interoperable knowledge ecosystem
- Ensure knowledge ecosystem fully addresses future vision

Enhance/Develop Digital Guidance
- Select targets for initial focus
- Build content for initial pilot
- Expand content scope to cover many other targets and settings
- Ensure computable content and related tools achieve future vision

Enhance Guidance Implementation
- Select settings for initial focus
- Execute pilots; develop implementation guides/learning communities
- Realize initial quad aim benefits; address many targets/settings
- Address key targets/settings to broadly realize future vision

Evaluate/Enhance Roadmap Execution
- Develop research/evaluation plan
- Execute plan; leverage pilot learning to accelerate improvements
- Continue evaluation to accelerate progress and research to fill gaps
- Do summative effort/results evaluation; apply to next steps

Roadmap Goal
- 2021
- 2022
- 2023
- 2024
- 2025
- 2026
- 2027
- 2028
- 2029
- 2030
Knowledge Ecosystem to Achieve ACTS Future Vision

DKP = Digital Knowledge Platform
How Common Standards Help Achieve the ACTS Future Vision
FHIR Four-Legged Stool

- Common Internet Technologies
- Health IT Certification
- Tooling
- Standards Development Environment
- Common Clinical Data Representation
- Ecosystem
- API
- Technical Transaction Representation
The Data Lifecycle and the Public’s Health

- Guidelines
- Recommendations
- Guidance
- Public Health Policies or Mandates

**Delivering actionable knowledge**

- Point of Care
- Emergency Response
- Public Health Departments
- Community Services

**Updating scientific evidence**

**Analyzing data to advance evidence**

- Data Science
- Analytics
- Data Linkages
- Data Visualization

**Health impacts & outcomes**

- EHRs
- Registries
- Public Health Info Systems
- Community Info Systems
- …many potential sources
The Data Lifecycle and the Public’s Health

**Guidelines**
- Recommendations
- Guidance
- Public Health Policies or Mandates

**UPDATING SCIENTIFIC EVIDENCE**
- Data Science
- Analytics
- Data Linkages
- Data Visualization

**Delivering actionable knowledge**
- Fast Healthcare Interoperability Resources (FHIR)

**ANALYZING DATA TO ADVANCE EVIDENCE**

**Point of Care**
- Emergency Response
- Public Health Departments
- Community Services

**ACTION**
- **HEALTH IMPACTS & OUTCOMES**
  - DATA
    - EHRs
    - Registries
    - Public Health Info Systems
    - Community Info Systems
    ...many potential sources
Clinical Quality Lifecycle with Situated Standards

1. RESEARCH, PAYER & PUBLIC HEALTH SURVEILLANCE
   What is ACTUALLY happening and why?

2. GUIDELINES
   (Professional Societies, CDC, etc.)
   What SHOULD happen. What do we want to happen?

3. CLINICAL DECISION SUPPORT
   MAKING it happen within local workflow.

4. CLINICAL CARE
   Clinician and Patient Workflow.

5. MEASUREMENT ANALYTICS
   What DID happen? What processes and outcomes have been achieved?

6. REPORTING
   • Public Health
   • Quality
   • Safety
Clinical Quality Lifecycle with Situated Standards

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DATA

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   • Quality
   • Safety

5. MEASUREMENT ANALYTICS
   What DID happen? What processes and outcomes have been achieved?

INFORMATION

EBM

CQL

QI Core

CR

KNOWLEDGE

CPG IG

CDS Hooks

ACTION

eCR

DEQM

QM IG
The Learning Health System
The Learning Health System

1. Collect Data
2. Assemble Data
3. Analyze Data
4. Interpret Results
5. Represent Knowledge
6. Manage Knowledge
7. Apply Knowledge
8. Take Action to Change Practice

INFORMATION

Knowledge to Practice Flow

DATA

Practice to Data Flow

ACTION

A Problem of Interest
The Digital and Trustworthy Evidence Ecosystem
The Digital and Trustworthy Evidence Ecosystem

INFORMATION

- Synthesize evidence
- Produce evidence

KNOWLEDGE

- Produce guidance
- Disseminate guidance to policy makers, clinicians and patients

DATA

- Digitally structured data
- Evaluated and improve practice

ACTION

- Implement guidance and decision support
- Culture for sharing and innovation
What are Computable Guidelines, and How Are They Critical to the Roadmap for Care Transformation?
Today’s Guideline Development and Implementation

Develop guidelines

Research Results → Guideline Narrative

Literature Review → Guideline Narrative

Meta-analysis → Guideline Narrative

Long Implementation Time
Develop guidelines

- Research Results
- Literature Review
- Meta-analysis

Guideline Narrative

Interpret guidelines

- Guideline released
- Clinicians hear about guideline
- Additional/conflicting guidelines?
- Convene internal clinical workgroup
- Determine which guideline (and which part(s)) to implement
- Adjust CDS as needed
- Test within workflow with actual users
- Multiple system tests
- Implement CDS tool in test system
- Create CDS tool
- Conduct workflow analysis
- Release CDS tool into production system
- Monitor CDS tool for issues & monitor for updates to guidelines

Performed by up to 96% of ~5500 hospitals
Performed by up to 86% of ~355,000 clinics

https://dashboard.healthit.gov/quickstats/quickstats.php
Today’s Guideline Development and Implementation

Develop guidelines

- Research Results
- Literature Review
- Meta-analysis

Guideline Narrative

Interpret guidelines

- Guideline released
- Clinicians hear about guideline
- Additional/conflicting guidelines?
- Convene internal clinical workgroup
- Determining which guideline (and which part(s)) to implement
- Search existing CDS tools
- Conduct workflow analysis
- NOTE: This process is repeated for EACH guideline

Implement guidelines

- Release CDS tool into production system
- Monitor CDS tool for issues & monitor for updates to guidelines
- Implement CDS tool in test system
- Conduct workflow analysis
- Implement CDS tool

Performed by up to 96% of ~5500 hospitals
Performed by up to 86% of ~355,000 clinics

https://dashboard.healthit.gov/quickstats/quickstats.php
Adapting Clinical Guidelines for the Digital Age

**Problem:** Long Lag Time, Inconsistencies, and Inaccuracies in Translation

Leads to an average of 17 years for scientific evidence to apply in patient care

**Reason:** Playing the “Telephone Game”

Multiple translations of guidelines add complexity, opportunity for error, and variation across sites/providers

**Solution:** Developing Tools and Guidelines Together

Can help evidence apply to patient care more easily, quickly, accurately, and consistently

https://www.cdc.gov/csels/phio/clinical-guidelines/index.html
Participating Stakeholder Groups

- Guideline authors
- Health IT developers
- Communicators
- Clinicians
- Patients / Patient Advocates
- Medical Societies
- Public Health Organizations
- Evaluation experts
- Laboratory Professional Groups
- Standards experts
- Clinical decision support developers
- Clinical quality measure developers
- Policy or technical support for implementation
Redesigning Guideline Development and Implementation

CURRENT STATE

Guidelines

10s-100s of translations

Informatics

Implementation

Evaluation (maybe)

Patient Care

CQMs

Inconsistent (or nonexistent) feedback loop

CDS

100s-1000s of translations

Communication

SEQUENTIAL & SILOED
Redesigning Guideline Development and Implementation

CURRENT STATE

Guidelines

10s-100s of translations

CDS

100s-1000s of translations

Evaluation (maybe)

Patient Care

CQMs

Inconsistent (or nonexistent) feedback loop

SEQUENTIAL & SILOED

PROPOSED FUTURE STATE

Guidelines

Informatics

Implementation

Communication

Local Implementation & Evaluation

Concurrent guideline development, translation, & implementation with early engagement and iteration

Consistent feedback loop

Patient Care

PARALLEL & ITERATIVE

Follows a consistent feedback loop
Levels of Knowledge Representation with Examples

<table>
<thead>
<tr>
<th>Knowledge Level</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Narrative</td>
<td>Guideline for a specific disease that is written in the format of a peer-reviewed journal article</td>
</tr>
<tr>
<td>L2</td>
<td>Semi-structured</td>
<td>Flow diagram, decision tree, or other similar format that describes recommendations for implementation <em>(HUMAN READABLE)</em></td>
</tr>
<tr>
<td>L3</td>
<td>Structured</td>
<td>Standards-compliant specification encoding logic with data model(s), terminology/code sets, value sets that is ready to be implemented <em>(COMPUTER/MACHINE READABLE)</em></td>
</tr>
<tr>
<td>L4</td>
<td>Executable</td>
<td>CDS implemented and used in a local execution environment (e.g., CDS that is live in an electronic health record (EHR) production system) or available via web services</td>
</tr>
</tbody>
</table>
1.0.0 FHIR Clinical Guidelines

The FHIR Clinical Guidelines Implementation Guide (CPG IG) provides a means of creating a computable representation of a clinical guideline that is faithful to guideline intent and supports the derivation of downstream capabilities such as cognitive and decision support, quality measures, case reporting, and documentation templates that direct clinical documentation in support of determining guideline compliance.

This implementation is organized into the following sections, accessible via the menu bar at the top of every page:

- **Home**: The home page provides summary, introductory, and background information
- **Approach**: The approach page documents the overall approach to representing computable guideline content
- **Methodology**: Describes methodologies for developing computable guideline content
- **Profiles**: Describes expectations for use and an index of the profiles and extensions used in representing computable guideline content
- **Terminology**: Describes expectations for the use of terminology as part of computable guideline content
- **Libraries**: Describes expectations for the use of libraries as part of computable guideline content
- **Examples**: Index of examples and example artifacts
- **Downloads**: Downloads for the specification
- **Version History**: Index of all versions of this implementation guide

http://build.fhir.org/ig/HL7/cqf-recommendations/index.html

1.1.0 Introduction

This implementation guide supports the development of standards-based computable representations of the content of clinical care guidelines. Its content pertains to technical aspects of digital guidelines implementation and is intended to be usable across multiple use cases across clinical domains as well as in the International Realm.

This implementation guide has been developed through a multi-stakeholder effort, holistically involving a range of stakeholders, including those who work at the beginning of the process (e.g., guideline developers) to the end users (e.g., clinical implementation team representatives, health IT developers, patients/patient advocates), and others in between (e.g., informaticists, communicators, evaluators, public health organizations, clinical quality measure and clinical decision support developers).
What is CPG-on-FHIR?

**INTERNATIONAL standard** (HL7, Universal Realm), including a standardized and scalable approach, to help translate and implement clinical practice guidelines and other types of guidance more efficiently and effectively.

**Framework** for improving the knowledge ecosystem using Fast Healthcare Interoperability Resources (FHIR®©) and related common health IT standards.

**Key aspects** include:

- **Integrated Process**
  - An integrated guideline/guidance development and implementation process

- **Common standards**
  - Across the entire data lifecycle (a.k.a. learning health system) and different electronic health record (EHR) platforms

- **Closed-loop** guideline content and information flow
  - Inclusive of feedback and feedforward processes
Framework Implementation Guide (IG)

CPG-on-FHIR serves as the core IG

Content IGs
• Use the CPG-on-FHIR IG as the base
• Specify details of the use case


Courtesy of Bryn Rhodes, Database Consulting Group
Data Lifecycle Revisited in context of CPG-on-FHIR

*Research-on-FHIR does not yet exist
How is Making EHR Data More Available for Research and Public Health Critical to the Roadmap for Care Transformation?
Making EHR Data More Available for Research and Public Health (MedMorph)

• Funded by the Patient-Centered Outcomes Research Trust Fund (PCORTF) via the U.S. Department of Health and Human Services (HHS) Assistant Secretary for Planning and Evaluation (ASPE)

  Total project timeline: 3 years

• **PROBLEM:** Patient-centered outcomes researchers and public health professionals need better ways to get data from different electronic health record (EHR) systems without posing additional burden on health care providers

• **GOAL:** Create a reliable, scalable, generalizable, configurable, interoperable method to get EHR data for multiple public health and research use cases

• **OBJECTIVE:** Develop a reference architecture and demonstrate a reference implementation (including implementation guides)
Technical Expert Panel (TEP)
Participating Stakeholder Groups

- Federal Partners
- Health IT developers
- Clinicians/ Healthcare Organizations
- Medical Societies
- Public Health Organizations
- Evaluation experts
- Laboratory Professional Groups

- Clinical and Public Health data registries
- Standards experts
- Clinical decision support developers
- Clinical quality measure developers
- Policy or technical support for implementation
The abstract model actors and systems will be used to define the various workflows identified in the use cases. The workflows identified in the use cases include:

- Provisioning
- Notification
- Data Collection and Submission Report Creation
- Data Submission
- Receiving Response/Acknowledgement
MedMorph serves as the core IG

Content IGs
- Use the MedMorph IG as the base
- Specify details of the use case

Draft IG: [http://build.fhir.org/ig/HL7/fhir-medmorph](http://build.fhir.org/ig/HL7/fhir-medmorph)

Courtesy of Bryn Rhodes, Database Consulting Group
Transforming the health data landscape with FHIR

Current: Multiple Different Methods/Approaches

Future: Common Method/Approach
Thank you!

maria.michaels@cdc.gov
Using Standards to Realize the ACTS Vision

Panel S43: A Multi-Stakeholder Roadmap for Care Transformation – the AHRQ evidence-based Care Transformation Support (ACTS) Initiative

Brian S. Alper, MD, MSPH, FAAFP, FAMIA
Chief Executive Officer, Computable Publishing, LLC
Project Lead, EBMonFHIR; Project Lead, COVID-19 Knowledge Accelerator (COKA)
balper@computablepublishing.com
@brianalperMD #AMIA2020
Disclosure

I disclose the following relevant relationship with commercial interests:

- Computable Publishing, LLC – current commercial interest
  - Augments digital publishing with machine-interpretable forms
  - Offers publishers the ability to extend their published works with computable (machine-interpretable) forms of expression
  - Offers users of any type support in using computable data to enhance, improve and achieve desired outcomes
- DynaMed – Founder, no current commercial interest
How does AHRQ evidence reach CDS in digital forms today?

<table>
<thead>
<tr>
<th>Topical capsaicin</th>
<th>5 studies</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.075% vs placebo</td>
<td>Previous SR: 3 RCTs</td>
<td>The previous review concluded that capsaicin 0.075% was more effective than placebo for reducing pain (Standardized mean difference -0.91 [CRI, -1.18 to -0.08]).</td>
</tr>
<tr>
<td></td>
<td>Additional identified studies: 2 RCTs</td>
<td>The pooled Standardized mean difference from a meta-analysis of 3 studies (2 from previous review and 1 new study) where a Standardized mean difference could be calculated was -0.46; 95% CI, -0.95 to 0.03.</td>
</tr>
<tr>
<td></td>
<td>(N=432)</td>
<td>Capsaicin is not more effective than placebo for reducing pain.</td>
</tr>
</tbody>
</table>

Example of topical capsaicin for treatment of diabetic peripheral neuropathy.
How does AHRQ evidence reach CDS in digital (not computable) forms today?

Example of topical capsaicin for treatment of diabetic peripheral neuropathy

STUDY SUMMARY
capsaicin 0.075% cream might not be useful for patients with diabetic peripheral neuropathy

SYSTEMATIC REVIEW: AHRQ Comparative Effectiveness Review 2017 Mar;187

Details

STUDY SUMMARY
capsaicin low-dose cream (0.075%) for ≥ 6 weeks might reduce chronic neuropathic pain but is poorly tolerated

COCHRANE REVIEW: Cochrane Database Syst Rev 2012 Sep 12;(9):CD010111

Details

Topical lidocaine

consider lidocaine patch for treatment of painful diabetic neuropathy (AAN Level 3)

lidocaine 5% patches, 1-3 patches applied topically once daily and left on for up to 12 hours/day can be added to other treatments at any time (3)
The Healthcare Knowledge Ecosystem Today
The Healthcare Knowledge Ecosystem Desired

**EVIDENCE**
Data Analysis, Synthesis, and Interpretation.

**GUIDANCE**
Guidelines, Recommendations, Decision Aids, Decision Support

**DATA**
Observations and Measurements.

**ACTION**
Healthcare (testing and intervention) decision-making and implementation
Applying Standards to a Domain

Specific content and people
Contextualized application for each instance

Schema
Common format for how data elements are expressed

Tooling
Common interfaces (UIs and APIs) and data transformations

Terminology
Common vocabulary and code systems
Fast Healthcare Interoperability Resources (FHIR®) is an HL7® standard
Applying Standards to a Domain

Specific content and people
Contextualized application for each instance

Common format for how data elements are expressed
Schema

Fast Healthcare Interoperability Resources (FHIR®)

Tooling
Common interfaces (UIs and APIs) and data transformations

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Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™
National Center for Health Statistics
ICD-10-CM Fiscal Year | FY2021 - October 1, 2020

Mobilizing Computable Biomedical Knowledge
LOINC® from Regenstrief
SNOMED International
RxNorm
MeSH
Medical Subject Headings
Applying Standards to a Domain

Fast Healthcare Interoperability Resources (FHIR®)

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Fast Healthcare Interoperability Resources (FHIR®)

National Library of Medicine

Mobilizing Computable Biomedical Knowledge

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Contextualized application for each instance

Specific content and people

Pain Care and Opioids

100 MILLION
adults in the United States with chronic pain

42,249
Americans died from opioid overdoses in 2016

$78.5 BILLION
The cost of prescription opioid misuse in the United States per year

To address this problem, PCORI has funded 37 comparative clinical effectiveness research studies and related projects aimed at preventing and treating opioid-related harm.

As of September 2020
Applying Standards to a Domain

Create/Use Collaboration Mechanisms
- Form RESC, Coordinating Center
- Form PPP, use RESC/Coordinating Center to drive efforts below

Enhance/ Leverage Knowledge Ecosystem
- Plan interoperable digital knowledge platform pilots
- Execute/evaluate pilots; formalize reference architecture
- Build out (inter)national interoperable knowledge ecosystem

Enhance/ Develop Digital Guidance
- Select targets for initial focus
- Build content for initial pilot
- Expand content scope to cover many other targets and settings

Enhance Guidance Implementation
- Select settings for initial focus
- Execute pilots; develop implementation guides/learning communities
- Realize initial quad aim benefits; address many targets/settings

Evaluate/ Enhance Roadmap Execution
- Develop research/evaluation plan
- Execute plan; leverage pilot learning to accelerate improvements
- Continue evaluation to accelerate progress and research to fill gaps

Ensure goals are realized; plan goals and Roadmap for next decade
Ensure knowledge ecosystem fully addresses future vision
Ensure computable content and related tools achieve future vision
Address key targets/settings to broadly realize future vision
Do summative effort/results evaluation; apply to next steps

Fast Healthcare Interoperability Resources (FHIR®) is an HL7® standard
Applying Standards to the EVIDENCE Domain

Specific content and people
- Contextualized application for each instance

Schema
- Common format for how data elements are expressed

Tooling
- Common interfaces (UIs and APIs) and data transformations

Terminology
- Common vocabulary and code systems
EBMonFHIR (Evidence Based Medicine on FHIR) is an HL7 project to extend FHIR to research findings and guidance.

COVID-19 Knowledge Accelerator (COKA) is an open virtual organization developing standards for machine-interpretable expression of scientific evidence. COKA is a massive acceleration of an EBMonFHIR project to extend the Fast Healthcare Interoperability Resources (FHIR) standard to the expression of scientific evidence (variable definitions, statistics, and certainty of findings). COKA is facilitating implementation of evidence-related FHIR resources across efforts to identify, evaluate and report COVID-19 evidence.
Applying Standards to the EVIDENCE Domain

Schema

Common format for how data elements are expressed

- FHIR Citation Resource
- FHIR Evidence Resource
- FHIR EvidenceVariable Resource
- FHIR EvidenceReport Resource

Example: SRDR+ transforms data defining an outcome to a FHIR EvidenceVariable Resource
SRDR+ Definition of 30-day Mortality
FHIR JSON Definition of 30-day Mortality
Get Involved in COVID-19 Knowledge Accelerator

Specific content and people
Contribute to or get alerts from the Systematic Meta-Review of Steroid Therapy for COVID-19

Schema
Share changes to shape FHIR resources for evidence communication

Tooling
Use Clinical Trial Results Reporter to express study results in computable form

Terminology
Join an Expert Working Group for Code System Development
Knowledge Ecosystem to Achieve ACTS Future Vision

DKP = Digital Knowledge Platform
Recap

Common nonproprietary elements and approaches for knowledge processing can be leveraged to improve efficiency for all these efforts.

Join the COVID-19 Knowledge Accelerator:
https://tinyurl.com/coka2020

Questions? Email
balper@computablepublishing.com
A Multi-Stakeholder Roadmap for Care Transformation – the AHRQ evidence-based Care Transformation Support (ACTS) Initiative Session Number – S43

Speaker: Blackford Middleton, MD, MPH, MSc, FACP, FACMI, FHIMSS, FIAHSI
Institution: Apervita, Inc., Chicago, IL
Twitter: @bfm email: Blackford.Middleton@Apervita.com
#AMIA2020
## Disclosure

<table>
<thead>
<tr>
<th>Category</th>
<th>Entity</th>
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<tbody>
<tr>
<td>Employee and Stockholder:</td>
<td>Apervita, Inc.</td>
</tr>
<tr>
<td>Stockholder:</td>
<td>Veravas, Inc.</td>
</tr>
<tr>
<td>Grant funding:</td>
<td>NCI, ONC, AHRQ</td>
</tr>
</tbody>
</table>
Learning Objectives

After participating in this session the learner should be better able to:

1. Understand in principle the steps to translate knowledge from a clinical guideline into computable knowledge for use in care

2. Understand in principle the benefits from using a standards-based approach to knowledge representation to promote knowledge sharing and re-use

3. Understand in principle the value of distributing computable knowledge artifacts via the cloud as web services and applications.
Overview

• Why is it so hard to transform care even with the best Health IT?
• Creating shareable and computable knowledge artifacts at scale
• Lessons learned in the CDS Consortium, Covid-19
• Toward a Learning Health System with shareable CDS and cognitive support
2011 – 2012: Data Capture and Sharing
- Accelerated adoption
- Data capture and exchange

2013 – 2014: Demonstrate Health System Improvement
- Widespread adoption and data exchange
- Process improvement

2015+: Transform Health Care and Population Health through Health IT
- Demonstrated improvements in care, efficiency, and population health
- Breakthrough examples of delivery and payment reform

Beyond 2015: Transformed Health Care
- Enhanced ability to study care delivery and payment systems
- Empowered individuals and increased transparency
- Improved care, efficiency, and population health outcomes

STRATEGIC GOALS
- Achieve Adoption and Information Exchange through Meaningful Use of Health IT
- Improve Care, Improve Population Health, and Reduce Health Care Costs through the Use of Health IT
- Inspire Confidence and Trust in Health IT
- Empower Individuals with Health IT to Improve their Health and the Health Care System
- Achieve Rapid Learning and Technological Advancement
Why is it so hard to transform care with even the best health IT?

Simply put: the chasm which exists between published knowledge and clinical experience, and implemented knowledge in health IT, is too wide for the average clinician or healthcare delivery organization to manage.
Knowledge Representation and Sharing is Hard

Experience → Evidence → Guideline(s) → K Repres’n → Shareable K → Executable

1980
ONCOCIN
EON(T-Helper) → GLIF2
GEODE-CM → GLIF3
Arden → GEM

1990
MBTA
Asbru
EON2

2000
PRODIGY → PRODIGY3
Oxford System of Medicine
DILEMMA → PROforma
PRESTIGE

Four Phases of CDS Architecture

Fig. 1 – A schematic drawing of the four-phase model for clinical decision support.
CDS Consortium Demonstrations: 2008-13

Toward a National Knowledge Sharing Service

- Clinical Decision Support Consortium
  Middleton B, PI: 2008-13, AHRQ –funded: HHSA290200810010

- Major accomplishments:
  - Knowledge artifacts published: 11 clinical rules, 50+ classification rules and 375 immunization schedule rules
  - 8 clinical sites implemented using 5 different EHRs
  - More than 240 users utilize CDS services
  - Established legal framework for collaboration
  - Since 2010 more than 1.7M CCD transactions were processed
  - 31 entities (companies and academics) in a pre-competitive environment
  - Contributed to ONC-sponsored Health-e-Decisions efforts: KAS 1 and KAS 2

Mid-Valley IPA (NextGen)
Salem, Oregon

Kaiser Roseville
UC Davis
Kaiser Sacramento
Kaiser San Rafael
Kaiser San Francisco
California

Wishard Hospital
Indianapolis, IN

Cincinnati Children’s
Nationwide Children’s
Ohio

Children’s Hospital
Colorado

PECARN TBI CDS

UMDNJ (GE)
Newark, NJ

NYP
NY

PHS

Copyright 2005 digital-geo-maps.com
Vision: The National Knowledge Ecosystem

1. Guideline Development
2. Knowledge Translation, Specification
3. Content Governance
4. Knowledge Implementation
5. Use, Evaluation, and Feedback

Vision: The National Knowledge Ecosystem

1. Guideline Development
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1. RESEARCH, PAYER & PUBLIC HEALTH SURVEILLANCE
   What is ACTUALLY happening and why?

2. GUIDELINES (Professional Societies, CDC, etc.)
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   What DID happen? What processes and outcomes have been achieved?

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   • Public Health
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   • Safety

- EBM
- CPG IG
- CDS Hooks
- QM IG
- CQL
- QI Core
- CR
- DEQM
- eCR

http://build.fhir.org/ig/HL7/cqf-recommendations/documentation-approach-01-main-page.html
A “Knowledge Network” is currently a Missing Layer in the CDS Ecosystem

<table>
<thead>
<tr>
<th>Reference Architecture</th>
<th>Knowledge Commerce Entities</th>
<th>Knowledge Network</th>
<th>Knowledge Repository Entities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Standards for Level of abstraction and implementation tier)</td>
<td>(Operational knowledge stores and implementations, e.g. EHRs, CDS Implementers (Apervita, etc.))</td>
<td>(Artifacts Index, Standards, Best Practices)</td>
<td>(Repositories, Sources of knowledge)</td>
</tr>
</tbody>
</table>

Knowledge Ecosystem to Achieve ACTS Future Vision

Roadmap to Achieve Vision

DKP = Digital Knowledge Platform
National Knowledge Ecosystem: Future State Goals

- **Rapid translation** of new knowledge (and updates) into practice
- **Mature ecosystem** of ‘parts suppliers’ for the knowledge supply chain
- **Comparability** of competing algorithms, cognitive aides, pathways
- **Trust** in knowledge artifacts, interpretability / explanation for recommendations
- **Rapid feedback** ‘upstream’ to participants in the knowledge ecosystem (suppliers, curators, authors)
Covid-19: Agile KE Overview

Cross-functional, Integrated Team
  • Agile CPG Team, Concurrent L1/2/3 Development

“Chunking” (composite artifacts)
  • Progression of incremental, focused parts

Iteration, rapid-cycle feedback
  • Together with incremental parts

Test-driven Knowledge Engineering
  • Specify by Example -> Incremental Testing -> Validation

Leverage Knowledge Base
  • ‘Intelligent’ Knowledge Content Management System
C19 Digital Guidelines WG: Agile Knowledge Engineering Work Flow

Evaluation

Knowledge Validation

Content

Agile CPG

Knowledge Repository

Delivery and Dissemination

Implementations

Knowledge Engineering

Terminologies

Knowledge Architecture and Standards

Knowledge Validation

Evaluation
Pathway (HL7 CPG) delivered into workflow, delighting clinicians, & adding value

Clinical Practice Guidelines (CPGs) with visualization of where patient has been—and where they should be going
Apervita’s Quality Measurement, Value Optimization, and Clinical Intelligence solutions work together to **continuously** make healthcare smarter and ultimately improve patient care.

Our strategy brings to life elements from the Learning Health System built on the interoperable near-frictionless flow of data and knowledge.
Thank you!
Blackford.Middleton@Apervita.com
Discussion (Following Poll Questions)

Sample Topics for your Input:

• Does the future vision and Roadmap (coordinated effort to address 5 goals [collaboration, ecosystem, guidance development and implementation, evaluation/research]) seem valuable for your efforts?
  • If so, how?

• Are there ways your organization can benefit from actions/collaborations the panelists are pursuing?
  • If so, what/how?

• How could any subsequent activities to execute the ACTS Roadmap most benefit your organization?

• Are there ways you or your organization could contribute to further Roadmap execution?

To reach ACTS Team: support@ahrq-acts.org