QUERI Enhancing Implementation Science Meeting
Panel on Developing Effective Partnerships with Operations

VISN Collaborative Project with ATHENA-HTN Clinical Decision Support (CDS)

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Contents of this presentation are views of the authors and not necessarily those of the Department of Veterans Affairs

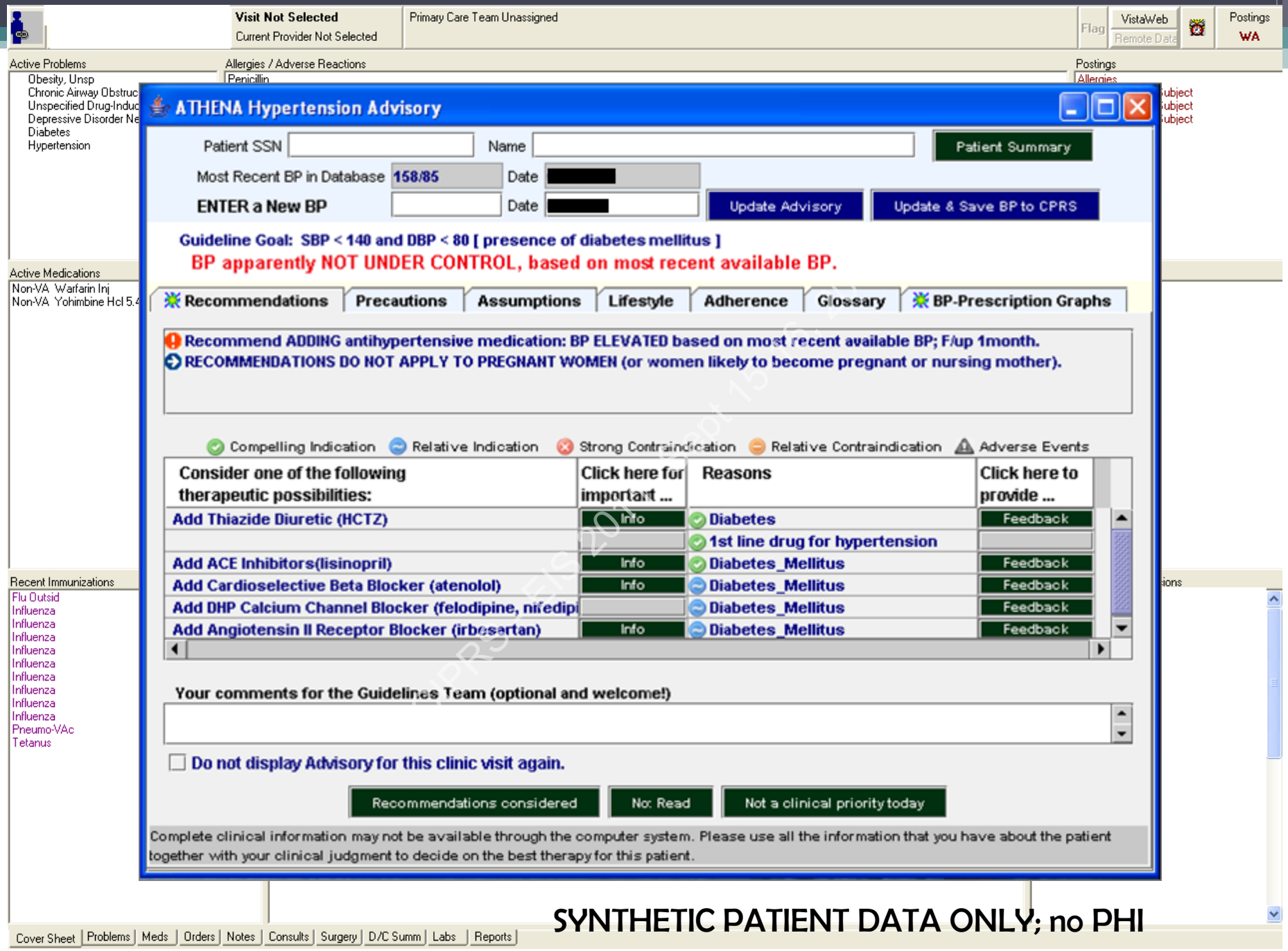
VISN Collaborative Project Goal

HSR&D IMV-04-062 *VISN Collaborative for Improving Hypertension Management with ATHENA-HTN (PI: Goldstein; Co-PI's Hoffman, Miller)…and many collaborators…*

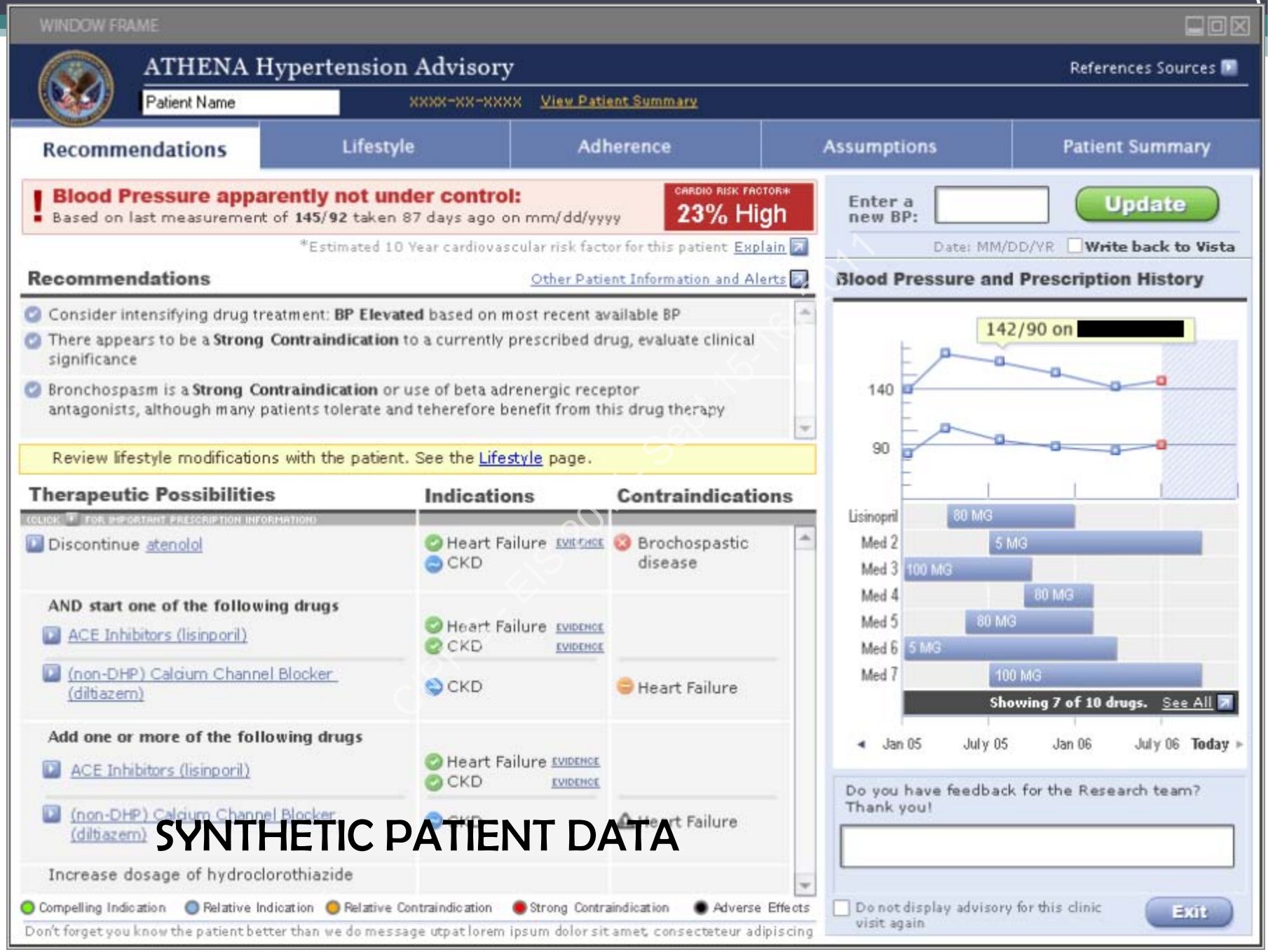
- Long-term goal
  - To contribute to improved health care for Veterans with hypertension
- Specific project goal
  - To implement clinical practice guidelines for hypertension management in primary care using clinical decision support (CDS) integrated with the electronic health record

Distinguishing What is Being Implemented from the Vehicle for Implementation

- What we were implementing
  - VA-DoD and JNC guidelines for managing primary hypertension
    - favoring VA-DoD guideline where the guidelines differed
- Vehicle for implementation
  - ATHENA-HTN, a clinical decision support system that integrates with an electronic health record

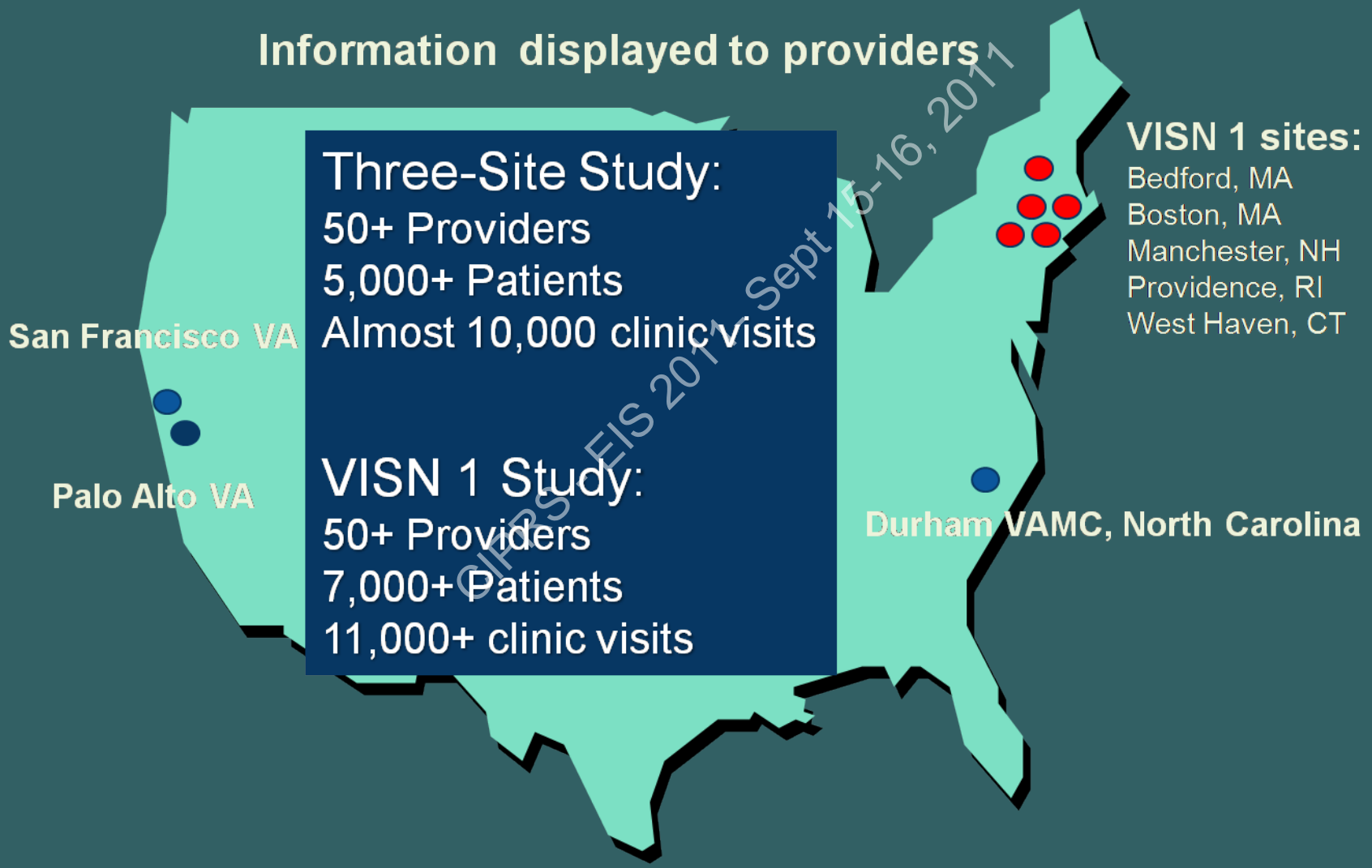


SYNTHETIC PATIENT DATA ONLY; no PHI



SYNTHETIC PATIENT DATA

ATHENA-HTN Implementation



Our Operational Partners

- VISN 1 New England Health Care Network
  - Our primary partnership
  - Note that our research group is across the continent, in California (in VISN 21)
- IRMS, which was re-organized into OI&T during the study
  - A partner to accomplish deployment of the system

VISN 1 Partnership

- HSR&D funding mechanism for “VISN Collaboratives”
  - Well-designed process that fostered collaboration between investigators and VISN
    - Required a senior VISN leader as a co-PI
    - Started with a planning grant followed by full proposal
- VISN 1 CMO very interested in improving hypertension management and also in research collaborations

IRMS/OI&T Partners

- Previous implementation with letter of support from Chief of IRMS (who later became informatics lead for VISN and then Region)
- Previous experience engaging Chief of IRMS at other VAMCs leading to successful deployment
- In VISN Collaborative project, VISN CMO facilitated relationship with VISN IRMS/OI&T
  - Identified point of contact (POC) for VISN who in turn identified POC at each VAMC
  - Discussed with VISN CIO when needed

Negotiation of Research/Academic Products

- Intellectual property not an issue since we develop for open-source
  - Non-proprietary
- During phase of recruiting site-PI's, discussed plans for co-authorship
  - Referenced standards for what types of participation warrant co-authorship versus acknowledgment

Deliverables

- Update the computable knowledge base of hypertension evidence-based recommendations
  - Included VISN leadership and VISN 1 experts to vet the knowledge in the system
- Install the system on VISN 1 servers and establish linkages to VistA data
- Deploy the system
  - Tacit understanding of expectation that we would not do anything that would detract from the ongoing clinical workflow and responsibilities of the PCPs

Implementation Facilitators and Barriers

- Organizational component of study
  - Roles, routines, rules, etc
- Facilitators
  - Well-designed funding mechanism with close involvement of senior VISN leader
  - Identification and use of correct organizational channels
    - Primary care leadership; IRMS points of contact
- Barriers
  - Intertwined OI&T reorganization and security issues
  - Limited contact with/access to PCPs

Thank you!

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Clinician Reaction to ATHENA-HTN

- Clinicians used the system extensively
  - Speaks to usability and usefulness
- Clinicians reported ATHENA-HTN affected their prescribing decisions (questionnaire)
- Free-text feedback entered to GUI during patient care
  - Identify barriers to following the guidelines
  - Identify areas for CDS improvement

Lin ND et al AMIA 2006

Chan A et al AHRQ Patient Safety 2005

Goldstein MK et al JAMIA 2004

References #1

- http://www.openclinical.org/aisp_athena.html
- http://protege.stanford.edu/

- Goldstein MK. Using health information technology to improve hypertension management. Curr Hypertens Rep. 10(3): 201-7; 2008.
- Trafton JA et al. Designing an automated clinical decision support system ... Implement Sci. Apr 12;5:26; 2010 PMCID: PMC28968045.

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- Goldstein MK et al. Translating research into practice. JAMIA 11(5): 368-76; 2004.
- Martins SB et al. Offline testing of the ATHENA Hypertension decision support system knowledge base to improve the accuracy of recommendations. AMIA Annual Symp Proc. 539-43; 2006. PMCID: PMC 1839611.
- Tu SW et al. Modeling data and knowledge in the EON guideline architecture. Stud Health Technol Inform 84: 280-4; 2001.

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- Chan AS et al. Post-fielding surveillance of a guideline-based decision support system. In Advances in Patient Safety: From Research to Implementation. http://www.ahrq.gov/qual/advances/index.html#Contents
- Myers GJ. The Art of Software Testing (2nd ed.) John Wiley and Sons, New Jersey, 2004.

Why Hypertension?

- Excellent evidence base for the guidelines
- Evidence at that time that clinicians were not following the guidelines
- Strong institutional interest in quality improvement for hypertension management
  - Alignment with organization's priorities
- Our interest in hypertension
  - Group visits for hypertension; other hypertension projects

Why Clinical Decision Support?

- Effecting change in clinician behavior requires more than just education
- Evidence of effect from some forms of CDS

- Conceptual framework Awareness to Adherence
  - CDS as a means to support each step of the model
    - Examples:

  - Awareness – CDS points out when patient's management is not guideline adherent
  - Adoption – facilitates having the relevant patient information available at the time of clinical decision making. Reinforces what is already known and provides education in new areas
  - Adherence – reminding function, while taking account of clinical complexity far beyond the clinical reminders

Assessment and **T**reatment for **H**ealthcare: **E**vide**N**ce-based **A**utomation - **C**linical **D**ecision **S**upport: **ATHENA-CDS**

- Started with hypertension
  - Designed as a model with plan from the start for extension to other clinical domains
- Built ATHENA-Hypertension (HTN)
  - VA collaboration with Stanford University
- Athena in Greek mythology is a symbol of good counsel, prudent restraint, and practical insight

Goldstein MK, Coleman RW, Tu SW, et al. Translating research into practice. *JAMIA* 2004 Sep-Oct;11(5):368-76

Goldstein MK. *Current Hypertension Reports*. 2008.

Were Clinicians Following Guidelines?

- Changing physician practice requires more active steps than simply making guideline available
  - Lomas, J., G.M. Anderson, K. Domnick-Pierre, E. Vayda, M.W. Enkin, and W.J. Hannah, *Do Practice Guidelines Guide Practice? The effect of a consensus statement on the practice of physicians.* NEJM, 1989. **321**:1306-1311.
- Clinicians not aware of their own rate of guideline adherence
  - Steinman, M.A., M.A. Fischer, M.G. Shlipak, H.B. Bosworth, E.Z. Oddone, B.B. Hoffman, and M.K. Goldstein, *Clinician awareness of adherence to hypertension guidelines.* Am J Med, 2004. **117**(10): p. 747-54.

Value of CDS

- Effective for monitoring therapy
- Fine-tune existing therapy by making recommendations to improve patient safety, adjust the dose, duration or form of prescribed drugs or increase the laboratory testing rates for patients on long-term therapy.
- Flag key safety issues
  - Alerting providers to high severity drug interactions, contraindications with other medications and cautions against prescribing particular medications for the elderly
- Provided quality use of medicine messages
  - Alterations to durations of therapy and/or form of prescribed drugs

Pearson SA et al BMC Health Services Research 2009

Providing Care to Patients with Chronic Disease

- An Activated, Informed Patient working with a Prepared Health Care Professional/Team
  - Wagner, E., B. Austin, and M. Von Korff, *Organizing care for patients with chronic illness.* The Millbank Quarterly, 1996. **74**(4): p. 511-544.

Design Goal for ATHENA-CDS

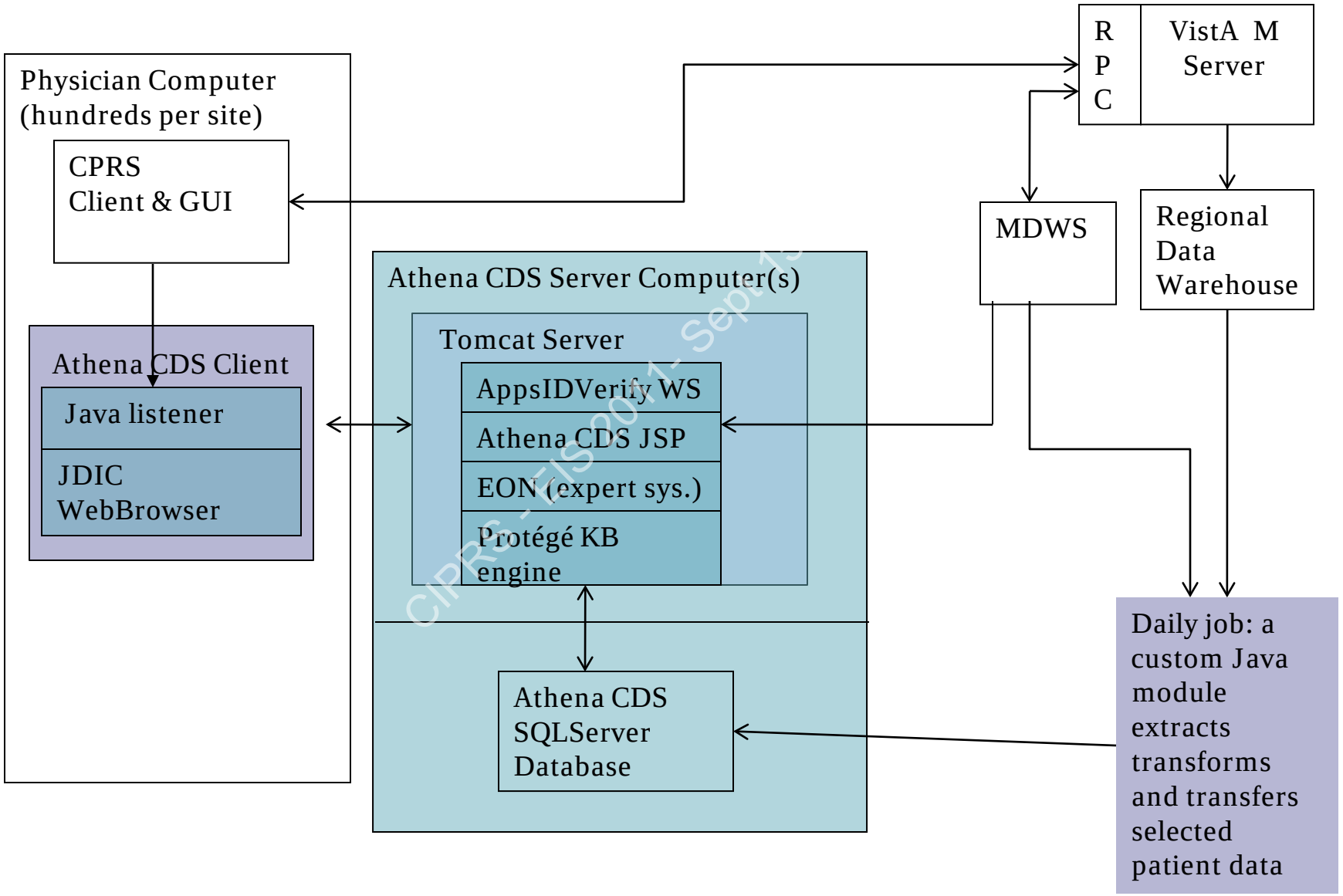
- To make advanced use of health information technology to assist with medical care, CDS should include, within workflow:
  - Rapid display of **pertinent** information about individual patients to the clinician
  - Rapid display of **relevant evidence-based advice/recommendations**
  - Sufficient clinical nuance for **clinical complexity**

Making Clinical Knowledge Computable

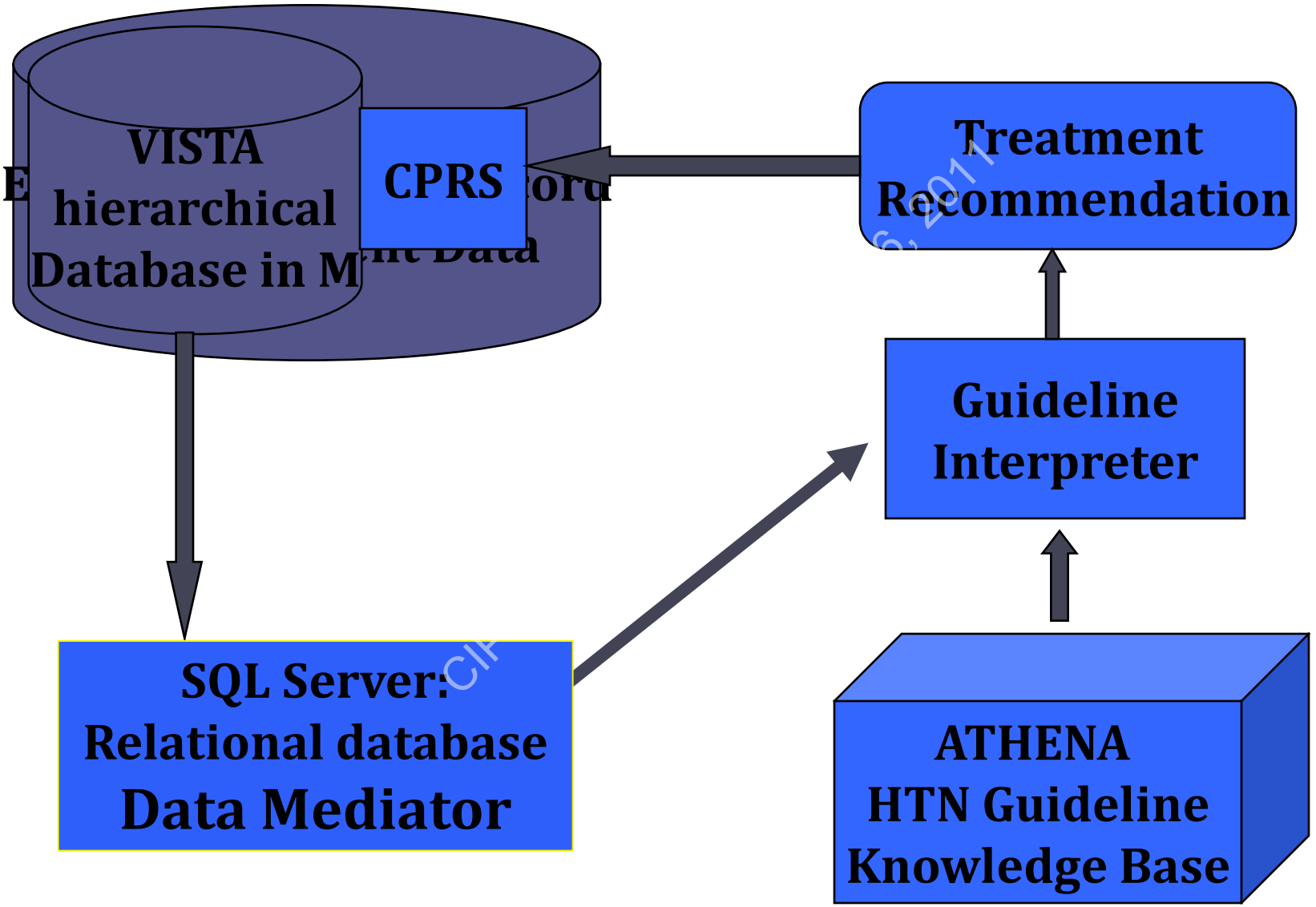
- Encode clinical knowledge into computer-interpretable "knowledge base"
- ATHENA-HTN Knowledge Base built with Protégé
  - Open-source Java tool for creation of customized knowledge-based applications
    - Developed Stanford Biomedical Informatics Research (BMIR)
    - http://protege.stanford.edu/overview/

Goldstein et al Proc AMIA Symp. 2000;300-4
Shankar et al Medinfo. 2001;10:538-42
Goldstein et al Proc AMIA Symp. 2001;:214-8

Athena CDS Architecture



ATHENA Architecture



Additional ATHENA-KBs

- ATHENA-Knowledge Bases
- Hypertension
- Managing non-cancer chronic pain with emphasis on safe use of opioids
- Type 2 diabetes
  - Modules for foot care, eye care, glycemic control
- Heart Failure
- Chronic kidney disease

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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

Abstract This document comprises an AMIA Board of Directors approved White Paper that presents a roadmap for national action on clinical decision support. It is published in JAMIA for archival and dissemination purposes. The full text of this material has been previously published on the AMIA Web site (www.amia.org/inside/initiatives/cds). AMIA is the copyright holder.

■ **J Am Med Inform Assoc.** 2007;14:141–145. DOI 10.1197/jamia.M2334.

"Clinical decision support (CDS) provides clinicians, staff, patients, or other individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and health care."

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Clinical decision support (CDS) provides clinicians, staff, patients, or other individuals with knowledge and person-specific information, intelligently filtered or presented at appro-

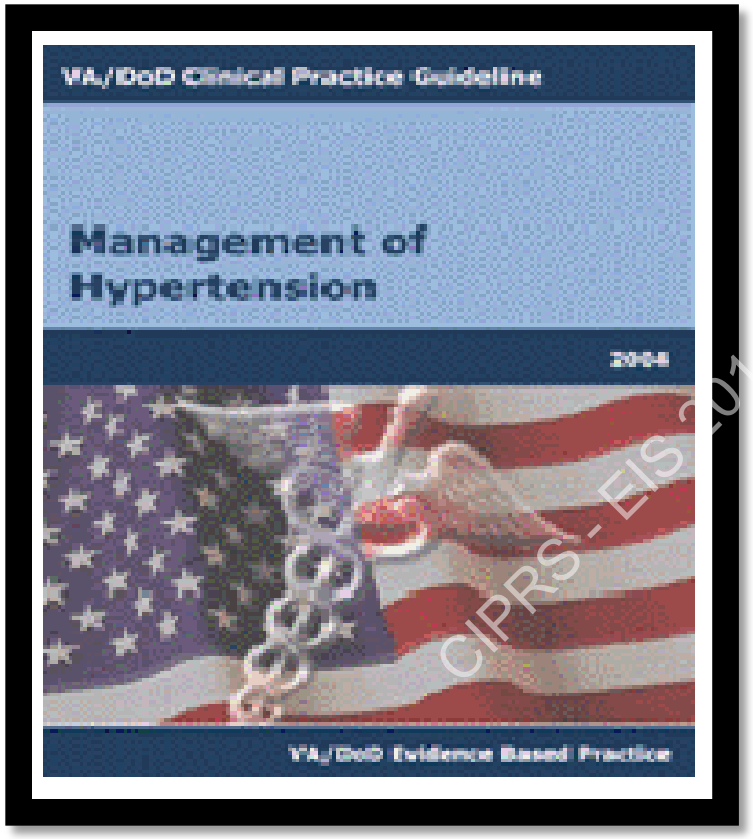
CDS Development Goals

- To make advanced use of health information technology to assist with medical care, our goals in developing CDS included
  - Rapidly presenting pertinent information about individual patients to the clinician
  - Rapidly providing evidence-based advice
  - Accounting for clinical complexity

Patients with EHR Data

Individual Patient Data

Clinical Practice Guideline

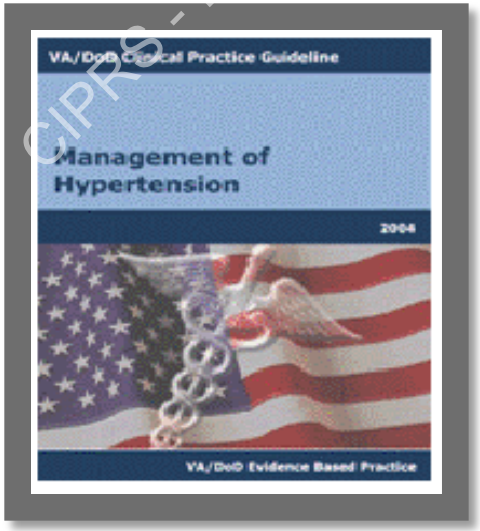


Encoded Guideline for Care of the Patient's Disease

http://www.healthquality.va.gov/Hypertension_Clinical_Practice_Guideline.asp

Applying Guidelines to Individual Patients

Individual Patient Data



Encoded Guideline for Care of the Patient's Disease

Complexity of Clinical Care

- Clinicians want to
  - Keep up with the latest research
  - Have patient data readily available
  - Have tools to visualize complex clinical information
- Patients are increasingly complex
- Medical Literature is huge and expanding
- Link information technology with clinical care
  - Information highly tailored to the patient being seen
  - Presented quickly to the clinician within the workflow