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Reorganizing Emergency Department Information Systems to Reduce Physician Cognitive Load

James C. McClay

Jeffery Nielson

Benjamin Slovis

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James C McClay, MD[1], Jeffery Nielson, MD, MS[2], Benjamin Slovis, MD[3]

[1]University of Nebraska Medical Center, Omaha, NE; [2]Northeast Ohio Medical University, Rootstown, OH; [3]Jefferson University, Philadelphia, PA

Abstract

Emergency physicians (EPs) require comprehensive patient data delivered in the emergency department information system (EDIS) in a cognitively supportive manner. While the HL7 Emergency Care Domain Analysis Model provides a set of standards for EDIS systems it does not specify usability of EDIS functions. This poster describes the preliminary consensus work of the American College of Emergency Physicians (ACEP) ED Information Systems Task Force.

Background

- The U.S. Hospital Based Emergency Care system manages 140 million annual visits in a high risk, low information environment.
- Emergency Physicians (EP) frequently practice in more than one emergency department (ED) with idiosyncratic, local EHR implementations
- EPs require rapid, on-demand access to focused patient information from multiple sources such as Health Information Exchange (HIE) systems.
- Standardization of EDIS functionality with integration HIE records may greatly aide EPs in the assessment and treatment of emergency patients while reducing the cognitive burden of information finding
- The American College of Emergency Physicians formed an Information System Safety Task Force to address issues of EDIS safety and cognitive load.
- These are the preliminary results of efforts to arrive at consensus on best practices in integration of HIE and EDIS design and functionality

Methods

- A Task Force of Emergency Department practitioners and informatics specialists meet to define focused areas to address in EDIS functionality.
- An initial environmental survey allowed the task force to prioritized specific EDIS functions for review based on the HL7 published Emergency Care Domain Analysis Model (Figure 1).

- An iterative , consensus process is used to identify both recommendations for display and actions of individual functional components and overall principles for organization of user interface and workflow.

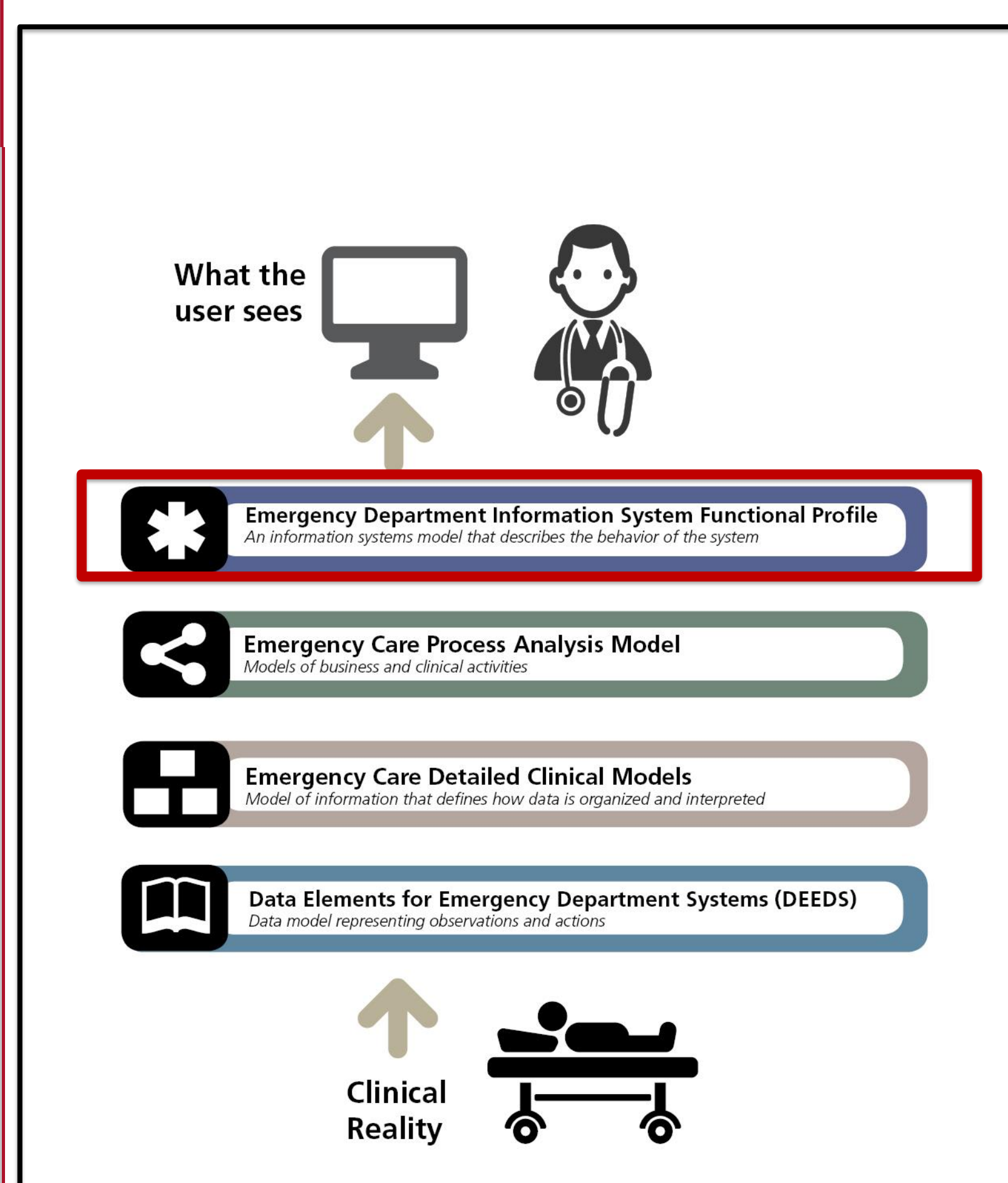- Wireframe diagrams are used to Display design for comment

Figure 1: The components of the HL7 EC-DAM. The top model of the EDIS functions does not specify the user interface or organization. Addressing "what the user sees" may impact cognitive burden.

"The nice thing about standards is that you have so many to chose from"
- Andrew S. Teanenbaum, Computer Networks, 1981, p168

Results

- Task force members emphasized the need for EHR patient record display to:
  - Rapidly orient the provider and highlight abnormal and missing items.
  - Remain consistent in location of screen elements and information flow.
  - Integrate disparate information sources from local health system and HIE without requiring separate screens.
  - Provide summary information related to current chief compliant rather than excessive detail
- Wireframe models were built to display these principles (Examples Figure 2 & 3)
  - Members preferred chief complaint driven summary display (figure 3)
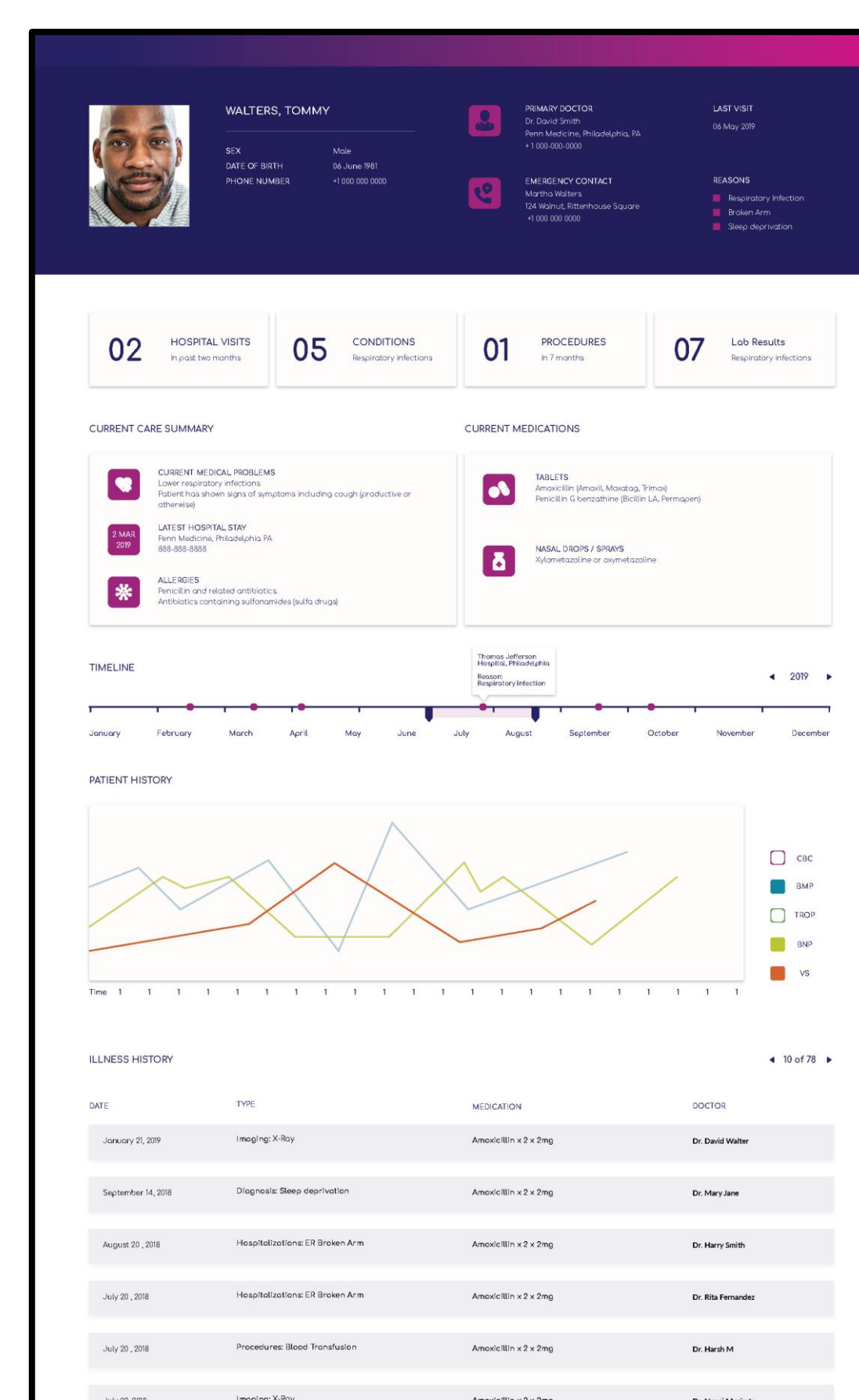 - Display of chief complaint specific summary elements was more useful.

Figure 2: Encounter Based Record Display. This record view is organized to show prior encounters. Provides background.
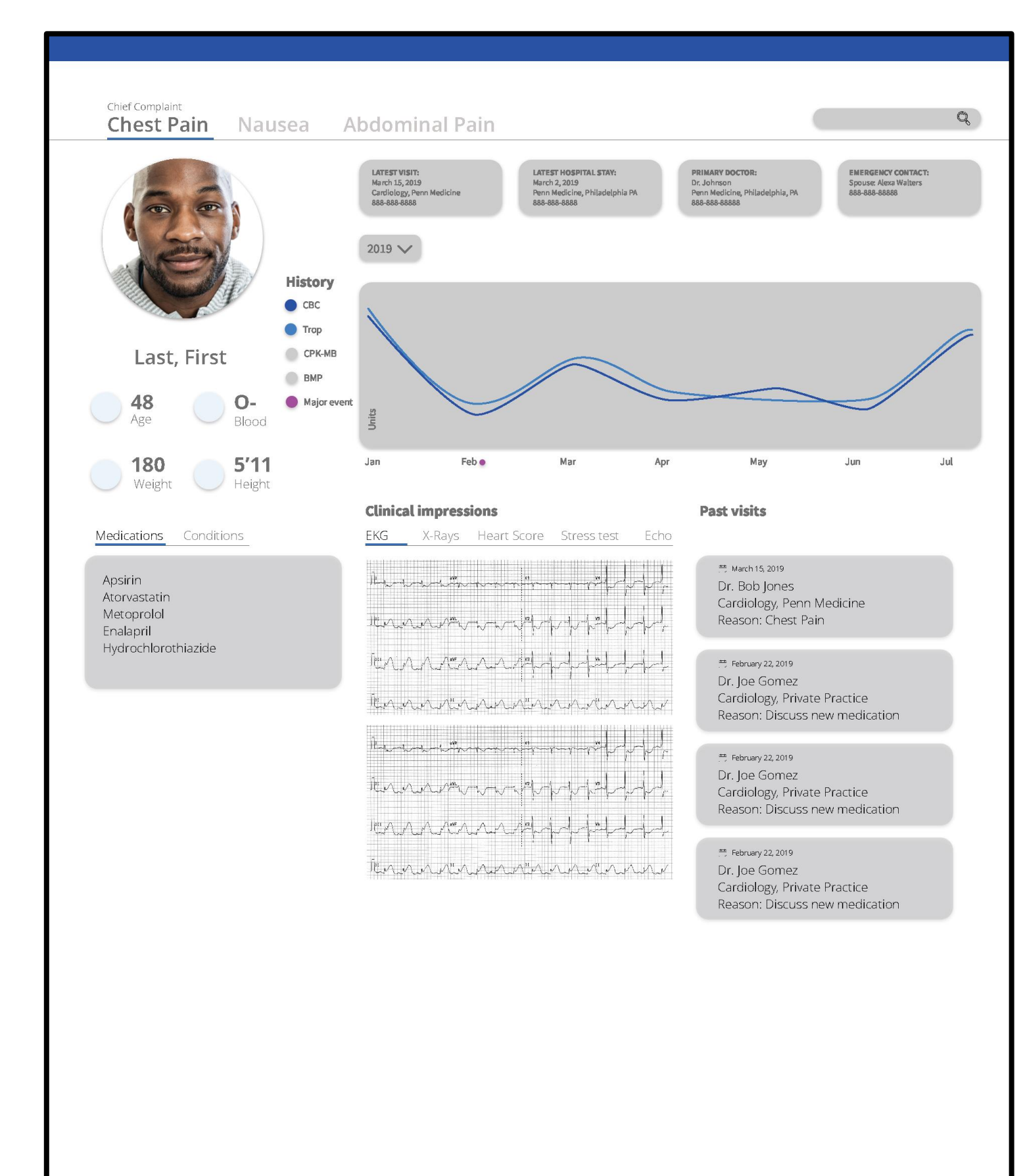
Figure 3: Chief Complaint Based Record Display. Data filtered and organized by Chief Complaint related information.

Discussion

- The quality of emergency care improves when complete records are available.
- Emergency Physicians often attend at multiple hospitals with disparate EMR systems and local organization.
- Recommendations for common EMR display paradigms are necessary to ensure user interoperability across systems
- Members of the task force developed and recommended a chief complaint-based organization of patient records in the ED.
- The HL7 Domain Analysis Modeling Process should consider extending existing semantic and syntactic clinical interoperability standards focus to include user interoperability
- The EC-DAM represents one of a family of HL7 domain analysis models representing a spectrum of clinical conditions.
- The open, consensus development process allows free adoption and reuse of standards by the knowledge management community

References

National Research Council. Hospital-based emergency care: at the breaking point. Washington, DC: The National Academies Press; 2007.

Zahabi M, Kaber DB, Swangnetr M. Usability and Safety in Electronic Medical Records Interface Design: A Review of Recent Literature and Guideline Formulation. Hum Factors.2015;57(5):805–34

HL7 Emergency Care Workgroup, "HL7 Domain Analysis Model: Emergency Care, Release 1 – US Realm" (2016) http://www.hl7.org/implement/standards/product_brief.cfm?product_id=421 (accessed 6/29/2019)

Hammond, W. E. (2008). eHealth interoperability. Studies in health technology and informatics, 134, 245.