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November 15 - 20, 2013

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Friday, November 15, 2013

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Saturday, November 16, 2013

Time	Session Info
8:30 AM-12:00 PM, International Ballroom West (Washington Hilton), **T02: Clinical Decision Support: A Practical Guide to Developing your Program to Improve Outcomes**	
8:30 AM-12:00 PM	**Clinical Decision Support: A Practical Guide to Developing Your Program to Improve Outcomes** R.A. Jenders; J.A. Osheroff; J.M. Teich; D.F. Sittig; R.E. Murphy
1:00 PM-4:30 PM, International Ballroom West (Washington Hilton), **T05: Fundamentals of EHR Usability**	
1:00 PM-4:30 PM	**Fundamentals of EHR Usability** A. Franklin; M.F. Walji; J. Zhang

Sunday, November 17, 2013

Time	Session Info
8:30 AM-12:00 PM, International Ballroom West (Washington Hilton), **T08: The EHR Usability Symposium: Vendor, User, Researcher, and Policy Perspectives**	
8:30 AM-12:00 PM	**The EHR Usability Symposium: Vendor, User, Researcher, and Policy Perspectives** J. Zhang; K. Graves; A. Franklin; M.F. Walji
3:30 PM-5:00 PM, Jefferson West (Washington Hilton), **S08: Papers - Designing HIT for Consumers**	
3:30 PM-5:00 PM	**An Information-Centric Framework for Designing Patient-Centered Medical Decision Aids and Risk Communication** L. Franklin; C. Plaisant; B. Shneiderman
3:30 PM-5:00 PM, Lincoln West (Washington Hilton), **S06: Papers - Advancing human-computer interaction in HIT**	
3:30 PM-5:00 PM	**Twinlist: Novel User Interface Designs for Medication Reconciliation** C. Plaisant; T. Chao; J. Wu; A.Z. Hettinger; J.R. Herskovic; T.R. Johnson; E.V. Bernstam; E.A. Markowitz; S. Powsner; B. Shneiderman

Monday, November 18, 2013

Time	Session Info
8:30 AM-10:00 AM, International Ballroom East (Washington Hilton), **S11: Featured Presentation - The SHARP Program and the Next Generation of Health Information Technology**	
8:30 AM-10:00 AM	**The SHARP Program and the Next Generation of Health Information Technology** C.P. Friedman; C.G. Chute; J. Goldman; C.A. Gunter; K. Mandl; J. Zhang
1:45 PM-3:15 PM, Cabinet (Washington Hilton), **S32: Podium Presentations - Meaningful Use**	
1:45 PM-3:15 PM	**EHR Certification and Safety Enhanced Design: The need for robust usability testing scenarios** A. Franklin; K. Graves; M.F. Walji; J. Zhang
5:00 PM-6:30 PM, Columbia Hall (Washington Hilton), **Poster Session I**	
5:00 PM-6:30 PM	**Alert Overrides: The Impact of Chained Events** J. Diaz-Garelli; M.F. Walji; A. Franklin; J. Zhang
5:00 PM-6:30 PM	**Design of an Interactive Laboratory Results Viewer for Critically Ill Patients** P.V. Killoran; J. Zhang
5:00 PM-6:30 PM	**A Systematic Yet Flexible Systems Analysis Framework** E.A. Markowitz; T.R. Johnson; E.V. Bernstam; J.R. Herskovic; H. Thimbleby
5:00 PM-6:30 PM	**Topological Visualization Uncovers Novel Clinically Relevant Clusters** R.P. Radecki
5:00 PM-6:30 PM	**Gaps in functionality: Work-centered Design of Medication List in Ambulatory EHRs** Z. Zhang; M.F. Walji; A. Franklin; J. Zhang
5:00 PM-6:30 PM	**User-Centered Design of a Model-Driven Rule Authoring Environment** D. Yauch; B.S. Bradley; M. Ebert; D. Sottara; P. Haug; D.R. Kaufman; R. Greenes

Tuesday, November 19, 2013

Time	Session Info
5:00 PM-6:30 PM, Columbia Hall (Washington Hilton), **Poster Session II**	
5:00 PM-6:30 PM	**Characterizing the Effects of a Cognitive Support System for Psychiatric Clinical Comprehension** V. Dalai; D. Gottipatti; T. Kannampallil; T. Cohen
5:00 PM-6:30 PM	**Reflective Random Indexing to Develop a Medication-Problem Knowledge Base** S. Fathiamini; T. Cohen; A.B. McCoy; D.F. Sittig

5:00 PM-6:30 PM	Health eDecisions (HeD): a Public-Private Partnership to Develop and Validate Standards to Enable Clinical Decision Support at Scale K. Kawamoto; T. Hongsermeier; A.A. Boxwala; B. Rhodes; A.A. Morton; J. Parker; C.J. Nanjo; V.C. Lee; B.K. Minton; D. Sottara; H.R. Strasberg; S. Claypool; J.A. Scherer; M.D. Pfeffer; D.E. Shields; K.W. Boone; P. Haug; T.M. Kuhn; M.C. Vida; A. Langhans; C. Mangir; E. Pupo; R.F. Lario; D.S. Shevlin; J. Reider
5:00 PM-6:30 PM	Ontology-Based Entity Extraction of Quality Metrics from Narrative Texts S. Madani; D.F. Sittig; H. Xu; P. Mirhaji; K. Dunn; R. Alemy
5:00 PM-6:30 PM	Comparative Analysis of Association Rule Mining, Crowdsourcing, and NDF-RT Knowledge Bases for Problem-Medication Pair Generation K. Sethuraman; D.F. Sittig; A.B. McCoy

Wednesday, November 20, 2013

Time	Session Info
8:30 AM-10:00 AM, Jefferson West (Washington Hilton), **S85: Podium Presentations - Decision Support: Development and Implementation**	
8:30 AM-10:00 AM	Cross-Vendor Evaluation of Key Clinical Decision Support Capabilities: A Preliminary Assessment D.F. Sittig; A.B. McCoy; A. Wright

Final ID:

Clinical Decision Support: A Practical Guide to Developing Your Program to Improve Outcomes

R. A. Jenders; [1]; _J. A. Osheroff;_ [2]; _J. M. Teich;_ [3]; _D. F. Sittig;_ [4]; _R. E. Murphy;_ [5];

1. Center for Biomedical Informatics, Charles Drew University & UCLA, Los Angeles, CA, United States.
2. TMIT Consulting, LLC, Cherry Hill, NJ, United States.
3. Elsevier Health Sciences, Newton, MA, United States.
4. UT – Memorial Hermann Center for Healthcare Quality & Safety, University of Texas Health Science Center at Houston, Houston, TX, United States.
5. Memorial Hermann Healthcare System , Houston, TX, United States.

Abstract: This tutorial will provide attendees with a practical approach to developing and deploying clinical decision support (CDS) interventions that measurably improve outcomes of interest to a health care delivery organization. The instructors initially will examine in detail the key building blocks of a CDS program, including creating and enhancing organizational structure for CDS success; identifying information systems for providing the data that drive CDS interventions; leveraging clinical workflow to optimize CDS interventions; processes and systems for measuring the outcomes of these interventions; and knowledge management to acquire and maintain the expert knowledge that informs these interventions. The instructors then will show how to leverage these building blocks to address key steps in developing, implementing, managing and evaluating CDS interventions.

Additional discussion will touch on the role of national programs relevant to CDS, including knowledge sharing; structured guidelines; meaningful use; special considerations for CDS for small clinical practices, for hospitals and health systems and for vendors; and medico-legal considerations pertinent to CDS. Further, following interactive presentations by the instructors, attendees will divide into small groups and participate in a highly interactive exercise in planning and designing a CDS project to address a specific clinical target, facilitated by the instructors.

Overall, this systematic approach to CDS implementation will be presented in an interactive, case-oriented fashion, incorporating examples provided by tutorial leaders and participants' experiences. The course content is drawn from the tutorial leaders' popular and award-winning guidebook series on improving outcomes with clinical decision support, the last two volumes of which (in 2009 and 2012) were co-published by AMIA.

Final ID:

Fundamentals of EHR Usability

M. F. Walji; [1,3]; *A. Franklin;* [1,2]; *J. Zhang;* [1,2];
1. National Center for Cognitive Informatics and Decision Making, University of Texas Health Science Center at Houston, Houston, TX, United States.
2. School of Biomedical Informatics, University of Texas Health Science Center at Houston, Houston, TX, United States.
3. School of Dentistry, University of Texas Health Science Center at Houston, Houston, TX, United States.

Abstract: A current and significant challenge in the design and implementation of health information technology (HIT) is to deal with the high failure rate of HIT projects. Most of these failures are not due to flawed technology, but rather due to the lack of systematic considerations of human factors and other non-technology issues in the design and implementation processes. In other words, designing and implementing HIT is not so much an IT project as a project about human-centered computing akin to human-computer interaction, workflow, organizational change, and process reengineering. Due to the complexity and unique features of healthcare, human-centered methods and techniques specifically tailored for this domain are necessary for the successful development of health information systems such as electronic health records (EHRs). Good usable design would engender systems that increase efficiency and productivity, are easy to use and straight forward to learn, increase user adoption, retention, and satisfaction, and decrease medical errors, development time and cost. In this tutorial we will focus on teaching two methods appropriate for assessing EHR usability. After the half-day tutorial, the attendees should have a basic understanding of the usability issues in health IT and have gained skills enabling them to evaluate the usability of EHRs and related products using these methods.

Final ID:

The EHR Usability Symposium: Vendor, User, Researcher, and Policy Perspectives

J. Zhang; [1, 2]; *K. Graves;* [1, 2]; *A. Franklin;* [1, 2]; *M. F. Walji;* [1, 3];

1. National Center for Cognitive Informatics and Decision Making in Healthcare , UT Health Science Center at Houston, Houston, TX, United States.
2. School of Biomedical Informatics, UT Health Science Center at Houston, Houston, TX, United States.
3. School of Dentistry, UT Health Science Center at Houston, Houston, TX, United States.

Abstract: The National Center for Cognitive Informatics and Decision Making in Healthcare (NCCD), funded by the Office of the National Coordinator for Health Information Technology, as part of the Strategic Health IT Advanced Research Program (SHARP), was formed to focus on the urgent and long-term cognitive challenges in Health Information Technology (HIT) adoption and meaningful use. Over the last three years, researchers at the NCCD have focused on addressing the urgent usability, workflow, and cognitive support issues of HIT that can fundamentally remove the key cognitive barriers to HIT adoption and meaningful use. The center generates research findings, tools and guidelines that have a real world impact in order to maximize the benefits of HIT for healthcare quality, efficiency, and safety. This symposium presents an opportunity for the user, vendor and research communities to share progress, ideas, and solutions in improving the usability of EHRs.

Final ID:

An Information-Centric Framework for Designing Patient-Centered Medical Decision Aids and Risk Communication

L. Franklin; [1]; *C. Plaisant;* [1]; *B. Shneiderman;* [1];
1. University of Maryland, College Park, MD, United States.

Abstract: Risk communication is a major challenge in productive patient-physician communication. Patient decision making responsibilities coms with an implicit assumption that patients are sufficiently educated and confident in their abilities to make decisions about their care based on evidence based treatment recommendations. Attempts to improve health literacy in patients by way of graphical decision aids have met with success. Such decision aids typically have been designed for a general population and evaluated based on whether or not users of the decision aid can accurately report the data points in isolation. To classify decision aids, we present an information-centric framework for assessing the content delivered to patients. We provide examples of our framework from a literature survey and suggest ways improvements can be made by considering all dimensions of our framework.

Final ID:

Twinlist: Novel User Interface Designs for Medication Reconciliation

C. Plaisant; [1]; T. Chao; [1]; J. Wu; [1]; A. Z. Hettinger; [2]; J. R. Herskovic; [3,4]; T. R. Johnson; [6]; E. V. Bernstam; [3]; E. A. Markowitz; [3]; S. Powsner; [5]; B. Shneiderman; [1];

1. University of Maryland, College Park, MD, United States.
2. Medstar Innovation Institute, Washington, DC, United States.
3. The University of Texas Health Science Center at Houston, Houston, TX, United States.
4. MD Anderson Cancer Center, Houston, TX, United States.
5. Yale University, New Haven, CT, United States.
6. University of Kentucky, Lexington, KY, United States.

Abstract: Medication reconciliation is an important and complex task for which careful user interface design has the potential to help reduce errors and improve quality of care. In this paper we focus on the hospital discharge scenario and first describe a novel interface called Twinlist. Twinlist illustrates the novel use of spatial layout combined with multi-step animation, to help medical providers see what is different and what is similar between the lists (e.g., intake list and hospital list), and rapidly choose the drugs they want to include in the reconciled list. We then describe a series of variant designs and discuss their comparative advantages and disadvantages. Finally we report on a pilot study that suggests that animation might help users learn new spatial layouts such as the one used in Twinlist.

Final ID:

The SHARP Program and the Next Generation of Health Information Technology

C. P. Friedman; [1]; *C. G. Chute;* [2]; *J. Goldman;* [3]; *C. A. Gunter;* [4]; *K. Mandl;* [5]; *J. Zhang;* [6];
1. University of Michigan, Ann Arbor, MI, United States.
2. Mayo Clinic, Rochester, MN, United States.
3. Massachusetts General Hospital, Boston, MA, United States.
4. University of Illinois, Urbana, IL, United States.
5. Boston Children's Hospital, Boston, MA, United States.
6. University of Texas at Houston, Houston, TX, United States.

Abstract Body: This session portrays the future of informatics where results of ground-breaking research propel technology to a next level of achievement in promoting individual and population health.

In April of 2010, the ONC awarded cooperative agreements to support research in four key areas where progress is essential to fully realize the benefits of health information technology: 1) security of health information technology, 2) patient-centered cognitive support, 3) health care application and network platform architecture, and 4) secondary use of EHR data. Through what became known as SHARP (the Strategic Health IT Advanced Research Projects), four awards resulted from separate competitions in each area. A fifth award, addressing medical device interoperability and supported by NIH, joined the SHARP family in 2011.

In this session, the SHARP principal investigators will describe the key work done by the projects, its transformational potential, and how the informatics community can engage with this work going forward. The session will close with description of a unique collaborative effort applying the work of all five SHARP sites to the challenging problem of medication reconciliation.

Final ID:

EHR Certification and Safety Enhanced Design: The need for robust usability testing scenarios

A. Franklin; [1, 2]; *K. Graves;* [1, 2]; *M. F. Walji;* [1, 3]; *J. Zhang;* [1, 2];

1. National Center for Cognitive Informatics and Decision Making in Healthcare , University of Texas Health Science Center at Houston, Houston, TX, United States.
2. School of Biomedical Informatics, University of Texas Health Science Center at Houston, Houston, TX, United States.
3. School of Dentistry, University of Texas Health Science Center at Houston, Houston, TX, United States.

Abstract: Summative usability testing as part of 2014 EHR Safety Enhanced Design Certification criteria requires the completion of specified tasks. To support user participants, activities, such as entering an e-prescription, are often embedded in scenarios or descriptions of hypothetical work. While existing NIST test procedures provide valuable materials for evaluation, greater specification into supported roles, workflow, and rich description are necessary to evoke appropriate engagement with test systems. We propose methods for the development and distribution of robust testing scenarios for EHR certification purposes.

Final ID:

Alert Overrides: The Impact of Chained Events

J. Diaz-Garelli; [1]; *M. F. Walji;* [1]; *A. Franklin;* [1]; *J. Zhang;* [1];

1. School of Biomedical Informatics, University of Texas Health Science Center at Houston, Houston, TX, United States.

Abstract: High override rates of drug-drug interaction alerts are well-established[1]. These studies often only look at total response rate. Here, we explore differences in override behaviors to isolated alerts and chains of repeated notifications. Implications of alert presentation effects, including increases to overrides later in alert chains, may inform display design to reduce alert fatigue and improve appropriate use of such systems.

Final ID:

Design of an Interactive Laboratory Results Viewer for Critically Ill Patients

P. V. Killoran; [1]; *J. Zhang;* [1];

1. School of Biomedical Informatics, University Of Texas Health Science Center - Houston, Houston, TX, United States.

Abstract: Voluminous laboratory data are generated while caring for critically ill patients. Though ubiquitous, temporally ordered tables become representationally inefficient when numerous results are reviewed. Here, we present an interface combining graphical and tabular displays to improve cognitive performance.

Final ID:

A Systematic Yet Flexible Systems Analysis Framework

E. A. Markowitz; [1, 2]; *T. R. Johnson;* [2, 3]; *E. V. Bernstam;* [1, 2]; *J. R. Herskovic;* [2, 4]; *H. Thimbleby;* [5];

1. School of Biomedical Informatics, The University of Texas Health Science Center, Houston, TX, United States.
2. National Center for Cognitive Informatics and Decision Making in Healthcare, Houston, TX, United States.
3. Division of Biomedical Informatics, Department of Biostatistics, University of Kentucky, Lexington, KY, United States.
4. The University of Texas MD Anderson Cancer Center, Houston, TX, United States.
5. FIT Lab - Interaction Laboratory, Swansea University, Swansea, Wales, United Kingdom.

Abstract: We hypothesize that many unintended consequences in healthcare result from a mismatch between system and task flexibility. Systematic Yet Flexible (SYF) systems encourage systematic approaches to tasks that allow flexibility in atypical situations. Despite recognition that SYF systems can improve efficiency, only general design goals for developing SYF exist [1-4]. Thus, we developed SYFSA (Systematic Yet Flexible Systems Analysis), a framework for analyzing and designing Systematic Yet Flexible systems that uses qualitative and quantitative analyses to compare trade-offs between systematicity and flexibility across multiple designs. The qualitative analysis involves comparing an idealized model and its associated constraints, or a lack thereof, to a system that is intended to support the task. Quantitative measures include interface efficiency, task completion rate, and an information-theoretic measure of flexibility. Here we describe SYFSA and show how it can be used to balance systematicity and flexibility for a data entry task.

Final ID:

Topological Visualization Uncovers Novel Clinically Relevant Clusters

R. P. Radecki; [1];

1. Emergency Medicine, The University of Texas Health Science Center at Houston, Houston, TX, United States.

Abstract: Clinical research data sets are traditionally interpreted and translated to clinical practice based on univariate and multivariate logistic statistical methods. However, in heterogeneous clinical cohorts, it is intuitive that individual patient characteristics co-occur in non-linear associative distributions. This concept is demonstrated through dimension reduction of clinical data sets using topologic visualization. The implication of this clustered approach to research data includes support for new translational informatics strategies for personalized medicine.

Final ID:

Gaps in functionality: Work-centered Design of Medication List in Ambulatory EHRs

Z. Zhang; [1]; *M. F. Walji;* [2]; *A. Franklin;* [1]; *J. Zhang;* [1];
1. University of Texas School of Biomedical Informatics, Houston, TX, United States.
2. University of Texas School of Dentistry at Houston, Houston, TX, United States.

Abstract: Inaccurate medication lists in ambulatory EHRs may partially result from lack of support for medication management workflows. Medication-related work activities were captured and patient adherence information was found to be missing in medication use documentation in six EHR products. Following a work-centered design approach, user interface mockups were developed to demonstrate an expanded data model.

Final ID:

User-Centered Design of a Model-Driven Rule Authoring Environment

D. Yauch; [1]; *B. S. Bradley;* [1]; *M. Ebert;* [2]; *D. Sottara;* [1]; *P. Haug;* [2]; *D. R. Kaufman;* [1]; *R. Greenes;* [1, 3];

1. Biomedical Informatics, Arizona State University, Scottsdale, AZ, United States.
2. Medical Informatics, Intermountain Healthcare, Salt Lake City, UT, United States.
3. Medical Informatics, Mayo Clinic, Scottsdale, AZ, United States.

Abstract: This research describes the design process for a model-driven rule authoring environment. Clinical decision support rule authoring is a complex endeavor, involving the need for both content domain and technical expertise, and is fraught with the potential for error, as rules are refined and adapted from narrative recommendations to formal statements to setting-specific adaptations. Several prior studies have focused on the usability issues surrounding front-end tools such as electronic health records and computerized provider order entry systems; studies of back-end tools are rare. In addition to facilitating the design of the authoring environment, this study also seeks to extract the important risks and challenges faced by clinical decision support rule authors.

Final ID:

Characterizing the Effects of a Cognitive Support System for Psychiatric Clinical Comprehension

V. Dalai; [1]; *D. Gottipatti;* [1]; *T. Kannampallil;* [2]; *T. Cohen;* [1];

1. Biomedical Informatics, University of Texas School of Biomedical Informatics, Houston, TX, United States.
2. Informatics, NewYork Academy of Medicine, NewYork, NY, United States.

Abstract: Cognitive studies of clinical experts reveal application of "intermediate constructs", clinically relevant clusters of information, for problem solving. Novice clinicians are less able to recognize these patterns, so a system to augment their comprehension is desirable. In this study, we evaluate a cognitive support system for psychiatric clinical comprehension, using propositional analysis and Latent Semantic Analysis to measure system effects on clinical comprehension. Results indicate the system promotes case interpretation more closely approximating expert emphasis.

Final ID:

Reflective Random Indexing to Develop a Medication-Problem Knowledge Base

S. Fathiamini; [1] *; T. Cohen;* [1] *; A. B. McCoy;* [1] *; D. F. Sittig;* [1] *;*
1. University of Texas, School of Biomedical Informatics, Houston, TX, United States.

Abstract: We evaluated the use of Reflective Random Indexing (RRI) to generate a medication-problem pairing knowledge base. An expert-reviewed list of medication-problem pairs was used as the gold standard. Three different corpora of free text, including Medline abstracts, UpToDate, and clinical notes, were chosen, and RRI was used for constructing the semantic space. Medline abstracts provided better results than the other two corpora.

Final ID:

Health eDecisions (HeD): a Public-Private Partnership to Develop and Validate Standards to Enable Clinical Decision Support at Scale

K. Kawamoto; [1]; T. Hongsermeier; [13]; A. A. Boxwala; [2]; B. Rhodes; [12]; A. A. Morton; [8]; J. Parker; [17]; C. J. Nanjo; [9]; V. C. Lee; [9]; B. K. Minton; [9]; D. Sottara; [7]; H. R. Strasberg; [10]; S. Claypool; [16]; J. A. Scherer; [14]; M. D. Pfeffer; [14]; D. E. Shields; [3]; K. W. Boone; [11]; P. Haug; [15]; T. M. Kuhn; [4]; M. C. Vida; [6]; A. Langhans; [6]; C. Mangir; [5]; E. Pupo; [5]; R. F. Lario; [1]; D. S. Shevlin; [6]; J. Reider; [8];

1. Biomedical Informatics, University of Utah, Salt Lake City, UT, United States.
2. Meliorix Inc., La Jolla, CA, United States.
3. Healthcare ITS, University of Utah, Salt Lake City, UT, United States.
4. Health Policy and Regulatory Affairs, American College of Physicians, Washington, DC, United States.
5. Federal Healthcare, Deloitte, Arlington, VA, United States.
6. Accenture Federal Services, Accenture, Arlington, VA, United States.
7. Biomedical Informatics, Arizona State University, Scottsdale, AZ, United States.
8. Office of the Chief Medical Officer , HHS/ ONC, Washington, DC, United States.
9. Zynx Health Incorporated, Los Angeles, CA, United States.
10. Clinical Solutions, Wolters Kluwer Health, San Diego, CA, United States.
11. Healthcare Systems, GE Healthcare, Boston, MA, United States.
12. Software Development, Veracity Solutions, Salt Lake City, UT, United States.
13. Lahey Health, Burlington, MA, United States.
14. newMentor, San Francisco, CA, United States.
15. Medical Informatics, Intermountain Healthcare, Murray, UT, United States.
16. Medical Content, ProVation Medical, Wolters Kluwer Health, Minneapolis, MN, United States.
17. ESAC, Inc., Rockville, MD, United States.

Abstract: Health eDecisions is a public-private initiative sponsored by the Office of the National Coordinator for Health IT to enable scalable clinical decision support (CDS). Included within its scope are the development and validation of standards to support (i) sharing knowledge artifacts for import into CDS systems and (ii) sharing patient-specific inferencing capabilities as software services. The standards are being piloted by multiple vendors and may be considered for potential inclusion in future EHR certification requirements.

Final ID:

Ontology-Based Entity Extraction of Quality Metrics from Narrative Texts

S. Madani; [1]; *D. F. Sittig;* [1]; *H. Xu;* [1]; *P. Mirhaji;* [3]; *K. Dunn;* [1]; *R. Alemy;* [2];

1. School of Biomedical Informatics, University of Texas Health Science Center, Houston, TX, United States.
2. School of Health Information Science, University of Victoria, Victoria, BC, Canada.
3. Systems and Computational Biology, Albert Einstein College of Medicine, Bronx, NY, United States.

Abstract: There is an increasing demand from heterogeneous organizations for collection and reporting of comparable healthcare quality metrics. Many of these metrics are captured in narrative format during the process of patient care. Manual abstraction of such entities is time consuming and expensive. We developed an ontology-based concept extraction framework that may increase the precision of existing natural language processing methods.

Final ID:

Comparative Analysis of Association Rule Mining, Crowdsourcing, and NDF-RT Knowledge Bases for Problem-Medication Pair Generation

A. B. McCoy; [2]; *K. Sethuraman;* [1]; *D. F. Sittig;* [2];
1. Department of Bioengineering, University of Pennsylvania School of Engineering and Sciences, Philadelphia, PA, United States.
2. The University of Texas School of Biomedical Informatics at Houston, Houston, TX, United States.

Abstract: Automatic summarization of electronic health records (EHRs) can help compile and organize the growing amount of patient information confronting healthcare providers. Here, we evaluate three different approaches to problem-medication pair generation, an important automatic summarization task, and find that association rule mining and crowdsourcing provide similar problem-medication relations while the National Drug File-Reference Terminology (NDF-RT) provides new relations not encountered in the other two.

Final ID:

Cross-Vendor Evaluation of Key Clinical Decision Support Capabilities: A Preliminary Assessment

D. F. Sittig; [2]; *A. B. McCoy;* [2]; *A. Wright;* [1];
1. General Internal Medicine, Brigham & Women's Hospital, Boston, MA, United States.
2. Biomedical Informatics, University of Texas Health Science Center at Houston, Houston, TX, United States.

Abstract: Clinical decision support (CDS) is essential for delivery of high-quality, cost-effective, and safe healthcare. We evaluated the CDS creation, implementation, and evaluation capabilities of four internet-accessible, ONC-ATCB electronic health records (EHRs). All evaluated EHRs lacked some CDS capabilities. Significant improvements in our EHR certification and implementation procedures are necessary.