Oral: Clinical Information Technology

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COMPUTER-AIDED TRANSLATION IN PATIENT CARE: SOLUTION FOR LANGUAGE BARRIERS? Michael A DeGuzman, MPH,[1] Gus E Turner, MPH(c),[1] Harold K Simon, MD, MBA.[1,2] [1]Department of Emergency Medicine, Children's Healthcare of Atlanta, Atlanta, GA; [2]Departments of Pediatric and Emergency Medicine, Emory University School of Medicine, Atlanta, GA.

Purpose: Healthcare providers face difficulties in treating patients when language barriers exist. Recent emergence of computer-aided translation illustrates the use of new technology to address this issue. One such program is VISTA (Voice-enabled Interactive Spanish Translation Aid). VISTA is a computer program developed at a pediatric hospital to assist healthcare providers' communication with Spanish-speaking patients. VISTA uses digitally-recorded questions in a yes/no and/or number decision-tree structure. Healthcare providers select questions from a comprehensive menu further driving examination based on patient responses. This study aims to understand the suitability of such a system in the clinical care setting.

Methods: Urban and rural healthcare providers and healthcare-related professionals were recruited to participate in moderated focus groups to assess the feasibility and utility of the program. Participants shared their experiences in serving the Spanish-speaking population. Next, a video of a mock-encounter between a Spanish-speaking mother with an ill child and a non-Spanish speaking doctor utilizing VISTA was viewed. A moderated discussion focusing on the strengths, weaknesses, and recommendations for the VISTA application followed. Sessions were recorded, transcribed, and qualitatively analyzed.

Results: Thirty-one individuals participated in three focus groups consisting of 22 healthcare providers and 9 professionals. Analysis highlights two main themes: concerns exist about the suitability of VISTA in physician diagnosis and treatment; and support exists to adapt VISTA more appropriately toward non-diagnostic and pre-treatment care.

Conclusion: In general, participants voiced an eagerness for assistance in dealing with language barriers present with non-English speaking patients. Findings suggest that participants did not find VISTA to be appropriate as presented in the mock-encounter video. However, appropriate use during screening, triage, and the preliminary interview is of interest for further study.

The author has indicated *no* financial relationship or interest with any proprietary entity related to the content of this CME activity.

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CONFORMING THE ATHLETIC PRE-PARTICIPATION EXAMINATION TO STRUCTURED DATA ENTRY. Frederick E Reed, MD,[1] Deborah Baker, NP.[1] [1]Pediatrics, Medical University of SC, Charleston, SC.

Purpose: Athlete and parent responses to Second Edition Pre-participation Physical Evaluation questions were compared prospectively to Third Edition questions (Access query). Questions most likely to elicit a positive response were identified. A retrospective review focused on Structured Data Entry for Electronic Health Record and isolated positive aspects of past history that will contribute to a Continuity of Health Record. From the two different PPE Forms single concepts were identified that could be included in future PPE questionnaires. The first hypothesis was that the best question to ask in a screening exam PPE is one which will elicit a positive response. The second hypothesis is that within the best question containing a group of concepts is a risk factor represented by a single concept.

Methods: Athlete PPE question responses from two consecutive years were the subject groups. Form and content of questions were assessed and compared for likelihood to elicit positive response. Second, the best components of all questions were separated into single concept history data points to provide the basis for future Structured Data Entry. Questions were placed in four categories to determine the field assignment in an Access Data Base.

Results: 1) Identical or substantially similar questions showed 100% correlation from year to year.

2) Questions with a same concept or different wording measuring the same health risk yielded comparable responses. Single concepts (= single risk factor) were identified for drop down selections under an Access Data field.

3) Different concepts or different aspects of the same diagnosis category did not show correlation and required assigning a new field.

4) Different questions from one year contained some concepts not completely covered by the other. These were preserved as drop down selections.

Conclusion: Athletic history questions most likely to yield positive response were selected. These determined the content of a third variation and methodology to allow assimilation of single concepts into an electronic format.

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CONTROLLED SUBSTANCES PRESCRIPTION WRITER: UTILITY IN MEDICAL ERROR REDUCTIONS. Karen P Zimmer, MD, MPH,[1] Marlene R Miller, MD, MSc,[1] Benjamin Lee, MD, MPH,[2] Myron Yaster, MD,[2] Robert E Miller, MD,[3] Christoph U Lehmann, MD.[1] [1]Pediatrics, Johns Hopkins University, Baltimore, MD; [2]Anesthesia and Critical Care, Johns Hopkins University, Baltimore, MD; [3]Pathology, Johns Hopkins University, Baltimore, MD.

Purpose: Prescription writing is an error prone step in medication administration with incorrect dosage being most common. Pediatric patients are at higher risks for medication errors.

The objective was to evaluate use, outcomes, and barriers to use of a web-based prescription writer with weight-based dosing logic for analgesic prescriptions in a tertiary care Children's Center.

Methods: A web-based prescription writer was deployed in 11/2005. This program provides soft alerts (override possible) and hard alerts (override only by Anesthsia pain service approval) with respect to proper dosing of analgesics. We analyzed use, outcomes. and barriers to use for 4 months.

Measured outcomes were: Number of prescriptions, % exceeding recommended 'soft' maximum doses, % pain service overrides and the number of prescriptions abandoned due to alerts. We collected information on all alerts that were generated and on how/if these alerts resulted in prescription alterations. We performed an electronic survey of users to assess clinician satisfaction with this program and identify barriers to use.

Results: We had 146 users and most common user groups were pediatric [73, 50%], surgery [21, 14%], and orthopedic [14, 10%] housestaff. There were 1,506 prescription attempts (227 prescriptions with alerts / 1,279 prescriptions without alerts) and 867 actual prescriptions were generated of which 2/3 were for oxycodone. Of the 348 alerts that were triggered by users, 30% of alerts were hard alerts and no actual prescriptions were generated that exceeded these hard alerts. Sixty-eight respondents (47%) completed the satisfaction survey. Compared to paper prescriptions, many users (43%) thought the prescription writer was easier to use. Many reported that the program prevented dosing errors (N=31, 47%) and did not add to their work load (N=30, 47%).

Conclusion: This web-based prescription writer prevented medication errors by alerting users that their doses exceeded hard limits for weight-based dosing. Adoption of this new technology was well accepted and not felt to add to work load.

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CHALLENGES OF EHR IMPLEMENTATION IN A PEDIATRIC SUBSPECIALTY HOSPITAL SYSTEM. Donald E Lighter, MD, MBA, FAAP,[1] William Bria, MD,[1] Ralph Lewkowicz, MS.[1] [1]Medical Affairs, Shriners Hospitals for Children, Tampa, FL.

Case Report: Shriners Hospitals for Children consists of 22 pediatric subspecialty hospitals with services in pediatric burns, spinal cord injury, and orthopedics. In 1997, the organization embarked on automation of clinical processes in the 20 U.S. hospitals. After selection of a vendor, the planning process began in 1999, and the first system installations ensued in 2004. The challenges of planning and early implementation included cultural, geographic, and system issues with problems such as synchronizing the system across six time zones, helping providers adjust to new work patterns, and the cultural issues of change management. Additionally, system performance was occasionally below expectations, with slow response times leading to user dissatisfaction. Through the efforts of headquarters and hospital staff members, however, working in a collaborative environment, these issues have been managed or prioritized for solution. The system will move into the second phase of implementation this year, and the lessons learned from Phase I are expected to improve the next phase of implementation.

Discussion: Through the application of quality improvement approaches, Shriners Hospitals for Children has worked with staff members at the 20 U.S. hospitals to implement the first phase of the system. During implementation, the system faced a number of challenges, including process redesign for physician workflow, computer system slowdowns, staff unease with system features, training disparities, and selection of modules for implementation. Additionally, the distribution of the hospitals across 16 states and 6 time zones produced some expected, but particularly vexing, issues that have been solved only after two years of use. Working with the clinical staff, hospital leadership, and the information technology department at headquarters, many of these problems have been solved. The challenges and approaches to obtaining solutions serve as the subject of this presentation.

The author has indicated *no* financial relationship or interest with any proprietary entity related to the content of this CME activity.

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A NOVEL WEB-BASED ANTIMICROBIAL APPROVAL PROGRAM IMPROVES EFFICIENCY, COMMUNICATION, USER SATISFACTION, AND RESULTS IN SIGNIFICANT COST-SAVINGS.

Allison L Agwu, MD,[1] Carlton KK Lee, PharmD,[1,2] Sanjay K Jain, MD,[1] Kara Murray, PharmD,[2] Jason Topolski, PharmD,[2] Robert E Miller, MD,[4] Timothy Townsend, MD,[1] Kwang Sik Kim, MD,[1] Christoph U Lehmann, MD.[3,4] [1]Department of Pediatric Infectious Diseases, Johns Hopkins School of Medicine; [2]Pediatric Pharmacy; [3]Division of Neonatology; [4]Division of Health Information Sciences, Johns Hopkins School of Medicine, Baltimore, MD.

Purpose: Inappropriate hospital antimicrobial use includes unnecessarily broad spectrums and prolonged antibiotic use. Since 1980 the Johns Hopkins Children's Medical & Surgical Center (JHCMSC) has required approval of restricted antimicrobials (RA) by a pediatric infectious diseases fellow prior to dispensing. All medication orders are handwritten. To address prescriber dissatisfaction and missed or delayed doses, an online antimicrobial request and approval system was developed and deployed. The web-based system provides clinical decision support, tracking of approval status and duration, and text pager notification for missing requests and expiring approvals.

Methods: Pre and post implementation of the web-based system the following were evaluated: dispensing time of RAs vs. non-RAs, prescriber and pharmacist satisfaction, and a cost analysis for equivalent 6 month periods. Wilcoxon Rank Sum test was used to compare dispensing time.

Results: 121 (pre) and 78 (post) prescribers representing all JHMSC services responded to the surveys; 86% were pediatric residents. 22% (pre) vs. 68% (post) of prescribers, and 13% (pre) vs. 69% (post) of pharmacists were satisfied or very satisfied with the approval system. There was a 21% and 32% reduction in prescriber reports of any missed or delayed doses, respectively. Approximately 50% reduction of ≥ 2 missed or delayed patient doses occurred. RAs were dispensed slower than non-RAs and there was no difference in RA dispense time pre vs. post (p= 0.24). Despite similar acuity scores (mean 3.23 vs. 3.09), and no major clinical policy changes, system implementation resulted in a $234,682 reduction in RA cost over a similar 6 month period.

Conclusion: The web-based antimicrobial approval program improved communication and user satisfaction, decreased missed and delayed doses, and resulted in significant cost-savings. Integrated web-based applications may be beneficial to institutions with antimicrobial restriction programs.

The author has indicated *no* financial relationship or interest with any proprietary entity related to the content of this CME activity.

THE IMPACT OF COMPUTER-ASSISTED AUSCULTATION ON PHYSICIAN RECOGNITION AND INTERPRETATION OF HEART MURMURS. <u>Reid Thompson, MD</u>,[1] Stacey J Ackerman, PhD,[2] Raymond L Watrous, PhD.[3] [1]Department of Pediatrics, Division of Cardiology, Johns Hopkins University School of Medicine, Baltimore, MD; [2]Covance Market Access Services, Inc, San Diego, CA; [3]Zargis Medical Corporation, Princeton, NJ.

Purpose: 50% to 80% of children have innocent heart murmurs, and among patients referred for cardiology evaluation or echocardiography because of a murmur, 60-70% have no heart disease. Recent studies have confirmed that auscultation skills are in decline. We sought to assess the impact of computer-assisted auscultation on primary care physicians with regard to detection and interpretation of heart murmurs and accuracy of referral decisions of asymptomatic patients with murmurs as defined by recent American Heart Association guidelines.

Methods: Physician subjects' auscultation skills were evaluated using prerecorded heart sounds from 100 actual patients with and without heart disease. Cases were listened to with and without the use of computer-assisted auscultation as provided by Cardioscan (Zargis Medical Corp., Princeton, NJ), a new diagnostic decision support system that performs spectral and temporal analysis of heart sounds, graphically displays murmur energy profiles and relates the data statistically to consensus referral guidelines.

Results: Sensitivity for detection of murmurs increased with the use of Cardioscan from 76.6% to 89.1%*, while specificity was not significantly different (80 % vs 81%). Improvement in sensitivity was due exclusively to better detection of innocent murmurs. Cardioscan improved sensitivity of correctly identifying pathological murmur cases from 81.9% to 90% and specificity of correctly identifying benign cases (with innocent or no murmurs) from 74.9% to 88.8%. Overall, referral accuracy increased from 70.4% to 82.9%* using Cardioscan. (*p<0.001)

Conclusion: Computer-assisted auscultation appears to be a promising new technology for improving the distinction of innocent from pathologic murmurs and refining the referral decisions of primary care clinicians. This technology provides objectivity to an inherently subjective, difficult clinical skill. In addition, graphical representation, quantification and archiving of auscultation may reduce uncertainty in the continuity care of patients with heart murmurs.

The author or immediate family member has a financial relationship or interest with a proprietary entity producing health care goods or services related to the content of this CME activity. The financial relationships are identified as follows: Zargis Medical Corp.; Cardiology, computerized auscultation technology, Johns Hopkins University licensed two of my inventions to Zargis Medical Corporation. As a co-inventor, I am entitled to a portion of royalty if the company were to develop and sell a product based on these technologies in the future. At this point, I have not received compensation from this license deal. The following is the University recommended disclosure language for related publications and presentations:

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SMALL PATIENTS, BIG HOSPITAL: IMPLEMENTING AN ENTERPRISE-WIDE EMR IN THE NICU. <u>William MacKendrick, MD, FAAP</u>,[1] Sue Wolf, RN,[2] Anne Wild, BSN, RN.[2,3] [1]Pediatrics, Evanston Northwestern Healthcare, Evanston, IL; [2]Nursing, Evanston Northwestern Healthcare, Evanston, IL; [3]Medical Informatics, Evanston Northwestern Healthcare, Evanston, IL.

Purpose: Most NICUs exist within large, adult-oriented hospitals. Implementation of enterprise-wide comprehensive EMRs in such hospitals is growing, but most enterprise EMR solutions are oriented toward adult medical-surgical patients. Implementation of such an EMR in the NICU requires careful planning and extensive customization. We report our experience with this process and outline key considerations for implementation.

Methods: In March 2002, the decision was made to implement a comprehensive EMR across our organization. Workflow analysis and systems build began in August 2002. User training began early spring 2003. The NICU went live with documentation and results viewing in June 2003 and with physician order entry in November 2003. After November 2003, the NICU was a completely paperless environment. Throughout the implementation process, and continuing up to the present, physician and nursing input on the usability and efficiency of the system have been sought and have formed the basis for ongoing system build modifications.

Results: Several key considerations for successful EMR adaptation to the NICU have been identified. These include: custom design of flowsheets and reports for efficient, NICU-specific data entry and review; capacity for high-precision, weight-based medication dosing and dose checking; ability to segregate neonatal medication and procedure orders from adult orders during order selection; ability to calculate and display data normalized for weight; display of growth charts; seamless abstraction of key data from the maternal chart; and NICU-specific user training.

Conclusion: Comprehensive, enterprise-level EMRs are not suitable for implementation in the NICU "out of the box". To be successful in the NICU environment, such systems must support extensive customization, and organizations must be responsive to the unique informatics needs of the NICU environment. With proper implementation and support, such systems can succeed in the NICU, and they confer the advantage of rapid access to all clinical data across the spectrum of care.

The author has indicated *no* financial relationship or interest with any proprietary entity related to the content of this CME activity.

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WEB-BASED CHILD PSYCHIATRY ACCESS PROJECT: A FEASIBILITY STUDY. <u>Maan Dela-Cruz, MPH,</u>[1] Deborah Steinbaum, MD, FAAP,[1] Anthony Battista, MD, FAAP,[3] Rachel Zuckerbrot, MD, FAAP,[2] Danielle Laraque, MD, FAAP,[1] NY Chapter 3. [1]Pediatrics, Mount Sinai School of Medicine, New York, NY; [2]Pediatrics, Columbia University, New York, NY; [3]Private Practice.

Purpose: One objective of Healthy People 2010 is to increase the number of persons seen in primary care who receive mental health screening, assessment, and treatment. Studies have found that a majority of pediatricians identify problems achieving this objective. These studies cite lack of health insurance and a shortage of mental health providers as barriers to accessing care. Notably, studies also show that pediatricians are more likely to provide mental health services if given more training or psychiatric back-up. This pilot project aims to make child and adolescent psychiatric services more accessible to primary care professionals (PCPs) via a web-based consultation program.

Methods: *Web-CPAP* is a modification of the Massachusetts CPAP regional model. *Web*-CPAP develops a web-based format allowing PCPs to request consultations from child psychiatrists on non-emergent mental health issues.

Results: An interdisciplinary group of pediatricians, psychiatrics, informaticians, and attorneys developed a web-based format to capture the consultative process between pediatrician and psychiatrist. Several structured forms were devised to capture information on the following: 1) Intake data fields for consultation query; 2) Consultant response data field; 3) Resolution of consultation data fields. All data are captured electronically. Queries are de-identified to comply with HIPAA standards and security measures include a unique login for each practitioner, encryption of all passwords, storage of all login attempts to detect violations and hacker attempts, and a 128-bit Secure Socket Layer Certificate. The Web-CPAP program also links PCPs to community-based services and resource materials.

Conclusion: This innovative planning project offers the hope of expanding access to mental health care for children. Using the CPAP format, data capture allows documentation and analysis of the "advice" provided by the child psychiatrist and the improvement in the provision of mental health services to children.

The author has indicated *no* financial relationship or interest with any proprietary entity related to the content of this CME activity.

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EXAMINING THE EFFECT OF A PHARMACY SYSTEM & ELECTRONIC MEDICATION ADMINISTRATION RECORD ON MEDICATION ERRORS AND ADES.

Joseph Dye, RPh, PhD,[1] James Jose, MD, FAAP,[2] Paula J Edwards,[3] Kimberly Rask, MD, PhD,[4] Alan Kohrt, MD, FAAP,[2] Steven Culler, PhD,[4] Francois Sainfort, PhD,[3] Timothy Stacy, RPh, MBA.[1] [1]Pharmacy, Children's Healthcare of Atlanta, Atlanta, GA; [2]Clinical Informatics Department, Children's Healthcare of Atlanta, Atlanta, GA; [3]Health Systems Institute, Georgia Institute of Technology, Atlanta, GA; [4]Rollins School of Public Health, Emory University, Atlanta, GA; [5]Quality Department, Children's Healthcare of Atlanta, Atlanta, GA.

Purpose: Computer-based inpatient medication administration records (eMAR) and pharmacy systems demonstrate promise in reducing medication related errors & adverse events. However, there is little information on their affects in pediatric settings, where process risks are higher due to the diversity of patient diagnosis and wide range of applicable doses for medications. This study examines the effect that a phased implemention of a commercial pharmacy system (eRx) and eMAR has on patient safety in two tertiary pediatric hospitals: 1 academic and 1 non-academic.

Methods: As part of a phased implementation of an electronic medical record (EMR) system, eRx was implemented in pharmacy followed 6 months later by eMAR on all inpatient units. Prior to and following each implementation, adverse events (ADEs & medication errors) are identified via chart review using the IHI trigger methodology with additional pediatrics triggers to ensure that medication-related events common in pediatrics are captured. Random samples of patient records from ICUs and general care units (GCU) at each hospital were selected for review at each time period.

Results: Initial before/after eRx reviews for the non-academic hospital are complete. The most common triggers found were antihistamines and antiemetics. From these triggers, the most common events identified included ADEs and order entry errors, which were reduce by 1/2 to 2/3, respectively, with the new system. Notable reductions in total and preventable events were observed in all units and a significant reduction of 88% was seen in total events per 1000 orders in GCU ($\chi2=5.77$, $p=0.016$). Chart reviews for the academic and for both hospitals at the post-eMAR time period are in progress.

Conclusion: Our results demonstrate that the drug-drug interaction, allergy alerts, & automated dosing guidelines provided in eRx systems can help pediatric hospitals reduce medication-related errors and events. Additional patient safety benefits are expected as a result of integrating these systems with CPOE and bar-coding.