Building the Vanderbilt Integrated Teaching and Learning System (VITALS) and VITALS Spotlight Tool

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VITALS SPOTLIGHT FINDS AND HIGHLIGHTS **REQUIRED CLINICAL EXPERIENCES** (RCES) IN **MEDICAL STUDENT** ELECTRONIC HEALTH RECORD **CLINICAL DOCUMENTATION** USING **STANDARDIZED TERMINOLOGY** MAPPINGS FOR RCES AND AN EXISTING **NATURAL LANGUAGE PROCESSING** (NLP) SYSTEM. **RCE DATA** ARE **MANUALLY ENTERED AND TRACKED** IN **VITALS**, BUT FUTURE ENHANCEMENTS COULD **IMPROVE RCE CONCEPT DETECTION** AND USABILITY AS WELL AS INFORM **FUTURE RESEARCH** ON THE **VALIDITY, UTILITY, AND GENERALIZABILITY** OF RCE DEFINITIONS BASED ON STANDARDIZED TERMINOLOGIES.

INTRODUCTION

Healthcare education presents opportunities to valuably enhance students' educational tools and experience through clinical informatics. Previous studies have evaluated tools that track residents' clinical exposure to specific diagnosis categories through use of electronic health record data.[1] Similar studies of tools for tracking medical student experiences are needed. The Liaison Committee on Medical Education (LCME), the accrediting body for medical schools in the United States, requires students to track RCEs. By leveraging an existing NLP platform at Vanderbilt University Medical Center (VUMC), Word Cloud NLP, and VUSM's custom integrated learning platform, VSTAR, the authors built complementary tools for aggregating, capturing, and tracking RCEs at VUSM.

METHODS

VUMC's Health Data Repository (HDR) is a vendor-neutral repository of all VUMC clinical data collected since 1995. The HDR contains structured data, reports, images, and free-text documents for 4.5 million patients, including 1.3 billion documents. Word Cloud NLP processes each document using regular expressions, then excludes certain Unified Medical Language System (UMLS) terms, applies synonyms, and extracts concepts using a subset of ~12,000 UMLS concept unique identifiers (CUI), previously identified as the most clinically useful in the HDR.

VUSM clinical and educational faculty developed a list of 100 RCEs and associated data capture needs based on consensus educational requirements. RCE concept terms were created ad hoc as no standard terminology for medical education concepts exists; they include 61 diagnoses, 28 skills, and 11 procedures. Of the total, 29 RCEs were determined to be difficult to discretely detect in clinical documentation. The remaining 71 RCE concepts were manually mapped to the broadest UMLS CUIs and the most commonly occurring related CUIs, then refined by expert clinician review.

The Vanderbilt Integrated Teaching and Learning System (VITALS) allows easy data entry and comprehensive RCE tracking for students and faculty. VITALS Spotlight is a proof-of-concept system that displays student clinical EHR documentation with highlighted RCE concepts. Future enhancements will expand RCE-mapped concepts to improve tool performance. Also, draft RCEs will be auto-built from VITALS Spotlight data to improve usability and RCE capture rates. Future research could compare the accuracy of computer aided RCE capture versus manual capture and evaluate the representation of RCEs in VUMC's patient population compared to expected exposures or future testing ratios. These data could eventually be used to augment future clinical rotations to support institutional educational goals or to personalize student experiences based on their interests or competency gaps. Lastly, RCE definition mappings could be validated and shared nationally to promote generalizability to other areas of healthcare education.

VITAL EXPERIENCES IN THE VANDERBILT INTEGRATED TEACHING AND LEARNING SYSTEM
Medical students manually record required clinical experiences.

VITALS SPOTLIGHT (DATE VIEW)
Required clinical experiences are organized by date and highlighted in medical student clinical documentation.

VITALS SPOTLIGHT (CONCEPT VIEW)
Required clinical experiences are aggregated by concept. Students can view highlighted instances of the concept and the relevant clinical documentation.

REFERENCES

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