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## Title

How Emergency Physicians Think: A Cognitive Task Analysis of Task and Patient Prioritization in a Multi-Patient Environment

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specialty and the experiences that drove them to this specialty.

**Methods:** An IRB approved cross-sectional survey study of EM bound 4th year medical students was performed. The 8-question survey explored when and why students choose EM as their specialty. The survey was distributed via e-mail the first week of March 2015 to all medical students who applied to an EM residency at 4 programs representing different geographical regions. Statistical Analysis included item description and creation of a multinomial logistic regression using timing of specialty decision as the outcome.

**Results:** 793/1372 (68%) M4 students responded overall to the survey. Of students who decided on EM, 110 (13.9%) chose prior to Year 3, 399 (50.4%) chose during Year 3, and 282 (35.7%) decided in Year 4 or later. A statistically significant multinomial logistic regression model was fitted ($p<.001$). Early exposure, presence of an EM residency program, employment in the ED, previous experience as a pre-hospital provide, and completion of a Year 3 clerkship were associated with earlier selection of EM (Table 1). Delayed exposure to EM until year three was associated with later selection of EM.

**Conclusions:** Early exposure and life experiences were associated with choosing EM earlier in a student's medical school career. The third year was identified as the most common time for definitively choosing the specialty. Directors interested in increasing student selection of EM as a career should focus on bolstering early exposure as well as considering a Year 3 clerkship.

**Table 1.** Do Medical Students Choose EM sooner based on previous experiences?

| VARIABLES | Decided on EM during M3 | | Decided on EM during M4 or still deciding | |
|---|---|---|---|---|
| | Relative Risk Ratio | 95% Confidence Interval | Relative Risk Ratio | 95% Confidence Interval |
| No affiliated EM residency program at medical school | 0.63 (0.16) | 0.39 - 1.02 | 0.56* (0.15) | 0.33 - 0.95 |
| *When was your first Exposed to EM* | | | | |
| Year 1 | 0.78 (0.28) | 0.39 - 1.57 | 0.71 (0.28) | 0.33 - 1.53 |
| Year 2 | 1.16 (0.62) | 0.4 - 3.30 | 1.63 (0.91) | 0.54 - 4.88 |
| Year 3 | 11.69* (12.43) | 1.46 - 93.91 | 16.57** (17.74) | 2.03 - 135.20 |
| Year 4 | 0.89 (0.80) | 0.15 - 5.16 | 5.41* (4.58) | 1.03 - 28.41 |
| *What was your first meaningful EM exposure* | | | | |
| Research | 1.25 (0.84) | 0.33 - 4.69 | 0.98 (0.72) | 0.24 - 4.09 |
| Employment in ED | 0.70 (0.24) | 0.36 - 1.36 | 0.44* (0.18) | 0.20 - 0.97 |
| Required Clerkship in EM | 2.01 (1.29) | 0.58 - 7.04 | 2.74 (1.77) | 0.77 - 9.72 |
| Pre-hospital Provider | 0.45* (0.15) | 0.24 - 0.85 | 0.63 (0.22) | 0.31 - 1.25 |
| Personal/Family cared for in ED | 1.60 (0.94) | 0.50 - 5.06 | 1.68 (1.04) | 0.50 - 5.67 |
| Other | 0.95 (0.43) | 0.40 - 2.30 | 0.79 (0.39) | 0.30 - 2.07 |
| Did have a Year 3 Rotation | 1.42 (0.33) | 0.90 - 2.23 | 0.45** (0.12) | 0.27 - 0.75 |

Outcome Comparison is Deciding before M3; Independent Variable Comparison Group is applicant at school with EM program first experience prior to medical school, first meaningful exposure was clinical shadowing; SE in parentheses; ***p<0.001, **p<0.01, *p<0.05; Hosmer-Lemeshow Not significant using deciles, Area under ROC .71.

## 35 How Emergency Physicians Think: A Cognitive Task Analysis of Task and Patient Prioritization in a Multi-Patient Environment

Chan T, Mercuri M, Van Dewark K, Sherbino J, Linberry M / McMaster University, Hamilton, ON; University of Illinois at Chicago, Chicago, IL

**Background:** Concurrent management of multiple ill patients is an important skill in emergency medicine, especially in the environment of increasing emergency department (ED) volumes.

**Objectives:** The objective of this study was to determine a framework for describing how physicians think about prioritization of patients in a multi-patient scenario.
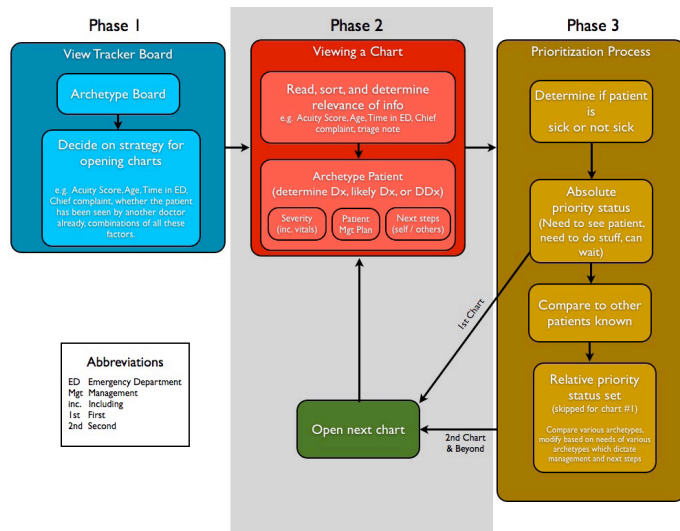
To do this, we conducted a think aloud study utilizing a simulated tracker board scenario (with multiple patient files generated by TMC and KVD) as part of a larger cognitive task analysis study.

**Methods:** DESIGN - Participants were asked to view and interact with a tracker board with various simulated patients and then prioritize these patients. SETTING - This study was completed at multiple teaching hospitals associated with a major Canadian academic institution between March 2014 and September 2015. PARTICIPANTS - Both experienced physicians (identified via a peer-nomination technique) and junior residents (PGY 1 or 2) were exposed to various tracker board scenarios and asked to think aloud, describing their process for prioritizing the various patients and patient-oriented tasks. ANALYSIS - Using an inductive technique, two investigators (TMC, MM) independently reviewed the transcripts from the think aloud process generating an item-based coding. This coding system was then reviewed collaboratively and used to combine the item-based codes into a cognitive task structure via an iterative process.

**Results:** 20 physicians (experienced n=10, junior residents n=10) participated in this study. The cognitive task of patient prioritization comprised of three components (Figure 1): 1) Phase 1 - Viewing the entire board to determine an overall strategy; 2) Phase 2 - Creating an archetype from patient-care information available in an initial chart (i.e. vitals, brief clinical history); 3) Creating a Relativistic Prioritization List.

**Conclusions:** We have generated a cognitive task analysis of how physicians think through prioritizing patients in simulated multi-patient environments. This may inform development of didactic and clinical educational materials.

**Figure 1.**



p-value<0.0141). There was a significant decline between the immediate post-quiz and the 3 month post-quiz, mean difference 3.3 (2.4-4.2; p-value<0.0001).

**Conclusions:** One presentation significantly increased participants' knowledge of HT. Annual education is recommended to strengthen participants' abilities to identify victims of human trafficking and to maintain a high level of awareness. Future areas of investigation will focus on the ideal timing of refresher presentations on HT and whether increased awareness among residents and faculty results in increased victim identification in the clinical setting.

## 36 Human Trafficking Didactic Session Resulted in Improved Awareness

Findlay S, Harland K, Runde D, Wheaton N / University of Iowa, Iowa City, IA

**Background:** It is estimated there are 25 million victims of human trafficking (HT) worldwide. Approximately 20,000 people are trafficked into the US annually. In 2014, less than 5100 victims were identified in the US despite the fact that up to 88% of victims of HT have contact with health care providers. This gives providers a unique opportunity to identify individuals of HT.

**Objectives:** The purpose of the study was to evaluate the effect of a HT presentation on participant awareness.

**Methods:** We performed a prospective cohort study of residents and rotating medical students in our university-based EM residency program. Participants were given a 45-minute presentation that focused on HT awareness, identification, and available resources. To assess knowledge and retention a 15 point quiz was given on three occasions. Quiz 1 was given prior to the presentation, quiz 2 was given one day following the presentation, and quiz 3 was given approximately three months following the presentation. Participants were excluded if they were unable to attend the presentation.

**Results:** Participants had a significant increase in HT knowledge following the presentation. There were 25 eligible participants. Two were excluded because they were unable to attend the presentation. Pre-presentation quiz and one day post-quiz were completed by 23 participants. Four participants didn't complete the 3 month post-quiz. Paired t-test analysis was performed. Mean pre-presentation score was 8.2 out of a total of 15 points. One day mean post-presentation score was 13.2 with a mean difference of 4.9 (95% CI, 4.1-5.7; p-value < 0.001). Three month mean post-presentation score was 10.1 with a mean difference of 1.7 (95% CI, 0.4-3.1;

## 37 Identification and Instruction of Core ECG Interpretation Skills Necessary for Emergency Medicine Residency Readiness

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**Background:** Adequate knowledge and recognition of multiple ECG abnormalities is essential for residency readiness. There is no clear consensus regarding core ECG interpretation skills necessary for Emergency Medicine (EM) residency. Confidence and proficiency in first year residents in ECG interpretation skills is low. The optimal way to teach ECG interpretation skills needs further investigation.

**Objectives:** Determine the core ECG findings incoming EM residents should recognize.

Evaluate a flipped classroom approach to teaching core ECG interpretation skills.

**Methods:** We surveyed EM faculty at 7 EM residency programs to determine the most important ECG findings that incoming EM residents should recognize. We used the top 20 findings to create a test for senior medical students during their 4th year EM Clerkship. 74 students were pretested on ECG interpretation during the first week of the clerkship. Students then completed a web-based asynchronous learning module followed by a readiness assurance quiz upon module completion. Each student next attended a small group interactive discussion to review the ECG interpretation concepts plus clinical correlation questions related to the 20 ECG findings. Students were retested 2 weeks later using the same exam as the pretest. A convenience sample of 22 students was retested 1-5 months following intervention providing retention data.

**Results:** 106 EM faculty from 7 residency programs responded to the survey (49%). Of 44 ECG findings, 20 were selected by more than 65% of respondents. Faculty felt the majority of incoming EM residents' ECG interpretation skills were at or below expected level. Over 40% of students couldn't identify 4 of these 20 core ECG findings during pretesting (Table 1). Following our intervention, total ECG interpretation test scores significantly improved from pretest to both posttest and retention (p < .001, r = .78), but there was