



Education

Assessment of neurological clinical management reasoning in medical students

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ABSTRACT

In neurology education there is evidence that trainees may have greater ability in general localization and diagnosis than they do in treatment decisions, particularly with considering longer term care and supportive care. We hypothesized that medical students completing a neurology clerkship would exhibit greater skill at considering the acute diagnostic and therapeutic management than at considering supportive management measures. Data from 720 standardized patient encounters by 360 medical students completing a neurology clerkship being evaluated via an objective structured clinical examination were analyzed for skill in three components of clinical decision making: diagnostic evaluation, therapeutic intervention, and supportive intervention. Scores for all standardized patient encounters over the 2008–2012 interval revealed a significantly higher percentage of correct responses in both the diagnostic (mean [M] = 62.6%, standard deviation [SD] = 20.3%) and therapeutic (M = 63.0%, SD = 28.8%) categories in comparison to the supportive (M = 31.8%, SD = 45.2%) category. However, only scores in therapeutic and supportive treatment plans were found to be significant predictors of the USA National Board of Medical Examiners (NBME) clinical neurology subject examination scores; on average, a percent increase in therapeutic and support scores led to 5 and 2 point increases in NBME scores, respectively. We demonstrate empirical evidence of deficits in a specific component of clinical reasoning in medical students at the completion of a neurology clerkship.

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1. Background

Continual efforts are being made to refine medical education [1,2]. Central to appropriately directing many of these efforts is an understanding of where improvements could and should be made. Awareness of specific weaknesses in either knowledge or clinical skills in significant numbers of students allows energies to be focused to improve these weaknesses and efficiently utilize resources. In neurology education there is evidence that trainees may have greater aptitude at general localization and diagnosis than they do in treatment decisions. Both medical students and neurology residents may have particular difficulty with considering longer term care and supportive care as opposed to the initial diagnostic work-up and therapeutic interventions [3–5]. Throughout this manuscript the term “supportive care” will refer to clinical services performed by integral non-physician members of the medical care team, for example physical, occupational, and speech therapists.

We hypothesized that medical students would exhibit greater skill at considering the acute diagnostic and therapeutic management of neurological problems compared to their skill at considering supportive management measures. The answer to this question is important because if students do indeed neglect to prescribe supportive care measures this may be indicative of a weakness in the curriculum that should be addressed. It is possible that similar deficits in clinical management reasoning may be present amongst students in other specialty clerkships as well as in more advanced trainees such as residents or fellows. We employed a component of our existing medical student assessment to study this hypothesis.

2. Methods

Our group has previously described validity evidence related to the use of an Objective Structured Clinical Examination (OSCE) to assess medical students at the end of a 4 week required neurology clerkship [6]. At the Pritzker School of Medicine of the University of Chicago, IL, USA, the neurology clerkship OSCE has been in place since 2008. The OSCE is mandatory for all students rotating through the neurology clerkship, and success on the OSCE is

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required in order to pass the clerkship. The OSCE consists of four distinct standardized patient (SP) encounters, of which each student is randomly assigned to two. The students are unaware of the clinical scenarios represented in the SP cases. For each SP case, students perform a focused history and a complete neurological exam. The students then complete an online post-encounter exercise describing the history, physical exam, assessment (including both localization and prioritized differential diagnosis) and plan. In the plan the students are expected to include a diagnostic work-up, acute therapeutic interventions, and supportive interventions. Students are scored by faculty raters using a checklist of expected components which should be included in their write-up. Additionally students are scored by the SP using checklists for performance of key elements of the history and neurological examination. The specific templates for the SP cases are available at MedEdPORTAL [7].

Answers in the plan section of the checklist were independently categorized into diagnostic, therapeutic intervention and supportive intervention by two of the authors (R.V.L., J.R.B.). There was 100% concordance regarding the classification of points in the plan into one of the three categories. If any discordant items had been found, a third expert rater would have participated in order to reach consensus among the raters. Each SP case did not contain each of the three categories being evaluated. Specifically, 10% of students were not evaluated using cases requiring a supportive component to the plan. All scores were compiled in a spreadsheet and identifiers were removed. Statistical analyses were performed using STATA IC 12 (StataCorp, College Station, TX, USA). Data were analyzed for the 360 medical students from July 2008 until June 2012 whose OSCE required a supportive component to the plan. For each student, there were two SP encounters. There were 334 third year students and 26 fourth year students included in the analysis. Students were assigned to one of two training sites: the University of Chicago Medical Center (UCMC) ($n = 284$), or the NorthShore University Health System (NSUHS), a large community-based University of Chicago affiliate ($n = 76$).

Initially we evaluated the aggregate mean (M) scores from all of our SP encounters in each management category (diagnostic, therapeutic, supportive) using t -tests; correlations were used to examine the association between different management measures. To examine trends over the academic year, linear regression was used. Finally, scores from the management measures were correlated

with SP checklist scores and National Board of Medical Examiners (NBME) clinical neurology subject examination scores to examine how student performance in the documentation of the plans was associated with other related variables; linear regression was used to examine the effect of each management plan on NBME scores while controlling for the simultaneous effects of the other plans. We compared the scores between third and fourth year students (2008–2012) for each category of intervention using t -tests.

This project was submitted to the institutional Internal Review Board and was deemed exempt from review as it fits into the minimal risk category of research conducted in established or commonly accepted educational settings, involving normal and/or special educational practices, strategies, or comparison of techniques.

3. Results

The scores for all SP encounters over the 2008–2012 interval revealed a significantly higher percentage of correct scores in both the diagnostic ($M = 62.6\%$, standard deviation [SD] = 20.3%) and therapeutic ($M = 63.0\%$, SD = 28.8%) categories in comparison to the supportive ($M = 31.8\%$, SD = 45.2%) category. The results suggest that, on average, there is no significant difference in the documentation of diagnostic or therapeutic plans. However, supportive plans had a significantly lower percentage of plans ($M = 31.8\%$) documented compared to diagnostic or therapeutic plans ($t [718] = 11.78$, $p < 0.001$ and $t [718] = 11.04$, $p < 0.001$, respectively). Correlations between the three categories were all statistically significant (diagnostic and therapeutic [0.244, $p < 0.001$], diagnostic and supportive [0.103, $p = 0.052$], therapeutic and supportive [0.178, $p < 0.001$]). Additionally, we found no significant differences in the scores by clerkship site (UCMC, NSUHS) for any of the three clinical management categories.

Comparing data between academic calendar years (2008–9, 2009–10, 2010–11, 2011–2) a trend toward improved scores over time in the therapeutic (about 4.1% per calendar year, $p = 0.004$) and supportive category (about 5.0% per calendar year, $p = 0.025$) was noted (Fig. 1). Comparison between student performance on the different components of the management plan between third and fourth year students found no significant differences in the diagnostic, therapeutic, and supportive categories. Analysis was

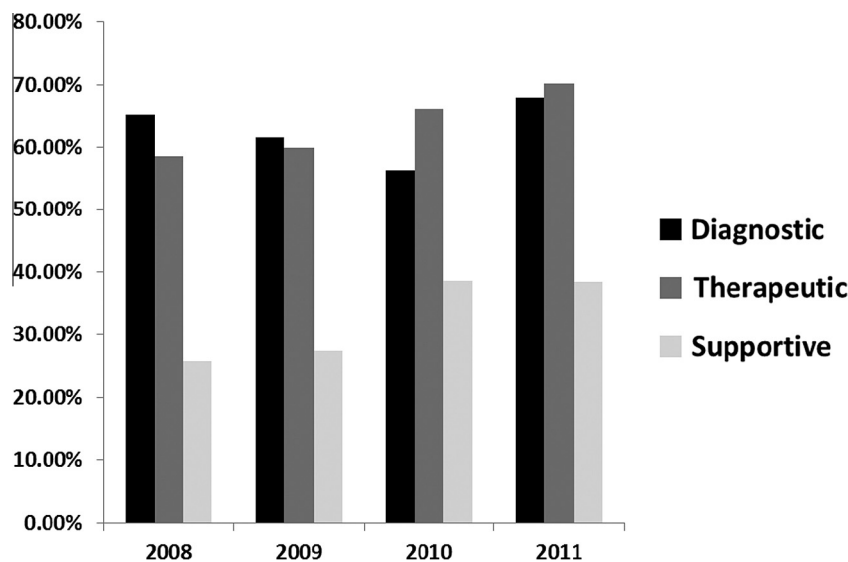


Fig. 1. Descriptive statistics of medical student clinical management reasoning in the diagnostic, therapeutic and supportive categories over the years 2008–2011.

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