

A Comparison of Medical Student NBME Scores and Satisfaction using a Team Based Learning Curriculum in place of Traditional Lectures on the Neurology Clerkship

Richard Dunham, MD, Zulfi Haneef, MD, and Doris Kung, DO – Department of Neurology, Baylor College of Medicine, Houston, Texas

BACKGROUND

Baylor medical students rotate through a four week neurology clerkship at one of four clinical sites. Historically, the clerkship has supplemented the clinical experience with a lecture based curriculum on neurologic diseases. Students were required to attend four hours of in-class lectures each week.

We noticed the learners often had difficulty applying the details to complex clinical cases. The problem was magnified by clinical site differences, particularly case variety, patient demographics, clinical volume, and attending faculty. However, curricular revision is difficult to accomplish while still meeting goals for student satisfaction and medical knowledge.

Team based learning (TBL) is a student centered approach using a flipped classroom model. It emphasizes student preparedness, problem solving, synthesis, and group communication. TBL has been shown to be more effective in comparison to traditional in-classroom lectures^{1,2}. We wanted to use a case based curriculum to standardize our education on core clinical competencies.

METHODS

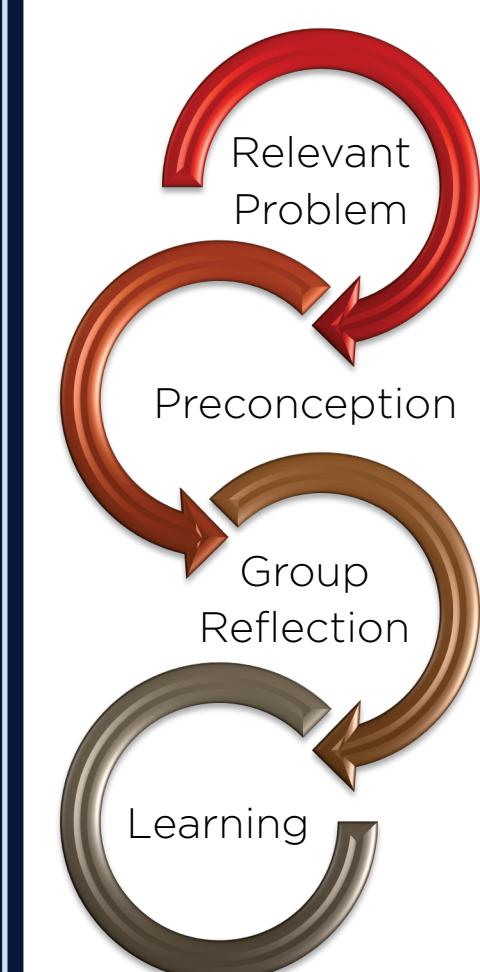
The clerkship leadership identified core concepts important for learners to master on their neurology rotation. These ideas were used to design a TBL series to replace the traditional lectures. Eight draft TBL modules for group discussion were developed. These were TBL Introduction with the Neurologic Exam, Stroke, Epilepsy, Neuromuscular Disease, Demyelinating Diseases, Headaches, Movement Disorders, and Cognitive. The drafts were circulated to faculty experts for revision and then refocused again by the clerkship leadership. Lecturing faculty recorded their didactic material in audio PowerPoint presentations for students to review remotely before the TBL session. The TBL objectives were given to the students a week prior to the session.

Each TBL module consisted of a written case followed by multiple choice questions (MCQs) for discussion in small groups of 4-5. Attendance at the session was required, but the TBL participation did not contribute to their clerkship grade. The students completed the TBL Introduction with the Neurologic Exam session at orientation. In subsequent weeks they were expected to attend a 1.5 hour TBL session each week.

Medical students on their neurology core clerkship rotation were divided into predetermined groups of 4-5. They remained in the same small group for all TBL sessions. Each team spent 30 minutes analyzing the written TBL case and marking their MCQ answers. After the case is presented for general discussion, the four teams simultaneously revealed their answers and reasoned through their different choices. This was facilitated by the clerkship faculty.

Anonymous, voluntary, self-reported surveys were collected at the end of each TBL session, except for the introduction. The TBL questions were revised with student feedback from survey comments and with faculty preceptor experience to target an appropriate educational depth and discussion.

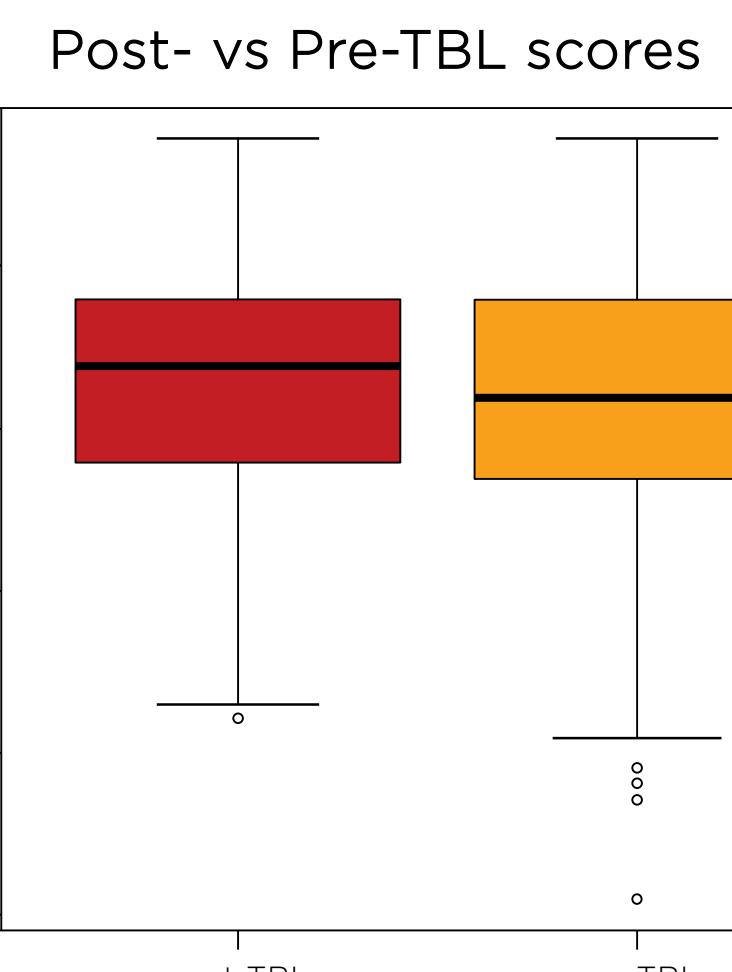
Figure 1



Students analyze a written history with a neurological exam. As they evaluate the case and answer questions, they often realize they may have some preconceptions that need to be explored. There are frequently different interpretations of the history or exam to discuss. As they reflect within a small group and later as a large group, they develop a deeper understanding for the complexity of patient care decisions. These discussions help develop clinical reasoning and critical thinking.

Figure 2

The mean NBME neurology scores for students with TBL sessions (mean 82.6%, n = 230) compared to three years of NBME scores under lecture based curriculum (mean 81.7%, n = 661).



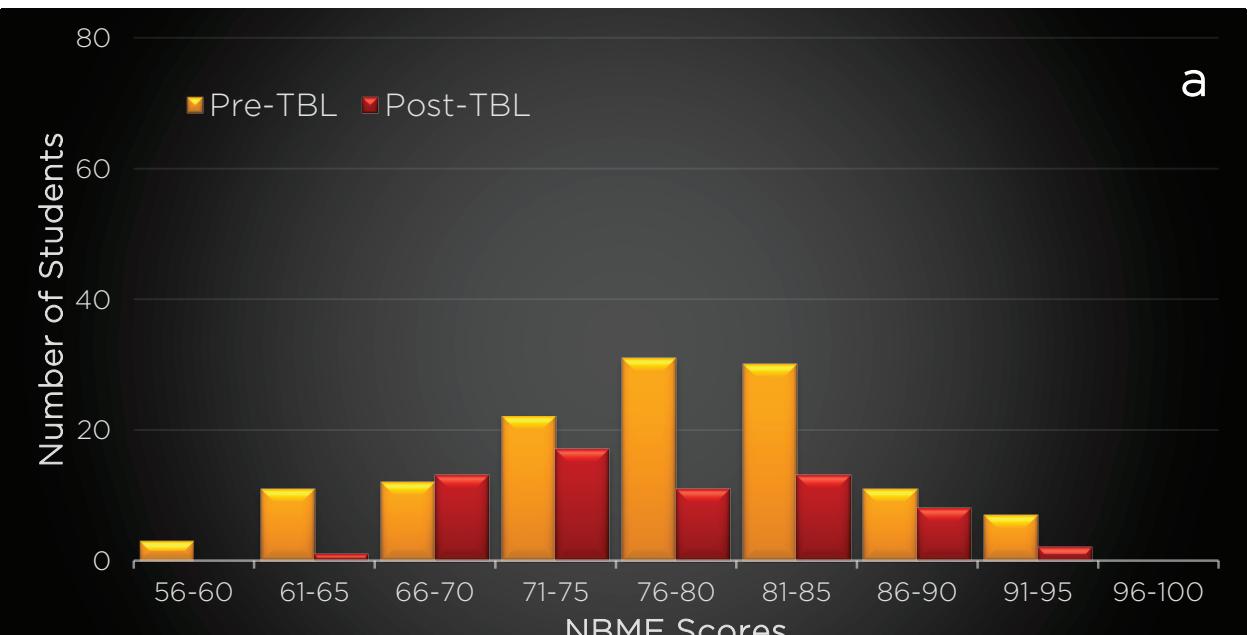
REFERENCES

- Levine RE, O'Boyle M, Haidet P, Lynn DJ, Stone MM, Wolf DV, Paniagua FA. Transforming a clinical clerkship with team learning. *Teach Learn Med*. 2004;16(3):270-5.
- Hake R. Interactive-engagement versus traditional methods: A 6,000 student survey of mechanics test data for introductory physics courses. *Am J Phys*. 1998;66:64-74.

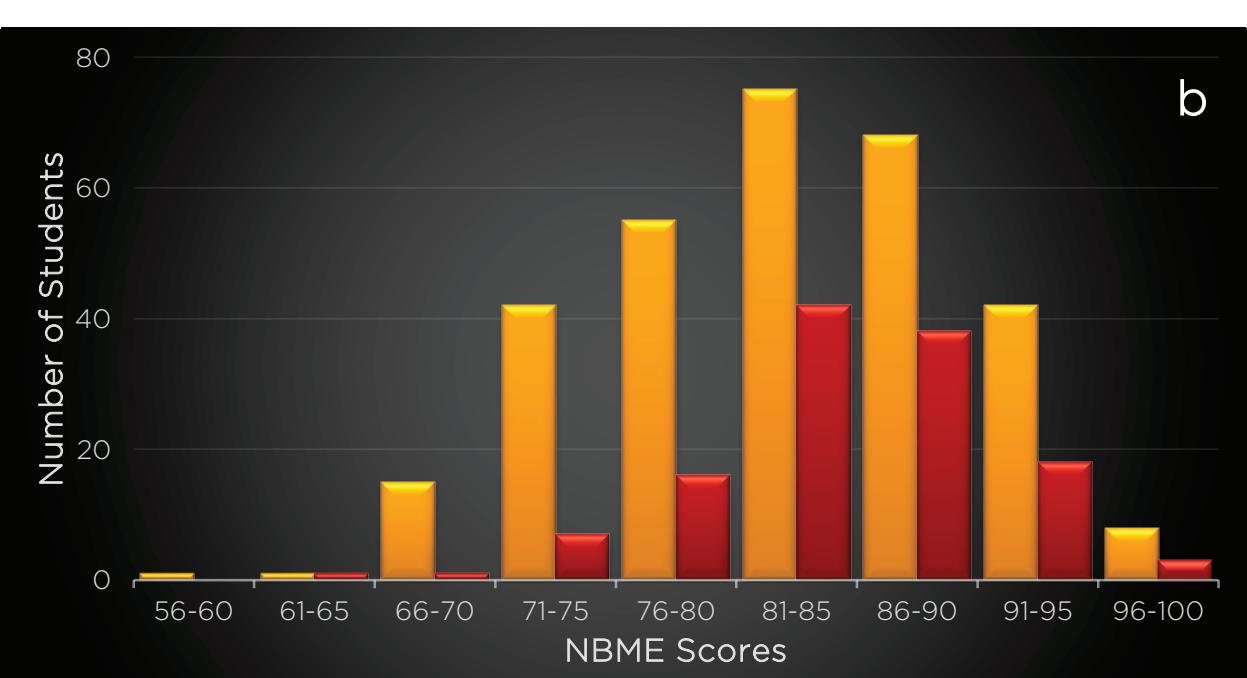
Figure 3

The three graphs show student NBME scores under the lecture based curriculum compared to TBL curriculum. In (a), the MS2 students with lectures had a mean NBME score of 76.9 (n = 128) compared to 77.3 (n = 65) with TBL. In (b), the MS3 students had a mean NBME score of 82.6 (n = 308) compared to 84.9 (n = 126) with TBL. In (c), the MS4 students had a mean NBME score of 83.3 (n = 225) compared to 84.3 (n = 39) with TBL.

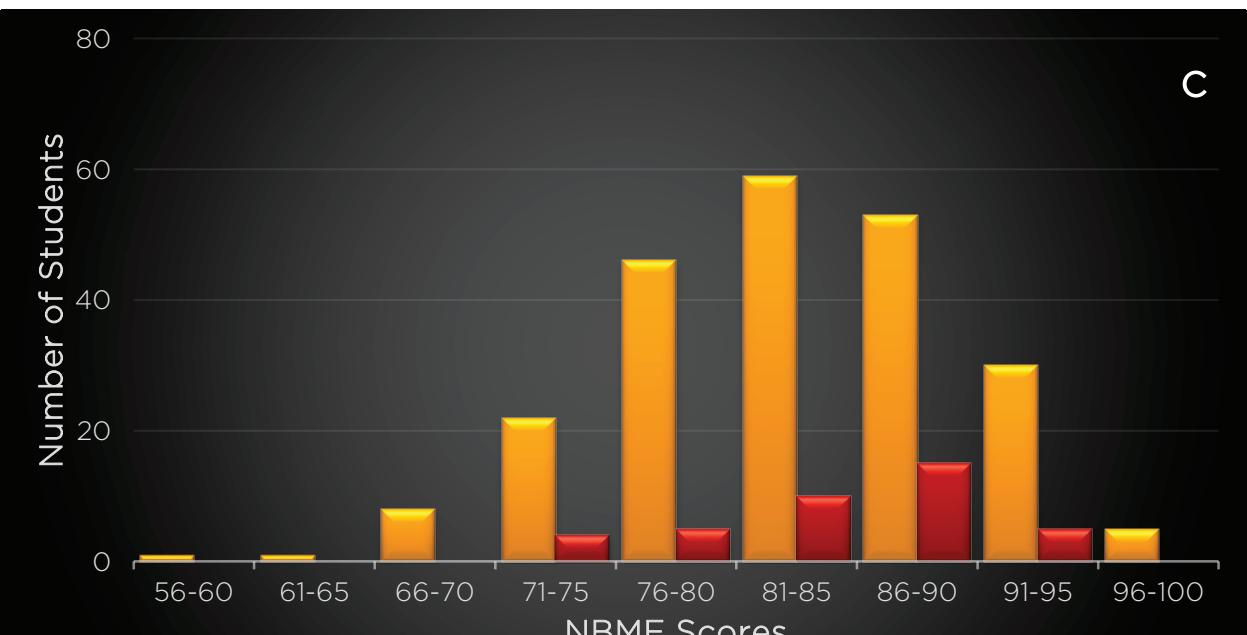
NBME averages for 2nd year medical students



NBME averages for 3rd year medical students



NBME averages for 4th year medical students



RESULTS

We collected 483 anonymous surveys over 14 months of the TBL curriculum.

Survey Results

	% of Students (agree or strong agree)
My team was prepared	97.3
My team worked well together	98.6
The group discussion improved my understanding	98.8
The online lectures prepared me	93.3
TBL facilitator enhanced my learning	98.6

Students rated the online lectures positively. There were comments about technical issues during the initial transition.

Students said the overall TBL sessions overall were "very good", (mode 4, scale 1-4).

NBME scores trended towards improvement with TBL curriculum (mean 82.6 during 2018-2019) when compared to three years of lecture based curriculum from 2014-2017 ($p = 0.098$, Figure 2).

NBME scores increased with medical student experience. The MS2 group consistently scored the lowest. All groups had a positive trend on NBME scores, but the MS3 group responded with the highest increase (mean 84.9 compared to 82.6 with lectures, $p < 0.001$, Figure 3).

DISCUSSION

Student satisfaction was very positive for a novel TBL curriculum on the neurology clerkship. The small group discussion helped develop clinical reasoning, differential diagnosis and localization and tolerance for uncertainty. We were also able to reduce the time away from clinical responsibilities.

Student preparedness for the TBL will be an ongoing issue and will require individual and group accountability. During the project we emphasized pre-class preparedness and noticed an increase in student work load. Satisfaction may not be a reliable measure of learning and will need to be complimented by a standardized assessment. Measuring competencies in communication and critical thinking may be better assessed by a simulated patient encounter.

Facilitators learned about case/question design to emphasize prearranged goals. TBL sessions generated more exploration of the topic when the questions were complex, directed towards concepts instead of facts, and reflected "real-life" situations.

The trend towards higher NBME scores was encouraging. The TBL curriculum seems to help learners at the lower ends of the NBME score spectrum, particularly students with prior clinical experience.