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# Near Peer Teaching of Surgical Physical Examination Skills in a Large Academic Medical Centre in Asia

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## Abstract

The surgical physical examination is a fundamental part of medical training. We describe our experience with a near-peer teaching program for surgical physical examination skills, which involved senior medical students tutoring junior students starting their clinical rotations. We assessed scores on an Objective Structured Clinical Examination of the abdominal, vascular, and lumps examination before and after teaching. There was improvement in scores for all examinations and overall positive feedback from all students. This suggests that near-peer teaching may be a useful adjunct to faculty-led teaching of clinical skills.

**Keywords:** *Near Peer Teaching; Physical Examination; Surgery*

## I. INTRODUCTION

Beside clinical examination is fundamental to the practice of medicine. All 2<sup>nd</sup> year medical students at the National University of Singapore (NUS) undergo a 1 month Clinical Skills Foundation Course at the end of the academic year. This course is their maiden clinical posting and aims to introduce fundamentals of history taking and physical examination before they transit to their clinical years (3<sup>rd</sup> to 5<sup>th</sup> year). Unfortunately, it is challenging for faculty to effectively impart these skills due to increasing student numbers, busy clinical workloads and time constraints, leading to inadequate opportunities for learners' active participation (versus passive observation), providing feedback, reflection and discussion (Spencer, 2003).

Near-peer teaching (NPT), using senior students to teach juniors, may supplement faculty-led teaching and ameliorate these difficulties. It has shown success in both case-based learning and teaching physical clinical examination (Blank et al, 2013). Beyond circumventing faculty constraints, NPT may promote a greater degree of active learning, knowledge application, and opportunities

to correct misconceptions. Near-peer tutors may better understand learner challenges and share personal

experience in overcoming these challenges (cognitive congruence), and promote a conducive, collaborative learning environment (social congruence) (Lockspeiser et al, 2008). Tutors who become role models may also benefit from deeper learning of content (Ten Cate et al, 2007) coupled with the development of higher cognitive skills whilst tutoring – to teach is to learn twice!

We describe a NPT initiative to teach surgical physical examination skills to students who are encountering clinical patients for the first time, in the ward via (i) a practical examination skills workshop and, (ii) the use of a novel course-book developed by the near-peer tutors as a teaching aid.

## II. METHODS

Forty second-year students undergoing their maiden clinical posting at the Singapore General Hospital, Singapore, participated in a one-day workshop with IRB approval and written consent (Singhealth Centralised IRB Exemption 2015/2248, 27 March 2015). Students were

divided into three groups and participated in three 2-hour long physical examination stations in a round-robin format. The stations were - (1) Abdominal examination, (2) Peripheral vascular examination, and (3) Lumps (skin, neck, breast, and groin). Five final-year students planned the workshop and served as near-peer tutors. A course book that served as a learning aid was written by near-peer tutors and vetted by faculty members. It was designed with the goal of encouraging the student to move beyond knowledge acquisition to application and synthesis of knowledge. Each section of the book introduced the sequence and rationale behind the steps of each surgical physical examination via a series of questions. These questions aimed to facilitate: (1) Understanding of the clinical significance and relationship between examination findings, (2) Clinico-pathological correlation and (3) Reasoning from first principles.

Instruction was modelled on Peyton's four-step approach. Near-peer tutors explained the background to each

examination, demonstrated the examination steps once, and discussed the technique, rationale, and possible findings in each step. Students then practiced on each other under supervision. To consolidate learning, near-peer tutors conducted post-tests based on objective structured clinical examination (OSCE) templates provided by the National University of Singapore, and provided qualitative feedback. Students also undertook identical OSCE pre-tests for comparison, and voluntarily completed anonymous feedback forms that made use of a 5-point Likert scale (Strongly Disagree to Strongly Agree) to evaluate various aspects of the workshop.

Statistical analysis was performed in R. Test scores were percentages of maximum possible score. Paired differences between individual pre-test and post-test scores were analyzed using Bayesian Estimation on weakly informative normal priors. Posterior probability distributions were approximated using Markov Chain Monte Carlo with 100,000 resamples.

### III. RESULTS

| Exam            | Mean pre-test score, out of 100 | Mean post-test score, out of 100 | Mean Paired Difference, absolute (95% credible interval) |
|-----------------|---------------------------------|----------------------------------|--|
| Abdomen (n=40)  | 73.3                            | 91.4                             | + 17.3 (10.0 – 24.6)                                     |
| Arterial (n=40) | 41.6                            | 91.3                             | + 49.7 (41.7 – 57.8)                                     |
| Lumps (n=38)*   | 55.7                            | 90.3                             | + 34.7 (27.6 – 41.5)                                     |

Table 1. Summary of pre-test and post-test results, and paired difference indicating the improvement from pre- to post-test

\*Two students had to leave early

OSCE scores improved after teaching (Table 1), most markedly in the arterial examination (+49.7, credible interval 41.7-57.8), and also in the lumps (+34.7, credible interval 27.6-41.5) and abdominal examination (+17.3, credible interval 10.0-24.6). The abdominal examination started with the highest mean pre-test scores (73.3%), compared to the arterial (41.6%) and lumps examinations (55.7%). This may reflect greater exposure to the abdominal examination during prior faculty-led tutorials.

Out of the thirty-four students who provided feedback, 33 (97%) students agreed that the workshop helped them to pick up basic physical examination skills, and 32 (94%) were now more confident in performing these examinations on a real patient. Notably, all 34 students (100%) described better understanding of the rationale behind each clinical examination step, as opposed to performing the examinations mechanically; all (100%) found the small-group format conducive for learning. While all (100%) would encourage their juniors to attend this workshop next year, only 12 (35%) expressed interest to be a mentor themselves.

### IV. DISCUSSION

We describe a student-initiated NPT initiative that supplements a faculty-led two-week surgical clinical rotation and physical examination teaching for students commencing their maiden clinical posting. This initiative has benefits to both students and near-peer tutors.

With regards to students, this initiative improved OSCE scores and was well received. The marked improvement in OSCE scores in areas less well-covered during faculty-led tutorials suggests that NPT sessions focusing on these gaps may complement and augment faculty-led tutorials particularly well. Physical examination stations with poorer OSCE scores may also highlight and objectively reflect areas in curriculum where faculty should focus on and refine. While it is encouraging that a number of students were keen to be mentors in the future, we are unsure as to why this aspiration was not a unanimous one amongst the entire student group. Possible reasons may include a lack of familiarity with the expectations of clinical teaching and lack of confidence given that this is their maiden clinical exposure.

Although the benefits to near-peer tutors were not formally evaluated, we propose that preparation of the course book and execution of the workshop required them to revisit

their pre-clinical knowledge, understand its application to their current clinical knowledge, and synthesize and crystalize all the information to present it effectively, thus reinforcing their own learning.

With regards to the use of teaching aids, near-peer tutor developed examination revision notes for final year students accompanying NPT has been described (Rashid et al, 2011). Our course book, however, is a unique intervention that is primarily aimed at facilitating the building of links between pre-clinical knowledge and first clinical exposure. Future evaluation is necessary to determine the objective benefits of such a teaching aid.

Study limitations include a small sample size, potential observer bias because workshop tutors were OSCE assessors, and the lack of a comparison arm (e.g. Faculty teaching). These limitations can be addressed in the future by: Increasing our sample size by gradually extending subsequent editions of the workshop to all local teaching hospitals, recruiting more near-peers to serve as independent assessors to eliminate observe bias, and designing a study to compare faculty teaching alone against NPT in addition to faculty teaching.

We hope to highlight this valuable, yet under-utilized teaching modality which may be uniquely valuable in addressing the challenges faced in teaching clinical skills. We are optimistic that future studies may detail its academic, non-academic, and logistical benefits to students, near-peer tutors and faculty members alike.

#### Notes on Contributors

Fong Jie Ming Nigel, Gan Ming Jin Eugene, Lim Yan Zheng Daniel, Ngiam Jing Hao Nicholas and Yeung Lok Kin Wesley are final year medical students at the NUS Yong Loo Lin School of Medicine. They have an interest in medical education and have been involved in coordinating and implementing various near-peer teaching efforts in medical school. They conceived this initiative and were responsible for its implementation and preparation for publication.

Associate Professor Tay Sook Muay is a senior consultant anesthesiologist at the Singapore General Hospital (SGH), and the current Associate Dean for NUS Yong Loo Lin School of Medicine, SGH Campus. She is highly active in local and international teaching programs, education meetings and pedagogical committees. She is the faculty mentor for this near-peer teaching initiative.

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#### Declaration of Interest

This is an unfunded study. All authors have no potential conflicts of interest.

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