Educating Medical Students: Are we doing it right?

Mingyue Li[1], Jill Cheng Sim Lee[1], Limin Kam[1], Rajeswari Kathirvel[1]

**Corresponding author:** Dr Mingyue Li mingyue.li@mohh.com.sg  
**Institution:** 1. KK Women's and Children's Hospital  
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**Abstract**

**Background:**
KK Women's and Children's Hospital (KKH) is a tertiary hospital in Singapore catering specifically to women and children. Undergraduate students from the three medical schools in Singapore rotate through KKH for their OBGYN clinical posting. We conducted this survey to find out their preferred methods and setting of teaching, so that we could optimize effective teaching by our tutors and tailor our curriculum delivery to meet our students’ needs and preferences.

**Methods:**
We surveyed a total of 83 fourth year medical students to find out their preferred teaching methods and settings at the start and end of their postings.

**Results:**
Small group teaching was the most preferred teaching setting by the medical students followed by one-to-one teaching; their least preferred setting was large group teaching.

The top two preferred methods of teaching were bedside teaching/direct observation and case-based discussion. Their least preferred method of teaching was electronic/video assisted learning followed by didactic lectures.

**Discussion and Conclusion:**
According to the survey, medical students preferred small group settings for clinical teaching and their preferred methods of teaching were bedside teaching/direct observation and case-based discussions. As our students’ preferences are in keeping with the available evidence on active adult learning theories, we have modified our curriculum delivery method to be pragmatic in our teaching approach and meet our students’ learning needs.

**Keywords:** Obstetrics and Gynecology; medical student education; teaching methods; preferred learning methods
**Introduction**

With the increasing life expectancy and healthcare demands, globally there is a recognized shortage of doctors (Grover and Niecko-Najjum, 2013). In order to meet the increasing healthcare needs, Singapore has set up three medical schools and enrolled more medical students to be trained locally (Khalik, 2015). When compared to 2011, there has been a 58% increase in the total number of medical students enrolled in 2019 in Singapore (Tan, 2017). With the increasing number of medical students, the demands of teaching on public healthcare institutions also increases (Cox and Desai, 2019).

KK Women's and Children's Hospital (KKH) is the leading training centre in Obstetrics and Gynecology (OBGYN) in Singapore, with 12,000 births annually. Singapore has three medical schools: Yong Loo Lin School of Medicine, National University of Singapore (YLL-NUS), Duke-NUS Medical School (Duke-NUS), and Lee Kong Chian School of Medicine, Nanyang Technological University (LKC-NTU), each with their own different curriculum. Students from all three schools rotate through KKH for their clinical OBGYN experience.

YLL-NUS is the largest and oldest medical school in Singapore, established in 1905 with a traditional five-year undergraduate curriculum, with around 300 students in each cohort. The first two years of medical school education consist predominantly of large group lectures for the whole cohort; the next three years consist of clinical rotations through various hospitals and disciplines in smaller clinical groups (35-40 students). Duke-NUS medical school was established in 2005 in partnership with Duke University, North Carolina. It conducts a four-year curriculum for postgraduate students that has around 80 students per cohort, with a focus on research training in their third year. LKC-NTU was started in 2013 in collaboration with Imperial College, London with a five-year undergraduate program that has around 150 students per cohort. Their first two years include a significant amount of electronic learning/video assisted learning (e-learning) and team-based learning.

LKC-NTU and YLL-NUS students undergo their clinical OBGYN rotation in three streams during the fourth year for five and six weeks respectively. Duke-NUS students have a six-week-long clinical OBGYN rotation in their second year of training in six streams throughout the year. Their rotation is further split into two three-week blocks, with a six-month gap between the two blocks, during which they rotate through other hospitals and disciplines.

OBGYN rotations for medical students in Singapore are only for 5-6 weeks, and for some of these future doctors, this period might be the only time that they are being exposed to OBGYN training in their career. We also expected some potential differences in the learning needs of the students from the various schools due to the varying curriculum delivery exposure during their initial years at medical school. Furthermore, KKH is the largest OBGYN hospital in Singapore and the very busy clinical faculty who are strapped for time also have to tutor the students from the three medical schools.

We therefore conducted this study to determine the students’ preferred settings and methods of learning in OBGYN so that we could tailor our curriculum delivery to meet the students' learning needs and preferences and also be pragmatic with our teaching approaches to optimise effective teaching for our students.

**Methods**

We conducted an anonymous questionnaire survey on the fourth year students from LKC-NTU and YLL-NUS medical schools on their first day of OBGYN posting in KKH to find out their preferred teaching settings and methods. Due to the differences in curriculum, Duke-NUS students were not included in this study.
The study questionnaire was developed following a discussion between the study investigators and key departmental education leaders. It was then piloted on OBGYN undergraduate and graduate programme coordinators to ensure the ease of use and understanding prior to being distributed to study participants.

The students went through their clinical OBGYN rotation for five to six weeks, where they were exposed to a mixture of different teaching methods including e-learning, large group (the entire stream of up to 25-35 students) lectures, case/problem based discussions (CBD) and bedside teaching/direct observation (bedside teaching) in one-to-one and small group (respective clinical group of 6-8 students) settings. E-learning included voice over Power Points (VOPPTs) and learning videos on certain topics. Bedside teaching included the students observing the tutors in clinical areas and the tutors observing the students’ interaction with the patients and their clinical examination in a one-to-one or small group setting.

We repeated the survey at the end of their posting with the same questionnaire to check if their preferences had changed after experiencing the current curriculum delivery methods.

The students were asked to rank their most to least preferred teaching setting including large group, small group and one-to-one settings. They were also asked to rank (from 1-4) their most to least preferred teaching methods including lectures, CBD, bedside teaching, and e-learning. Additional qualitative feedback was collected.

The quantitative data was analysed using Microsoft Excel 2017 version. The qualitative data was analysed line by line, identifying common keywords and themes using principles of grounded theory.

SingHealth Centralised Institutional Review Board approved this study with an exempt status.

**Results/Analysis**

A total of 83 fourth year medical students were invited to participate in this study from January to December 2018. Of these, 53 students were from LKC-NTU and 30 students were from YLL-NUS medical school. We had a 100% response rate at the start of the posting. After excluding 2 incomplete responses from LKC-NTU students, we analysed 81 responses. Of these students, 49 were male and 32 were female. At the end of the posting, 75/83 (90.4%) had completed the survey. This included 49/53 students from LKC-NTU and 26/30 from YLL-NUS; of whom 49 were male and 28 were female.

All the students agreed that the setting and method of teaching was important for them to learn clinical medicine at the start of the posting and a vast majority (98.7%) felt the same at the end of their posting.

At the start of the posting, the majority of students (86.4%; 70/81) from both medical schools considered small group teaching as their most preferred setting to learn clinical medicine followed by one-to-one teaching (17.6%; 9/51). Their least preferred setting was large group teaching (2.5%; 2/81) as shown in Figure 1. Their preferences remained the same (Chi square test: p = 0.796) at the end of their clinical posting with a total of 82.7% (62/75) preferring a small group setting, 14.7% (11/75) preferring one-to-one setting, and 2.7% (2/75) preferring large group setting to learn clinical medicine. It is also interesting to note that there were no statistically significant differences in the preferences between the students from the two schools, both at the start (Chi square test: p = 0.539) and at the end of their posting (Chi square test; p = 0.758).

**Figure 1 shows the students’ preferred teaching setting.**
The students were then asked to rank their most to least preferred teaching methods. The top two preferred methods of teaching were bedside teaching, followed by CBD for all students regardless of medical school, as shown in Figures 2 and 3. At the start of the posting, the majority (71.6%; 58/81) of students preferred bedside teaching as their first choice and CBD (55.5%; 45/81) as their second choice. At the end of the posting, their preferences remained the same (Chi square test: p = 0.64) with bedside teaching being the most preferred teaching method for 69.3% (52/75) of students, followed by CBD for 56% (42/75) of students. There were no significant differences between the students from the two schools, both at the start (Chi square test: p = 0.298 and at the end of the posting (Chi square test: p = 0.854).

Figure 2 shows the students’ most preferred teaching method.
Figure 3 shows the students’ second most preferred teaching method.
The least preferred teaching method for the vast majority of the students was e-learning, both at the start (65%; 53/81) and at the end (58.7%; 44/75) of the posting as shown in Figure 4. This was followed by the didactic lectures both at the start (23%; 19/81) and at the end (30%; 23/75) of the posting. Though the students' least preferred method of teaching was e-learning both at the start and at the end of the posting (Chi square test: p-value = 0.836), a significant number of LKC-NTU students were more accepting of this method, with a lower proportion of LKC-NTU students choosing this as their least preferred teaching method than the YLL-NUS, both at the start (46.9% Vs 80.8%; Chi square test: p-value = 0.007) and at the end of the posting (52.9% Vs 86.7%; Chi square test: p-value = 0.022).

Figure 4 shows the students' least preferred teaching methods.
We analysed the qualitative feedback received at the end of posting based on themes. We identified two main themes:

1. The students praised practical hands-on and bedside learning opportunities. The comments received from YLL-NTU included: "bedside teaching was the best", "practical sessions help to reinforce learning", "hands on was most useful", and "nothing beats practical sessions and examining patients". The LKC-NTU students had commented "would like more bedside teaching".

2. There was a noticeable affinity from LKC-NTU students who praised the electronic learning resources for reference which was not seen amongst the responses from YLL-NUS. The comments include "Lectures and VOPPTs were useful for reference throughout the posting", and "VOPPTs were useful but only when supplemented with case scenarios, it improved learning quality".

Discussion

In our study, the majority of medical students preferred small group setting for clinical teaching followed by one-to-one setting. The preferred methods of teaching identified were bedside teaching and CBD. These results are similar to that of other published literature which showed that the majority of medical students preferred interactive lectures, problem-based learning and small group discussions (Bhalli, Khan and Sattar, 2015, Kumar et al., 2017). It is also well established in literature that active learning techniques including small group discussions may have greater effectiveness in medicine and certain other disciplines (Prince, 2004).

Despite e-learning being the least preferred method for all the students, the difference in acceptance of this method between LKC-NTU and YLL-NUS could be attributed to the exposure and familiarity with e-learning for LKC-NTU students in their first two years of medical school. Although e-learning provides flexibility and easy accessibility to resources, students may view it as a complement to other methods of teaching and it cannot replace face-to-face learning situations (Hyll, Schvarcz and Manninen, 2019), particularly in clinical medicine, where hands-on procedures are involved.
We have made some changes to our curriculum delivery methods for our medical students based on these findings. As the students preferred bedside teaching and CBD in small groups over large group lectures, we have reduced the number of large group lectures and instead have allocated more time during their rotation for bedside teaching and CBD in small groups. In order to provide the core knowledge that was traditionally delivered by large group lectures, we have uploaded VOPPTs on the common OBGYN topics to their learning platforms to provide an overview of the subject. The students can access these VOPPTs prior to starting their OBGYN clinical posting to be better prepared for the clinical rotation and also could use these resources as a reference for exam preparations at a later date. This has also helped to reduce our tutor fatigue as a tutor may have had to repeat a lecture for up to 12 times/year to cover the same topic for the various streams of students from the three medical schools. However, we are mindful that our students’ least preferred learning method is e-learning on its own. Therefore, we have reiterated to the tutors that it is really important for them to engage their students with bedside and small group discussions to consolidate their clinical knowledge during the posting to address this issue.

There are certain limitations to our study. This study was conducted during the OBGYN posting of the medical students. We have not established if the students’ preferences would be the same across the other clinical disciplines. Secondly, the study questionnaire was not formally validated prior to its administration due to the lack of existing data with regards to similar clinical contexts in current literature. Thirdly, the qualitative data was limited to voluntary written feedback from students in the questionnaire and did not generate discussion between the study participants. Fourthly, the difference in preferences at the start and the end of the posting for various teaching methods has been compared as a cohort of students and not as individuals. Therefore, it is difficult to establish if the changes in perception by the students are truly absent or it is masked by such analysis.

In future, it would be interesting to see if the same conclusions would be drawn if the study is conducted with a larger sample size, as well as across the different core clinical disciplines. Focus group qualitative studies in future may also help us to better understand the reasoning behind teaching method preferences amongst students.

**Conclusion**

Medical students preferred bedside teaching and case-based discussions in small groups of six to eight students to learn OBGYN. As our students’ preferences are in keeping with the available evidence on active adult learning theories, we have modified our curriculum delivery method based on their preferences to deliver effective teaching and to meet their learning needs.

**Take Home Messages**

Students’ preferred methods of teaching may be influenced by their previous learning experiences. It is important to tailor the teaching methods to students’ preference in order to maximize their learning experience.

**Notes On Contributors**

**Mingyue LI;** MBBS. Resident, Division of Obstetrics and Gynecology, KK Women’s and Children’s Hospital, SingHealth Duke-NUS OBGYN Academic Clinical Program, Singapore. Core Resident Tutor, Lee Kong Chian School of Medicine, NTU, Singapore.

**Jill Cheng Sim LEE;** MBChB, MSc (Clinical Education), MRCOG, MRCP. Associate Consultant, Department of Urogynaecology, Division of Obstetrics and Gynecology, KK Women’s and Children’s Hospital, SingHealth Duke-
National University of Singapore (NUS) Obstetrics and Gynecology (OBGYN) Academic Clinical Program, Singapore. Clinical Tutor, Lee Kong Chian School of Medicine, Nanyang Technological University (NTU), Singapore.

Limin KAM; BComm. Senior Executive, SingHealth Duke-NUS OBGYN Academic Clinical Program, Singapore.

Rajeswari KATHIRVEL; MBBS, FRCOG. Consultant, Division of Obstetrics and Gynecology, KK Women’s and Children’s Hospital, SingHealth Duke-NUS OBGYN Academic Clinical Program, Singapore. Adjunct Assistant Professor, Lee Kong Chian School of Medicine, NTU, Singapore. Adjunct Assistant Professor, Duke-NUS and Yong Loo Lin School of Medicine, National University of Singapore, Singapore.

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Figures 1 to 4. Source: the authors.

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Appendices

None.

Declarations

The author has declared that there are no conflicts of interest.

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Ethics Statement

SingHealth Centralised Institutional Review Board approved this study with an exempt status.

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