

A Novel Hybrid Urology Education Model for Medical Students: A Urology Clinic Experience

Tıp Öğrencileri İçin Orijinal Hibrid Üroloji Eğitimi: Bir Üroloji Kliniği Deneyimi

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Abstract

Objective: To compare traditional and hybrid model of education in urology among 4th-year medical students in terms of training success

Materials and Methods: In our urology clinic, the training success scores of seven randomly selected training groups among 4th-year medical students, who were trained with the traditional model between 1998-2018, and the 4th year medical students who were trained with the hybrid model between 2018-2020 and constituted five randomly selected training groups were compared. Of the total 582 medical students, included in the study, 278 (47.8%) were enrolled in the traditional model group, and 304 (52.2%) in the hybrid model group. The training was evaluated with hands-on applications and theoretical and oral exams. Differences between both male and female students and differences that may vary depending on different faculty members teaching the students were evaluated using multivariate logistic regression analysis.

Results: The training success rates were significantly higher in the hybrid model group (300/304; 98.7%) than in the traditional model group (261/278; 93.9%) [p:0.002]. Multivariate logistic regression analysis found that factors such as the number of training groups, gender of medical students, and evaluations of different faculty members did not affect the educational success rate.

Conclusion: The hybrid model could be accepted as a mobile education model in a sense. The exam results of medical students educated with the hybrid model were better than those receiving training with the traditional model which can be explained by the increased accessibility of medical students to education in the hybrid model without constraints of time and place. Additionally, it is thought that conducting the oral exam as a “structured oral exam” also contributed to these results.

Keywords: Traditional urology education model, hybrid urology education model, structured oral exam, mobil devices, youtube channel

Özet

Amaç: Dördüncü sınıf tıp öğrencilerinde üroloji stajı eğitimlerinde geleneksel ve hibrit eğitim modelinin eğitim başarısı açısından karşılaştırılması.

Gereçler ve Yöntemler: Üroloji kliniğimizde 1998-2018 yılları arasında geleneksel modelle eğitim gören 4.sınıf tıp öğrencileri arasından rastgele seçilmiş yedi eğitim grubu ile 2018-2020 yılları arasında hibrit modelle eğitim almış ve rastgele seçilmiş beş eğitim grubunu oluşturan 4. sınıf tıp öğrencilerinin eğitim başarı puanları karşılaştırıldı. Araştırmaya dahil edilen toplam 582 tıp öğrencisinin 278'i (%47,8) geleneksel model grubuna, 304'ü (%52,2) hibrit model grubuna kayıtlıydı. Eğitim, klinik uygulamalar, teorik ve sözlü sınavlarla değerlendirildi. Hem erkek hem de kız öğrenciler arasındaki farklar ve öğrencilere ders veren farklı öğretim elemanlarına bağlı değişebilecek farklılıklar çok değişkenli lojistik regresyon analizi kullanılarak değerlendirildi.

Bulgular: Eğitim başarı oranları hibrit model grubunda (300/304; %98,7), geleneksel model grubuna (261/278; %93,9) göre önemli ölçüde daha yüksekti [p:0.002]. Çok değişkenli lojistik regresyon analizinde eğitim gruplarının sayısı, tıp öğrencilerinin cinsiyeti ve farklı öğretim üyelerinin değerlendirmeleri gibi faktörlerin eğitim başarı oranını etkilemediği saptandı.

Sonuç: Hibrit eğitim modeli bir anlamda mobil eğitim modeli olarak kabul edilebilir. Hibrit modelle eğitim gören tıp öğrencilerinin sınav sonuçlarının geleneksel modelle eğitim alan öğrencilere göre daha iyi olması, tıp öğrencilerinin hibrit modelde zaman ve mekân kısıtlaması olmaksızın eğitime erişimlerinin artmasıyla açıklanabilir. İlave olarak sözlü sınavın “yapılandırılmış sözlü sınav” olarak yapılmasının da bu sonuçlara katkısı olduğu düşünülmektedir.

Anahtar kelimeler: Geleneksel üroloji eğitim modeli, hibrit üroloji eğitim modeli, yapılandırılmış sözlü sınav, mobil cihazlar, youtube kanalı

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Introduction

Advances in telecommunication technology such as mobile internet devices have changed medical educational practices in academic centers. Today, the biggest benefit of the use of mobile phones and laptops for education is that they provide a great deal of freedom regarding the time and place at which information is obtained [1]. In recent years, the transfer of educational programs to virtual platforms has begun to take its place in medical education. Applications used in other fields of education have become important tools when used for medical education [2]. The development of instant messaging applications, especially on mobile phones, has gained popularity among healthcare professionals and medical students.

Traditional medicine education continues to be the cornerstone of many educational institutions in the world. In addition to traditional education, the use of mobile devices will be essential for the education and exams of medical students, interns, and medical residents [3-5]. There is limited information in the literature about the place of hybrid models in urology. In this study, we have compared training success rates between traditional and hybrid model of education among 4th-year medical students rotating in urology clinics of a university hospital.

Materials and Methods

At the beginning of training, all 4th-year medical students downloaded urology training applications and, subscribed to the urology training videos channel from YouTube, administered by our clinics, and were informed with detail concerning hybrid structured-oral exams in the hybrid model group.

The total duration of teaching in urology for 4th-year medical students was 3 weeks. In either group, the theoretical lessons were presented by seven academic members during training period. Practical activity report cards were given to the students at the start of training which they filled out with practical activities they carried out such as patient examinations, urethral catheterization, minor surgical intervention, etc. The two groups had the same practical and theoretical objectives. The students that had $\geq 60/100$ grades on their report cards were considered successful at the practical exam at the end of training and gained the right to sit for the theoretical exam. Unsuccessful students were excluded from the training program.

In either group, the theoretical exam consisted of two parts; a test exam and an oral exam (traditional or hybrid). The test exam was organized as a multiple-choice test. The overall theoretical grade was calculated by the arithmetic mean of the test and oral exam grades.

In the hybrid group, the hybrid oral exam was applied with the help of software developed by our clinic using Microsoft Access. The questions, asked in an oral exam by an academic member, were randomly chosen among question groups at Urology Training Applications that also had the answers to them.

In either group, theoretical oral exams were done by seven academic members for seven student groups. The students were examined again by a different academic member in case they failed the oral exam, and then the theoretical oral exam grades were estimated, and expressed as the arithmetic mean of the final grades assigned by both academic members. The medical students who had both practical and theoretical exam grades of ≥ 60 were evaluated as successful. The final grade was estimated, and

expressed as the arithmetic mean of the practical and theoretical exam grades. The students who scored less than 60 in the practical exam weren't allowed to enter the theoretical exam and had to repeat the internship. However, students who scored less than 60 on the theoretical exam were given a chance to resit the exam. If they failed to surpass 60 points after the resit exam, they had to repeat the internship as well. The study protocol was reviewed and approved by the Mersin University Clinical Research Ethics Committee (04.26.2023/294).

Statistical Analysis

Descriptive statistics for continuous variables were expressed and also tabulated as mean \pm standard deviation, and for categorical variables as frequencies, and percentages (%). T-test were used to compare continuous variables between the two groups. One-way ANOVA and post- hoc tests were used to compare continuous variables among the groups, and chi-square test was used for qualitative variables in patient groups. In addition, multivariate logistic regression analysis was done to present factors predicting training success. Statistical analysis was performed using Statistical Package for the Social Sciences software (version 21.0, IBM SPSS), and a p-value of less than 0.05 was considered statistically significant.

Results

Of the total 582 medical students (352 males and 230 females), included in the study, 278 (47.8%) were in the traditional model group, and 304 (52.2%) were in the hybrid model group. The mean grades for all items of the exam were higher in the hybrid model group (**Table 1**). All students were divided into four groups by gender and education model. The hybrid model group that consisted of female students had the highest mean grades in all items of the exam (**Table 2**). All results of these groups are shown clearly in **Figure 1**.

Multivariate logistic regression analysis was done to present factors predicting training success among the students. The number of training groups, gender of the medical students and evaluation by a different academic member have predicted the training success in both groups ($p > 0.05$ and $p > 0.05$, respectively). Based on results of the one-way ANOVA test, the mean training grades evaluated by different academic members were not significantly different in the hybrid model ($p: 0.072$), but they differed significantly in the traditional model ($p: 0.004$).

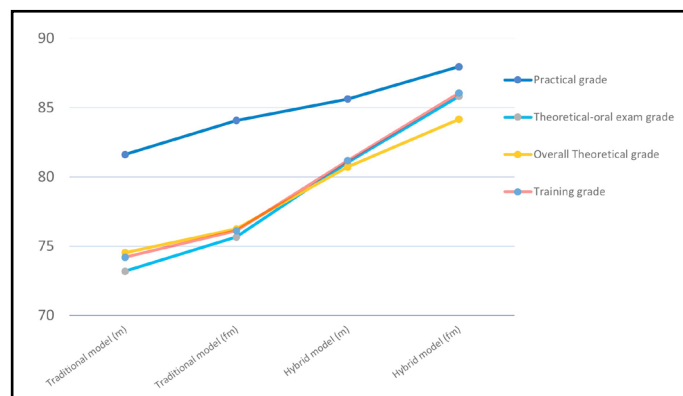


Figure 1. Mean grades by education model and gender

Table 1. Comparisons of the mean grades for all items of exam in education model groups

Item	Group*	Mean	Std. deviation	Std. error mean	P**
Practical grade	1	82.45	7.52	0.45	0.000
	2	86.65	6.64	0.38	
Theoretical (test exam grade)	1	76.20	9.71	0.51	0.000
	2	81.40	9.50	0.54	
Theoretical (oral exam grade)	1	74.04	18.82	1.13	0.000
	2	83.15	17.52	1.00	
Overall theoretical grade	1	75.11	11.89	0.71	0.000
	2	82.28	10.75	0.62	
Final grade	1	75.06	20.06	1.20	0.000
	2	83.68	11.12	0.64	

* Group 1: Traditional model; Group 2: Hybrid model; ** Student's t test

Table 2. Comparisons of the mean grades for all items of exam in education&gender groups

Item	Group*	Mean	Std. deviation	Std. error mean	p (Anova)	Post Hoc Tests (Tamphane)
Practical grade	1	81.61	7.87	0.58	0.000	1 - 2 : p = 0.033 1 - 3 : p = 0.000 1 - 4 : p = 0.000 2 - 3 : p = 0.363 2 - 4 : p = 0.000 3 - 4 : p = 0.012
	2	84.08	6.52	0.67		
	3	85.62	6.89	0.52		
	4	87.95	6.09	0.52		
Theoretical (test exam grade)	1	75.87	10.85	0.80	0.000	1 - 2 : p = 0.939 1 - 3 : p = 0.000 1 - 4 : p = 0.000 2 - 3 : p = 0.004 2 - 4 : p = 0.000 3 - 4 : p = 0.340
	2	76.83	7.02	0.72		
	3	80.54	10.37	0.79		
	4	82.49	8.19	0.70		
Theoretical (oral exam grade)	1	73.19	19.67	1.45	0.000	1 - 2 : p = 0.860 1 - 3 : p = 0.001 1 - 4 : p = 0.000 2 - 3 : p = 0.111 2 - 4 : p = 0.000 3 - 4 : p = 0.087
	2	75.66	17.07	1.75		
	3	81.04	19.07	1.46		
	4	85.82	14.98	1.29		
Overall theoretical grade	1	74.53	12.85	0.94	0.000	1 - 2 : p = 0.766 1 - 3 : p = 0.000 1 - 4 : p = 0.000 2 - 3 : p = 0.006 2 - 4 : p = 0.000 3 - 4 : p = 0.029
	2	76.24	9.74	0.99		
	3	80.71	11.95	0.91		
	4	84.16	8.69	0.75		
Final grade	1	74.20	20.59	1.52	0.000	1 - 2 : p = 0.892 1 - 3 : p = 0.000 1 - 4 : p = 0.000 2 - 3 : p = 0.132 2 - 4 : p = 0.000 3 - 4 : p = 0.002
	2	76.11	18.99	1.95		
	3	81.17	13.93	1.07		
	4	86.05	4.99	0.43		

* Group 1: Traditional model (male); Group 2: Traditional model (female); Group 3: Hybrid model (male); Group 4: Hybrid model (female)

Discussion

In this study, in addition to the traditional model, we have created a hybrid model with applications that were accessed through mobile devices for the 4th-year medical students rotating in urology. In addition, we have supported this hybrid model by changing traditional oral exams to structured oral exams with the use of a Microsoft Access application.

Although traditional medical education is the cornerstone, the development of new methods such as mobile messaging attracts the attention of educators [6]. Especially during the COVID-19 pandemic, medical education had to be carried out virtually in many countries of the world. Indeed, Pandya et al. have shown that the use of these easily accessible applications can improve nephrology education [1]. Various studies have examined the use of instant messaging applications in medical education and have shown that students' learning motivation and satisfaction increase depending on these applications [7,8]. In studies evaluating online and offline education in dermatology, it has been suggested that online teaching presents some difficulties [9,10]. Recently, Shahar et al. evaluated the role of secure instant messaging applications, and Siilo which is also a secure instant messaging application in medical education [11]. They demonstrated that the "Siilo" appeared to be a promising tool for facilitating case-based learning in a medical setting and it was found to be user-friendly and secure, with a high level of satisfaction reported by participants.

To the best of our knowledge, these two educational models for medical students rotating in urology have not been compared so far. In our study, the mean success grades for all items of the exam were significantly higher in the hybrid education model compared to the traditional education (**Table 1**). A remarkable amount of increase was observed in success rates of both male and female students in the hybrid group, compared to the traditional model. Female medical students in both groups were more successful than their male counterparts (**Table 2, Figure 1**). In multivariate logistic regression analysis, the sample size of the training group, students' gender, and evaluation by different academic members did not predict the training success in either group. However, based on the one-way ANOVA test results, the mean training grades given by academic members were not significantly different in the hybrid model ($p:0.072$) but differed significantly in the traditional model ($p:0.004$). We have attributed this issue to the standardization of questions and answers in the structured oral exams.

This study has several limitations. First of all, it was done only in our own center. Second, different applications were not compared in our study. On the other hand, the strength of our study is that it will shed light on future multicenter studies performed with a larger sample size in the field of urology education.

Conclusion

We have observed that medical students who received training with our hybrid model were greatly interested in urology residency programs. We have arrived at the conclusion that a hybrid model, coupled with structured oral exams, can create an environment where medical students will achieve the maximum possible success.

Ethics Committee Approval: The study protocol was reviewed and approved by the Mersin University Clinical Research Ethics Committee (ethics committee approval date and number: 26.04.2023/294).

Informed Consent: An informed consent was obtained from all the patients.

Publication: The results of the study were not published in full or in part in form of abstracts.

Peer-review: Externally peer-reviewed.

Authorship Contributions: Any contribution was not made by any individual not listed as an author. Concept – E.A., E.E.; Design – E.A., E.E.; Supervision – S.C., M.B., E.U.; Resources – H.E.D., M.T.; Materials – H.E.D., M.T.; Data Collection and/or Processing – E.U., H.E.D., M.T.; Analysis and/or Interpretation – E.U., H.E.D., M.T.; Literature Search – H.E.D., M.T.; Writing Manuscript – E.A., E.E.; Critical Review – E.A., E.E., S.C.

Conflict of Interest: The authors declare that they have no conflicts of interest.

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Supplementary Materials

1. Urology Internship- Mobile Application (Google Play)
<https://play.google.com/store/apps/details?id=com.akbay.erdem.urologytraining&gl=TR>
2. Mobile Urology Internship & Internship Exam Guide (App Store)
http://www.mersinuroloji.com/?smd_process_download=1&download_id=542
3. Urology False-True Hybrid Quiz (Google Play)
<https://play.google.com/store/apps/details?id=com.akbay.erdem.urologyhybridquiz>
4. Urology Multiple Choice Quiz (Google Play)
<https://play.google.com/store/apps/details?id=com.akbay.erdem.multiplechoice>
5. Mersin Urology Structured Oral Exam
<http://mersinuroloji.com>
6. Mersin University Urology Training Videos
https://www.youtube.com/channel/UCWfDer4I9WG_Gr4Fu3Gnwxw

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