



Ubiquitous-based testing in medical education

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To cite this article: HyeRin Roh, Jong-Tae Lee & Byoung Doo Rhee (2015) Ubiquitous-based testing in medical education, Medical Teacher, 37:3, 302-303, DOI: [10.3109/0142159X.2014.956070](https://doi.org/10.3109/0142159X.2014.956070)

To link to this article: <https://doi.org/10.3109/0142159X.2014.956070>



Published online: 03 Sep 2014.



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To set the scene, I announced that a man sat in front of them, breathless and unable to speak. No other medical personnel were present, and they alone could work out the diagnosis and treat the patient. The clues they had were four envelopes, which contained an ECG, a chest X-ray, blood and sputum cultures, and the results of an arterial blood gas.

The students were given minimal background information: simple guides to interpreting the basics of each investigation; a brief medical glossary to explain terms such as acidosis, consolidation and tachycardia; a list of eleven possible diagnoses with expected corresponding findings in the clues; and the clues themselves. They were allowed to see each clue for up to five minutes, but could not see the same clue again once their time with it had elapsed.

Following initial trepidation, they quickly got to work in groups of four. The underlying diagnosis was an infective exacerbation of COPD, with the clues corresponding to this (e.g. an ECG showing sinus tachycardia and a hyper-expanded chest X-ray). Satisfaction was audible as pennies dropped around the room, students spotting what they were looking for in each "clue".

Three out of the four groups arrived at the correct diagnosis, and the final group came close, but wrongly identified the case as acute respiratory distress syndrome due to misinterpretation of the chest X-ray. Despite no medical background, the students were able to suggest oxygen, antibiotics and inhalers as the treatment they would want to provide.

Diagnosing medical cases provides potent opportunities to raise scientific curiosity and develop problem-solving skills, even to those years away from considering starting medical school. I left the session impressed at the students' abilities and reinvigorated in enthusiasm for teaching.

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Declaration of interest: The author reports no declaration of interest.

A call for greater transparency in the evidence base supporting the BMAT

Dear Sir

The BioMedical Admissions Test (BMAT) and the United Kingdom Clinical Aptitude Test (UKCAT) are the two major aptitude tests used for the selection of medical students in the UK. The importance of using evidence-based practices in admissions processes is undeniable, as is the need for the evidence to be more transparent and accessible. Whilst the predictive validity of the UKCAT has been well established by peer-reviewed publications, there has been a relative

paucity in the peer-reviewed evidence supporting the use of the BMAT.

Accordingly, we advocate that the evidence base for the BMAT be expanded. Specifically, it is necessary to improve access to existing unpublished data held by admissions offices, and for the effectiveness of the BMAT to be assessed using rigorous, peer-approved research methods. The advantage of promoting this is two-fold. Firstly, the peer-reviewed evidence evaluating the predictive validity of the BMAT (Emery & Bell 2009), albeit convincing, is solely limited to the University of Cambridge, which follows a traditional course structure with a prominent pre-clinical/clinical divide. Further studies to probe the applicability of the BMAT at institutions with different course styles will provide a more comprehensive overview on its effectiveness in candidate selection. This issue is particularly pertinent as institutions such as the University of Leeds and Brighton and Sussex Medical School begin incorporating the BMAT into their admissions processes. Secondly, much of the evidence pertaining to the BMAT is provided by its developers, Cambridge Assessment. The use of the BMAT will be more robustly supported by peer-reviewed articles written by independent authors than by reports published by Cambridge Assessment, who may have vested interests in the outcomes of any study they carry out.

To conclude, we are concerned by the apparent disparities in the evidence base supporting the UKCAT and the BMAT. We believe that evidence-based practices involving the use of the BMAT should be ultimately held to the same standards as that of the UKCAT.

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Declaration of interest: The authors report no conflicts of interest.

Reference

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Ubiquitous-based testing in medical education

Dear Sir

Ubiquitous-based testing (UBT) is a variation of electronic assessment using smart devices (Huh 2012). UBT provides the

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same advantages as computer-based testing (CBT) (Peterson et al. 2004) whilst requiring lesser budget and space than CBT. We performed UBT with 920 Korean medical students in 2013. The test consisted of multiple-choice questions comprising clinical vignettes with multimedia.

The tests were delivered using 10.1-inch tablet PCs with Android operating system. To reproduce traditional test-taking behaviour, we created an overview button, a bookmark button, a calculator, a note function, and a button to detect unanswered items. The tablets featured a countdown timer and an item counter. The examinees downloaded the test onto their own devices and took it in pre-assigned seats under the supervision of the proctor. A total of five minutes per 50 questions was required to download the exam questions. No technical problems were experienced during the UBT.

Our students felt confident in using smart devices in the exam and had a positive attitude toward the UBT interface. Students experienced in CBT and male students favoured UBT. However, some students had a negative attitude toward the UBT measurement accuracy. Some students raised concerns about the limitations of using pencil and paper in the UBT context. No statistically significant score difference was observed when examining tablet proficiency or CBT experiences. There was no statistically significant score difference between examinees who preferred paper-and-pencil test and those who preferred UBT. Students with a positive attitude toward UBT measurement accuracy obtained better scores.

Therefore, we make three suggestions on how to improve student performance in UBT environments. First, we should develop a more convenient UBT interface. In particular, the note-taking functionality should be improved. Second, support should be given to students who are unfamiliar with smart devices. Finally, we should encourage students' positive attitude toward UBT.

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Acknowledgements

We acknowledge the support from educators at five medical schools in the Busan-GyeongNam region of Korea.

Declaration of interest: The authors report no conflicts of interest.

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