PRACTICAL TIPS

The assessment clock: A model to prioritize the principles of the utility of assessment formula in emergency situations, such as the COVID-19 pandemic [version 1]

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Abstract
This article was migrated. The article was marked as recommended.

Many concerns have been raised regarding the impact of the changes to medical education as a result of the coronavirus disease 2019 (COVID-19) pandemic, particularly the impact of these changes on student assessments. This paper suggests an assessment clock as a conceptual model to enable medical educators to decide which assessment method is suitable under challenging circumstances, such as the COVID-19 pandemic. The assessment clock has five numbers, representing the five principles of the utility of assessment formula, which are arranged from the principle with the lowest weight (cost = 1) to the principle with the highest weight (validity = 5). The numbers are repeated in each half of the clock, and the clock is placed in the middle of two overlapping axes. The vertical axis is related to exam stakes (high or low). The low stakes condition, which represents the normal situation of running assessments at the beginning of each academic year, is placed at the top of the clock. The horizontal axis is related to the type of situation (normal or crisis). The high stakes condition is placed at the bottom of the clock. The right half of the clock represents the normal situation of planning and conducting assessments, while the left half represents an emergency situation, such as the current COVID-19 pandemic. The assessment clock offers assessment planners insights into how to determine the most important assessment principles on which they should focus during a crisis situation. Moreover, it provides practical guidance for educators.
to help them decide which assessment tool is suitable for use in which situation.

**Keywords**
Assessment clock, assessment utility Assessment formula, e-Assessment, Remote Assessment

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**Competing interests:** No competing interests were disclosed.

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Introduction
The rapid change of the coronavirus disease 2019 (COVID-19) from outbreak to pandemic has had significant consequences on education sectors worldwide, including medical education. Country-specific protective measures, such as social distancing, which aim to stop the spread of the disease, have led to medical school responses ranging from the total cessation of formal teaching and learning activities to the use of online/distance learning approaches (Taha et al., 2020).

Many concerns have been raised regarding the impact of the changes to medical education as a result of the COVID-19 pandemic, particularly the impact of these changes on student assessments (Ahmed, Allaf and Elghazaly, 2020; Rose, 2020). The greatest worries are about the assessment of clinical competencies during end-of-year exam, and some voices are calling for the immediate graduation of final year medical students to allow them to join the healthcare workforce (Ahmed, Allaf and Elghazaly, 2020; McVeigh, 2020). Therefore, the current dilemma for medical teachers and assessors is whether assessments should ensure the achievement of learning outcomes and the acquisition of the competencies required for safe practice (Van Der Vleuten, 1996; Wojtczak, 2000; Cutrer et al., 2017) or whether assessments should be adjusted based on extenuating circumstances, such as the social distancing measures and the needs for healthcare workforce to combat the COVID-19 pandemic. The following question has arisen in this situation: to what extent do we need to adhere to quality assessment criteria in the presence of the COVID-19 pandemic challenges?

This paper suggests the use of an assessment clock as a conceptual model to enable medical educators to decide which assessment method is suitable in difficult circumstances, such as the COVID-19 pandemic.

The Assessment Clock Model
The assessment clock model was developed by the authors-who work in medical education units/centres in three different universities-based on the utility of assessment (UA) formula suggested by Van Der Vleuten (Van Der Vleuten, 1996), which incorporates five assessment principles: validity (V), which indicates the meaningfulness of the assessment tools, reliability (R), which indicates the reproducibility of the assessment tools and whether they will yield the same results; educational impact (E), which indicates the assessment’s effect on the learning process; acceptability (A), which indicates whether the assessment should be accepted by examiners and examinees; and cost or feasibility (C), which indicates whether the assessment tools are cost-effective. The formula is UA = V*R*E*A*C. The main principle of this formula involves combining different weightages, which are above zero in their sum The essential meaning of the weightages in this formula is to direct the assessor to pay more attention to the higher weighted principles and apply the best practices to achieve each principle in order to optimise the assessment practice. Usually, assessment developers maximize the weight of validity, reliability and educational impact (Norcini and McKinley, 2007). However, the assessment clock (Figure 1) is designed to help prioritize the adoption of the assessment criteria in different circumstances.

The clock can be used using in two different kinds of scenarios, as discussed below.

Using the Assessment Clock
The clock can be used using in two different kinds of scenarios, as discussed below.

- The first scenario (normal practice)
Medical schools are bound to an academic calendar, which includes many teaching and assessment activities, and assessments are assigned fixed dates in that calendar. When developing a low stakes exam, such as the formative assessment, which is usually done through e-learning platforms (Gikandi, Morrow and Davis, 2011), attention is mainly...
paid to the cost, acceptability and educational impact. Therefore, the developer would subjectively consider the numerical values at the one, two and three o’clock positions, respectively, which would be reflecting their relative importance. Meanwhile, for high stakes exams, validity and reliability are more important, so the developer would pay more attention to the values at the four and five o’clock positions, respectively.

- **The second scenario (emergency situation, e.g. the COVID-19 pandemic)**

Many schools are struggling to make decisions on how to conduct high stakes exams remotely in the emergency situation created by the COVID-19 pandemic. First, attention of school leaders was on the acceptability of the tools that will be used by the assessors and the learners and cost issues (eight and seven o’clock, respectively). Regarding acceptability by students, it is an essential matter especially as there is a sudden shift to online summative eAssessment for the first time. So, it needs familiarization and explanation to students. Considering cost, conducting online assessment are costly because consideration of fidelity and security issue (Dennick, Wilkinson and Purcell, 2009).

In other words, they were concerned with selecting the most suitable and most cost-effective online assessment tool, which would provide a fair environment for all students. Validity and reliability (10 and 11 o’clock, respectively), which are the most important principles for high stakes assessments, should not be neglected in an emergency situation. These principles could be maintained by using high-quality items from existing question banks at colleges.

For example, regarding assessing clinical competencies, only the cognitive parts of clinical competencies—such as clinical reasoning and communication skills—could be assessed during this period. Some colleges have used an objective structured video exam (OSVE). Studies have shown that OSVE is efficient, quick to administer and reliable and have demonstrated some evidence of its validity (Humphris and Kaney, 2000).

**Conclusion**

In the current COVID-19 pandemic situation, medical schools worldwide have been required to make major changes in assessments, e.g. conducting remote assessments. This shift represents a real challenge for medical educators, who must prioritize assessment criteria based on a conceptual framework in order to choose the most suitable assessment tools and instruments. The assessment clock model can help in applying that conceptual framework.

**Take Home Messages**

In an emergency situation in which remote assessments must be conducted, assessment designers should use the assessment clock model to:

- evaluate the resources available to conduct remote assessments;
- focus on acceptability and feasibility, which are the first principles considered during a sudden transformation;
  and
- remember to consider validity and reliability.

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

Ethics Statement
This manuscript is a reflective experience and for developing a guideline for practice.

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Figure 1 was developed by the authors.

Bibliography/References
Ahmed, H., Alaf, M. and Elghazaly, H. (2020) COVID-19 and medical education. The Lancet Infectious Diseases. Reference Source
Cutrer, W. B., Miller, B., Pusic, M. V., Mejicano, G., et al. (2017) Fostering the development of master adaptive learners: a conceptual model to guide skill acquisition in medical education. Academic Medicine. 92(1), pp. 70–75. Reference Source
Dennick, R., Wilkinson, S. and Purcell, N. (2009) Online eAssessment: AMEE guide no. 39. Medical Teacher. 31(3), pp. 192–206. Reference Source
Gikandi, J. W., Morrow, D. and Davis, N. E. (2011) Online formative assessment in higher education: A review of the literature. Computers & Education. 57(4), pp. 2333-2351. Reference Source
Humphris, G. M. and Kaney, S. (2000) The Objective Structured Video Exam for assessment of communication skills. Medical Education. 34(1), pp. 939–945. Reference Source
McVeigh, K. (2020) ‘We feel compelled’: the doctors planning to return to NHS frontline. The Guardian. Available at: Reference Source (Accessed: 25 April 2020).
Norcini, J. J. and McKinley, D. W. (2007) Assessment methods in medical education. Teaching and Teacher Education. 23(3), pp. 239–250. Reference Source
Rose, S. (2020) Medical Student Education in the Time of COVID-19. JAMA. Reference Source
Taha, M. H., Abdalla, M. E., Wadi, M. and Khalafalla, H. (2020) Curriculum delivery in Medical Education during an emergency: A guide based on the responses to the COVID-19 pandemic. MedEdPublish. 9(1), pp. 69. Reference Source
Van Der Vleuten, C. P. (1996) The assessment of professional competence: developments, research and practical implications. Advances in Health Sciences Education. 1(1), pp. 41–67. Reference Source
Wojtczak, A. and Schwarz, M. Roy. (2000) Minimum essential requirements and standards in medical education. Medical Teacher. 22(5), pp. 555–559. Reference Source
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Hosam Eldeen Gasmalla
Sudan International University

This review has been migrated. The reviewer awarded 4 stars out of 5

This interesting article addresses the dilemma of the assessment during the COVID-19 pandemic, the developed “clock” helps in the planning of the assessment, however, it would be an added value to mention more examples.

Competing Interests: No conflicts of interest were disclosed.

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P Ravi Shankar
American International Medical University

This review has been migrated. The reviewer awarded 3 stars out of 5

This is an interesting article describing the use of an assessment clock to prioritize the utility of principles of assessment formula in emergency situations like the current pandemic. Their diagram of and description of the clock is clear. The authors mention that the clock can be used for both low stakes and high stakes exams and in normal practice and in emergency situations. However, I am still not able to fully understand how the assessment clock can be used and the authors can clarify this using more
concrete examples. This will significantly strengthen the paper.

**Competing Interests:** No conflicts of interest were disclosed.

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PATRICIA CURY
FACERES

This review has been migrated. The reviewer awarded 3 stars out of 5

this is a very interesting paper, but I also got lost with the clock model. It woud be very helpfull if the authors give some examples to explain better their ideas!

**Competing Interests:** No conflicts of interest were disclosed.

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Trevor Gibbs
AMEE

This review has been migrated. The reviewer awarded 3 stars out of 5

I am not sure that I fully understood this paper, perhaps because when using the van der Vleuten VA formula, I always thought that many of the assessment qualities were very context and diversity driven, hence I was not sure that the authors' assessment clock was not that universally acceptable. Plus I feel that within the Covid-19 pandemic, very little is universally acceptable and all of the VA qualities are justifiable. It would have been very helpful had the authors explored this and given more concrete examples to justify their points.
Competing Interests: No conflicts of interest were disclosed.

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Hui Meng Er
International Medical University

This review has been migrated. The reviewer awarded 4 stars out of 5

The dilemma faced by medical educators around the world in conducting student assessments during the Covid-19 pandemic are well described by the authors. Given the common challenges encountered by most institutions in this unprecedented crisis situation, shared guidelines and practices among academic institutions are useful, however, should be further contextualised to the institutional needs and resources. The conceptual model of an assessment clock that is founded on the principles of assessment utility is practical, realistic and serves as a guide for rationalising assessment tools and platform during an emergency situation. In addition to acceptability by the examiners and learners, the acceptability of the alternative assessment tools by the accreditation and professional bodies should also be considered.

Competing Interests: No conflicts of interest were disclosed.

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Felix Silwimba
University of Lusaka

This review has been migrated. The reviewer awarded 5 stars out of 5

this article is informative and challenging to medical educators.

Competing Interests: No conflicts of interest were disclosed.