ABSTRACT

The USMLE Step exams are significant milestones and statistics for medical learners. The Step 1 exam, in particular, represents a critical data point referenced by residency programs when considering medical student applications. Despite the importance of this examination, most study aids (textbooks, lectures, online videos, etc.) follow a paradigm of passive, individualized learning rather than collaborative, active engagement. This occurs despite abundant research that demonstrates substantial benefit of active participation in learning. Gamification, which can be described as the application of game-design elements and principles to information systems aimed to afford specific experiences and motivations, can enable learners to actively participate in an exchange of information. Participants in games have additional motivation to engage in the game itself and can retain contextual information when trying to remember important knowledge at later points. The purpose of this project is to apply the concept of gamification to Step 1-related medical information to provide students with a supplemental means of active preparation aimed toward collaborative study.

GAMIFICATION

Gamification is a topic that has been trending in recent years and is seeing growing use as an integrated teaching tool in post-graduate education. While it is not necessarily a new term, increasingly it is drawing more focus as its appears to boost cognitive enhancement and synaptic activity. The process of gamification involves the adaptation of study techniques to include aspects of gameplay, which can include storylines, rewards, and external motivation, with the idea that these additional aspects can help increase a student’s interest in learning new material and reinforce knowledge gained. While not yet developed specifically for USMLE preparation, gamification has shown positive impacts on effective study in other areas and the similar adaptation of USMLE material could allow students to more efficiently engage Step 1 preparation.

DX Cards

On the USMLE Step exams, while questions often refer to specific diagnoses these are only the direct answer. More often, students are required to not only be able to recognize a specific diagnosis, but also be able to answer indirect questions relating to it. For example, a question stem could depict a patient with Osteogenesis Imperfecta, but rather than the answer being “Osteogenesis Imperfecta,” the question could ask about the condition’s inheritance pattern, mutation, etiology, management, etc. So, the “DX Cards” were designed to train students to first think about the correct diagnosis then answer additional, related questions pertaining to the diagnosis.

To that end, a “DX Card” can contain a vignette written similarly to that of a Step 1 question and players first have to ascertain the correct diagnosis. Then, they will be asked about other aspects of the condition, as listed above, to gain full credit for the card. Depending on the condition, some cards contain only 1 or 2 questions, while others can have up to 6 total questions.

Primary Cards

For patients who inherit a mutation in the SMN gene, they tend exhibit a wide range of various signs and symptoms that are attributable to their disease. What genetic term refers to this range of signs and symptoms seen in patients who inherit a mutated SMN gene?

Variable Expressivity (Spinal Muscular Atrophy)

Name It Cards

A disease caused by a defect in fibrillin that results in arachnodactyly, lens subluxation, aortic dissection and increased joint flexibility. BONUS: What is the direction of lens subluxation seen in this condition?

Marfan Syndrome

BONUS: Upward

Findings Cards

What physical exam finding associated with Marfan syndrome refers to the protrusion of a patient’s thumb beyond the ulnar border of his/her hand when crossed?

Thumb Sign

The “Name It” cards were designed with a similar principle as the DX cards and contain certain pieces of information that relate directly to specific pathologies. However, rather than presenting a full vignette, these were condensed to 1 or 2 sentences and contain a limited number of key aspects of a condition that allow for a diagnosis. For example, a “Name It” card referring to Ehlers-Danlos can read “A disease characterized by increased skin elasticity, hypermobility of joints, and increased risk of bleed due to a defect in either Type V or Type VI collagen” (presentation depends on collagen type defect).

As the objective of these is to reinforce information contained in the “DX” cards, many of the conditions reiterate the key pieces of diagnostic information that is embedded in the DX vignettes.

The “Findings” Cards were originally developed to ask simple primary type questions specific to certain physical exam findings. This was too narrow of a window, however, so the card’s question types were expanded to include other types of findings like those that can be found with tissue or fluid analysis, imaging, as well as chief complaints, etc. So, these cards can read questions like “What term refers to shortness of breath?” (answer: dyspnea) or “Associated with asthma, what histologic finding can show trapped epithelial cells that have been killed by eosinophilic major basic protein?” (answer: cuscramm Spiralis). Like the “Primary” and “Name It” cards, the “Findings” questions were written to emphasize key information from the DX cards.