Immunol Genet J, Vol. 4, No. 4, Dec 2021, pp.211-214 DOI: https://doi.org/10.18502/igj.v4i4.12762

Letter

Case-Based Learning of Primary Immunodeficiency: A Pilot Gamification for Education

Sara Hanaei[1,2]

[1]*Research Center for Immunodeficiencies (RCID), Tehran University of Medical Sciences (TUMS), Tehran, Iran*
[2]*Universal Scientific Education and Research Network (USERN), Tehran, Iran*

Received: 25 August 2021; Accepted: 18 November 2021

Abstract

Objectives: Proper knowledge transfer to medical students would be highly important in training future generation of physicians and scientists. the current pilot study was designed to determine a model of gamification would be efficient in education of primary immunodeficiency diseases (PIDs) in medical students.

Results: 15 PIDs were selected among the most common PIDs, and were described as an infographic case-problem. The cases were distributed among the students via emails and social media. Generally, we received 125 answers (102 correct and 23 incorrect). For each correct answer, the student was rewarded with a grant. In case of an incorrect answer, the student was encouraged to continue efforts on providing the most accurate answer. The immediate feed-backs encouraged some students to more precisely seek for the correct answer. The pattern of received answers, could provide a clue for the trainer regarding which PIDs have been more commonly learnt and established in minds, and which ones may need more practice and explanation in classes. It is proposed that not only such methods would make the teaching-learning process more exciting, but also, they may lead to more permanent establishment of an educational concept in the students' minds.

Keywords: Primary Immunodeficiency Disease; Medical Education; Gamification; PID

Corresponding Author: Sara Hanaei, MD
Research Center for Immunodeficiencies (RCID), Tehran University of Medical Sciences (TUMS), Tehran, Iran; Universal Scientific Education and Research Network (USERN), Tehran, Iran.
E-mail: sara.hanaei@gmail.com

How to cite this article
Hanaei S. Case-Based Learning of Primary Immunodeficiency: A Pilot Gamification for Education Immunology and Genetics Journal, 2021; 4(4): 211-214. DOI: https://doi.org/10.18502/igj.v4i4.12762

Introduction

Primary immunodeficiency diseases (PIDs) are inborn errors of immunity which are mainly caused by genetic defects and makes the victims susceptible to infections. Although not very much prevalent in comparison to some other diseases of childhood, these diseases may result in patients' mortality and morbidity in case they are not properly diagnosed or treated (1).

Proper knowledge transfer to the students would be highly important in training future generation of physicians and scientists, which would lead to more efficient clinical care of these patients. According to Bloom's Taxonomy Pyramid of education, learning objectives start with remembering in the first step, and continues with understanding, applying, analyzing, evaluating and finally creating (2, 3).

In order to increase the learning level of PID, we designed a pilot platform to promote the learning status from remembering and understanding to applying and analyzing. 15 PIDs were selected which were among the most common or the most important types of PIDs. Each disease was described as an infographic case, based on the most prominent clinical manifestation and included 1-4 short-answer questions. The cases were distributed among the juniors via emails and social media; the answers were then received, with immediate feed-backs. The cases were mainly those taught in classes and therefore, the students had to apply the previous learnt knowledge to solve the cases.

Main Text

The infographic presentation of 15 PID cases are described in **figure 1**. The 15 cases included: Case no. 1: Chronic Granulomatosis Disease (CGD), Case no. 2: Chediak Highashi, Case no. 3: Wiskott Aldrich Syndrome, Case no. 4: Severe Combined Immunodeficiency Disease (SCID), Case no. 5: Leukocyte Adhesion Deficiency (LAD), Case no. 6: Early Onset IBD (IL10/IL10R Deficiency), Case no. 7: Ataxia Telangiectasia, Case no. 8: Autosomal Dominant Hyper IgE Syndrome (*STAT3* Mutation), Case no. 9: Autosomal Recessive Hyper IgE Syndrome (*DOCK8* Mutation), Case no. 10: Severe Congenital Neutropenia (HAX1 Deficiency), Case no. 11: DiGeorge syndrome, Case no. 12: Hyper IgD Syndrome, Case no. 13: MonoMac Syndrome, Case no. 14: X-linked Agammaglubulinemia, Case no. 15: Griscelli Syndrome Type 2.

The details of received answers are described in **figure 2**. Generally, we received 125 answers (102 correct and 23 incorrect). For each correct answer, the student was rewarded with a grant for registering in the PID school. In case of correct, but incomplete answer, or receiving an incorrect answer, the student was encouraged to continue efforts on providing the most accurate answer to each case. Surprisingly, the immediate feed-backs encouraged some students to more precisely seek for the correct answer and therefore, increased their knowledge level as they had to re-review the disease characteristics in case of an incorrect or incomplete answer. Moreover, the pattern of received answers, could provide a clue for the trainer regarding which PIDs have been more commonly learnt and established in minds, and which ones may need more practice and explanation in classes. As for example according to **figure 2**, cases no. 1, 3, 4, 5, 6, 8 and 9 seemed to be more generally learnt by the students in classes, as both the total number of answers and the correct answers were higher than the others. On the other hand, cases no. 2 and 7 may need more emphasis in classes, as although the total number of answers for these cases were high, but the number of incorrect answers were high as well. Also, for cases no. 10-15 there was low participation of the students, which might be explained as if the cases were hard ones to be answered, or the students were not efficiently informed about the case presentation via social media.

Altogether, it is proposed that not only such methods would make the teaching-learning process more exciting, but also, they may lead to more permanent establishment of an educational concept in the students' minds. Besides, sufficient knowledge regarding the hardness points of a subject would be helpful for the trainer in better time-allocation for teaching each part of a subject.

Limitations

Considering that the current study was a pilot, the sample size was low, and the study was aimed to estimate the how welcome the students would be for these teaching-learning methods. Also, as there was only one group of students who experienced this method, it cannot be compared to other methods. So, future studies are recommended to evaluate the effect of such methods in comparison with others.

Funding

Not applicable. The study was not funded by any organization.

Acknowledgement

The author would like to kindly thanks the students who contributed in this study as study subjects.

Ethical approval

Participation in this study was voluntarily for all study participants, and the students were requested to declare their consents to participate in the study, before their answers to the cases were considered for analysis and report. The study was approved by the Ethics Committee of Tehran University of Medical Sciences.

Figure 1. Infographic Presentation of 15 PID Cases
Diagnosis of The 15 Cases (from Left to Right): Case no. 1: Chronic Granulomatosis Disease (CGD), Case no. 2: Chediak Highashi, Case no. 3: Wiskott Aldrich Syndrome, Case no. 4: Severe Combined Immunodeficiency Disease (SCID), Case no. 5: Leukocyte Adhesion Deficiency (LAD), Case no. 6: Early Onset IBD (IL10/IL10R Deficiency), Case no. 7: Ataxia Telangiectasia, Case no. 8: Autosomal Dominant Hyper IgE Syndrome (STAT3 Mutation), Case no. 9: Autosomal Recessive Hyper IgE Syndrome (DOCK8 Mutation), Case no. 10: Severe Congenital Neutropenia (HAX1 Deficiency), Case no. 11: DiGeorge syndrome, Case no. 12: Hyper IgD Syndrome, Case no. 13: MonoMac Syndrome, Case no. 14: X-linked Agammaglubulinemia, Case no. 15: Griscelli Syndrome Type 2.

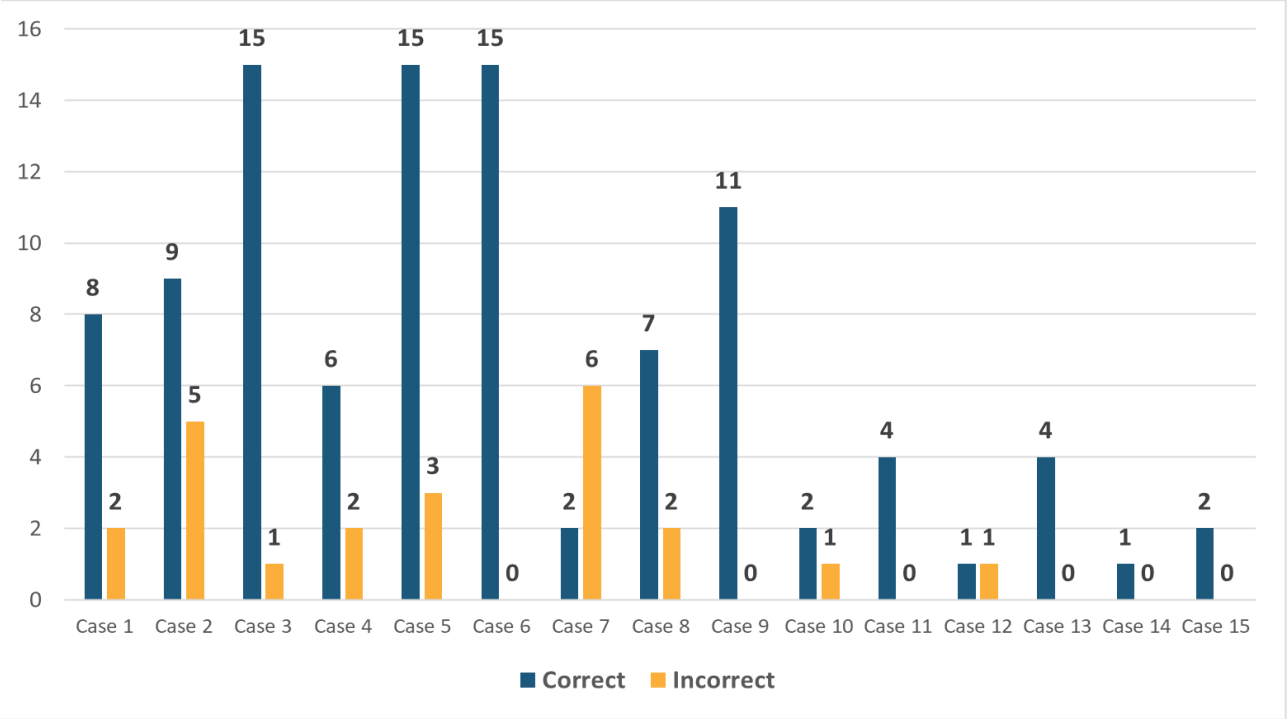

Figure 2. Students' Responses to 15 PID Cases

References

1. Abolhassani H, Kiaee F, Tavakol M, Chavoshzadeh Z, Mahdaviani SA, Momen T, et al. Fourth Update on the Iranian National Registry of Primary Immunodeficiencies: Integration of Molecular Diagnosis. J Clinical Immunol. 2018;38(7):816-32.
2. Anderson LWSosniak LA. Bloom's taxonomy: Univ. Chicago Press Chicago, IL; 1994.
3. Forehand M. Bloom's taxonomy. Emerging perspectives on learning, teaching, and technology. 2010;41(4):47-56.