

The effect of gamification on antimicrobial resistance knowledge and its relation to dentistry in Saudi Arabia: Randomized Controlled Trial

Methods (study protocol)

Study design and participants

This study was conducted using a parallel-group single blinded randomized control trial (RCT) design, where the participants in the study group received information about AMR by playing a board game aiming to improve AMR knowledge. The participants in the control group received the same information but by a conventional lecture. This study has been documented using CONSORT guidelines. The participants were female volunteers recruited from female department of Friends Association Charitable Society (FACS) in Makkah, Saudi Arabia. Inclusion criteria were (a) Arabic speakers (b) older than 18 years old, and (c) Agree to participant in the intervention and answer all the questionnaires. All participants who did not agree to sign the consent form were excluded from the study. The invitations were sent using mobile data base of female department of FACS only for active members who attend most activities for FACS (n=112).

Setting

All participants who agreed to participate in the study registered at FACS main office and signed the study consent. Then participants assigned randomly by the research team into study group (SG) and the control group (CG). Randomization was conducted using simple randomization process of previously shuffled sealed envelopes by equal allocation ratio, using pieces of paper in bowl, so each participant picked a piece randomly so she could be

allocated with 50% chance into two comparative groups. To fulfil concealment of allocation, the sealed envelopes were opaque and numbered sequentially. This resulted into allocating participants into SG and CG. To ensure blindness, the participants informed that the study aimed to compare between two method of delivery to improve AMR knowledge. None of the participants was aware that gamification was the main of the study. Thus, the study was single blind. The participants were evaluated three times, (T1) immediately before the intervention conducted, (T2) immediately after the intervention, and (T3) one month after the intervention. Questionnaires at T1, T2 and T3 were administrated as self-reported hard copy format. Participants who did not attend the FACS at T3 were contacted by phone to fill questionnaire by one of the research team. All identifiable data were destroyed after completing T3 data collection.

Intervention and control

Participants in the SG played a custom-made educational board game, created by the research team, called (The Chancellor). The game was created after reviewing most popular board games from (www.boardgamegeek.com) and its way to playing (game mechanism). The game went to three rounds (in groups of 5-7) of pilot to test the game and its experience until reaching the final version to be used in the study. The game in a completion form between two players (A and B) who try to finish her ten steps in the gameboard before the opponent. It is composed of one boardgame, two pile of flash cards, two different pawns for each player, and a dice to decide who play first, as shown in figure 1. At each turn a player try to move one step forward and the opponent try to stop her to move by drawing a flash card that contain question about AMR, extra information about AMR, and/or funny challenge. The funny challenge is a request to do specific task in each card such as saying the same information about AMR in different accent or saying the information while the player holding his nose. If the player win the challenge, she can move forward, otherwise she stay at her place waiting for another turn. The mechanism is detailed in figure 2. Each game takes around 20-30 minutes. Participants played the games in multiple set of two

players at the same time. For more detail about the game you can contact the study authors. During the intervention, the game was supervised by the research team to explain and facilitate playing.

On the other hand, the control group received a lecture titled “Antimicrobial resistance”. Composed of power point presentation delivered by one of the research team in Arabic Language. The lecture was given in 20 minutes. The lecture was conducted in a pilot of 10 participants to validate the content and understanding.

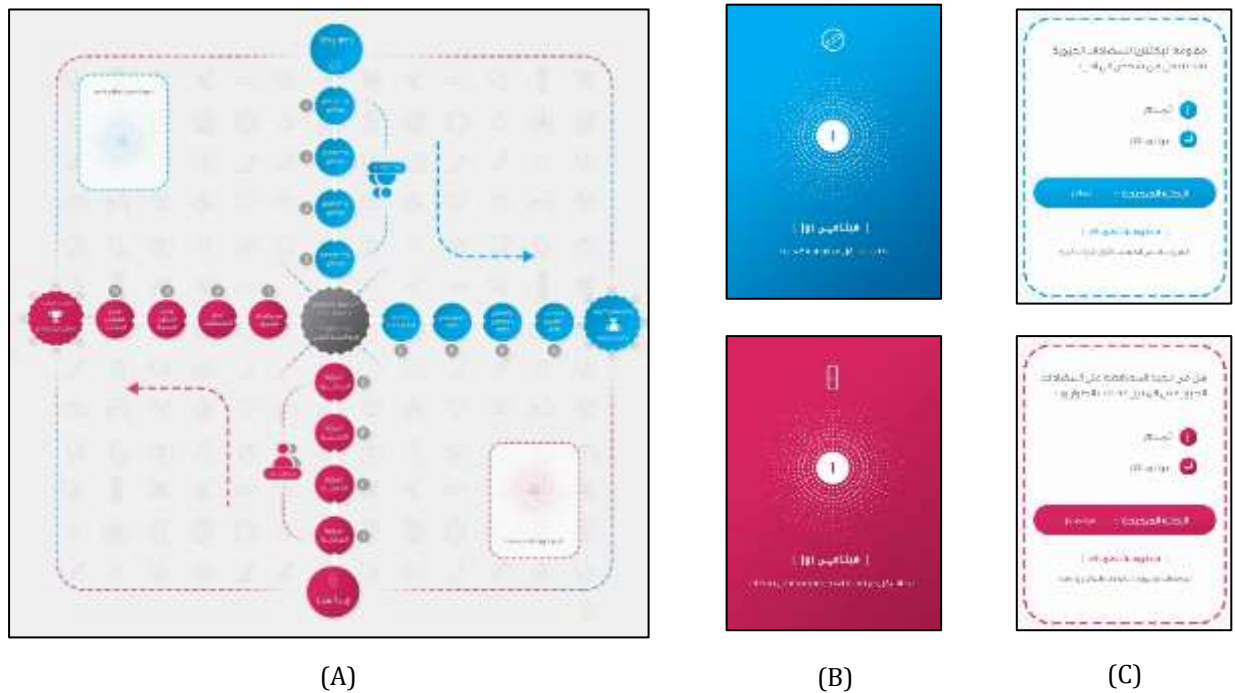


Figure 1. The Chancellor board game.

(A) Board game layout, (B) Faces of the cards, (C) Back of the cards.

Figure 1. The Chancellor board game layout

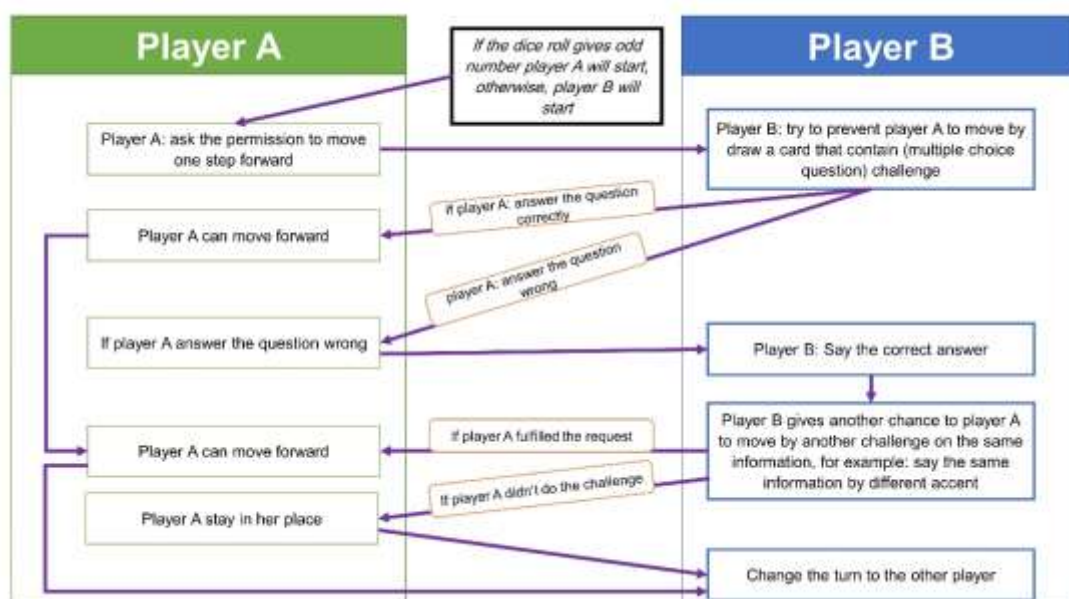


Figure 2. Flow chart explain steps of the game

Both groups were given the exact information about AMR. The interventional game and control lecture were delivered at FACS in their theaters and meeting rooms. The contents about AMR included in both SG and CG were retrieved from previous studies (André, Vernby, Berg, & Lundborg, 2010; McNulty, Boyle, Nichols, Clappison, & Davey, 2007), in addition to other AMR information related to dental treatment (Palmer N, 2016). The information include: proper way to store AB in home, problems in AB self-prescribing, the relation of AB to bacteria and viruses, proper AB indications, AB and recovery time, AB and normal flora, AB side effect management, natural antibodies, AMR, AB and embryo dental development, BA and dental management, and AB and dental extraction (André et al., 2010; McNulty et al., 2007; Palmer N, 2016).

Assessment

Hard copies of self-administrated questionnaires were used, including questions to test the participants' knowledge three times as mentioned before T1, T2 and T3. The questions have been derived from a previous study (André et al., 2010; McNulty et al., 2007) in addition to the questions related to

AMR and dentistry (Palmer N, 2016). The questionnaire is divided into 3 sections: demographic, AMR knowledge, and game experience. Section one includes demographic questions that include age, marital status, educational level, and family income. Section two includes questions that ask about AMR in general and AMR related Dentistry questions. These questions have a range of answers as “Agree”, “Do not agree”, and “I do not know”. Questions in section two is scored as correct or incorrect answers, then the total score of correct answers were summed into total knowledge score. Section three was administrated only for the study group to assess participants experience and perception of game usability and engagement. This section contained ten statements with answer range from 1 to 10, as 1 means strongly disagree, and 10 means strongly agree. Some of the statements questions in section three were derived from previous article (El Tantawi et al., 2018) with modification, while the rest were made by the research team. The overall questionnaire was administrated in Arabic language and was face and content validated during a pilot of 10 participants.

Incentives and ethical considerations

All identifiable data was destroyed after data collection completed at T3. All participant received certificates of appreciation, after completing the follow-ups. Also, they entered in two random prize draw for 50 Saudi Riyal (13.33 U.S dollar) as vouchers from a local bookstore. Participation was completely free of charge. All participants signed the study consent before starting the intervention. Formal approval was taken from FACS. Ethical approval was taken from faculty of dentistry at Umm Al-Qura University ethical committee with number 120-19.

Data analysis

The data is collected, tabulated and analyzed statistically using SPSS software package version 21. Chi-square, Fisher's exact test, t-test and parried t-test were used to analyze the data.