**Use of Instant Messaging Applications in Case-Based Learning for Medical Students**

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**Abstract:**

**Introduction**

Instant messaging software has recently grown in popularity among medical professionals and students. During the COVID-19 pandemic, medical education was largely transferred to virtual platforms, making secure instant mobile messaging applications (IMMAs) an increasingly important tool for medical instruction. Siilo is a secure instant messaging application, whose interface is loosely based on the popular WhatsApp IMMA, designed specifically for use by medical professionals [1]. Siilo offers several advantages over standard messaging services: 1. Information security and encryption: Siilo meets European standards for information security and is protected by a personal password that must be entered at each login [2]. 2. User identity verification: The application verifies users’ identities based on Medical License Number and additional personal details, and enables searching within groups, even without prior knowledge of participants’ phone numbers. 3. Availability: Siilo can be installed on any smartphone device, and a desktop version is available as well. 4. Case management: The application enables the creation of individual folders for each case, where messages and relevant media files can be updated, to allow for clear follow-up of discussions regarding each patient. 5. Patient privacy: The application contains a built-in blurring tool, which enables users to obscure details to protect patient privacy. Using these tools, doctors can conduct separate discussions about several patients simultaneously without compromising their private information, and without confusing them with each other or involving them in discussions unrelated to the therapeutic process.

Several studies that examined usage of IMMAs found that they increase motivation and knowledge among students [5, 7], increase their satisfaction [3, 8], aid in achieving higher scores [7] and contribute to positive relationships between doctors and students [4].

**Methods**

Based on the understanding that communication via digital media has become central to the lives of students and physicians, and considering the advantages of Siilo over similar applications, we decided to try a novel technique that harnesses the application’s features to implement case-based learning among medical students using the Siilo application.

The goal of the study was to characterize case-based learning while using Siilo and evaluate student satisfaction from this learning method.

We opened a Siilo group for fifth-year medical students from Hebrew University, who were on clinical rotations in the Gynecology Ward at the Hadassah Medical Center in Ein Kerem, between June 21 and July 23, 2020. During their last week of clinical rounds, after learning the theoretical material, the students participated in an exercise that included three evolving cases, specially prepared for the students on the topics of ultrasounds, midwifery and fertility. We also conducted two evaluation questionnaires: one questionnaire before the case-based exercises, and a second questionnaire after the exercise.

Each case was introduced with a brief description and related questions; the case developed according to students’ questions, which were answered with additional data relevant to the case, as well as further questions.

**Case details**

Case 1. Ultrasound. The case included 54 messages, including 37 text messages, seven ultrasound videos, six ultrasound images, two graphs, one PDF and one link to a YouTube video on the topic. One physician and seven students actively participated in the case, and seven additional students observed without actively participating.

Case 2. Midwifery. The case included 78 messages, including 68 text messages, three ultrasound images, two PDFs, two graphs, two diagrams and one photograph. Nine students participated in the discussion, and five additional students observed without actively participating.

Case 3. Fertility. The case included 108 messages, including 107 text messages and one photograph. Nine students participated in the discussion, and five more observed without actively participating.

**Participants’ feedback**

Prior to the exercises, the participating students filled out a questionnaire to evaluate their expectations before joining the IMMA group. The majority of students (73.3%) predicted that learning about evolving cases during rounds would aid them in learning the material. Students shared that they expected to “have a clear review of basic, common cases,” “practice clinical thinking and understanding the consequences of treatment choices,” and “experience good clinical instruction, with helpful, timely technical support, hopefully without encountering many technical difficulties.”

After participating in the case studies, students answered a feedback questionnaire to evaluate their satisfaction with the program. The majority of students reported that the Siilo case study was effective, and only one student said it was not effective. Most students found Siilo easy to use. All participating students stated that the Siilo case study contributed to their exam preparedness. Most of the students said they would be happy to participate in additional Siilo case studies during clinical rotations, while only one student said he would prefer not to participate in such exercises. It should also be noted that one student had a cellular phone that did not support the Siilo application and therefore did not participate in the exercises.

When asked to summarize their overall experience, students said: “This is a very good platform to practice while on rounds and for learning”; “The exercise was good and it touched on a number of central topics. The addition of simulations during the exercise was impactful”; and even, “In my opinion it was excellent, and I wish there were more.”

**Discussion**

To evaluate the effectiveness of Siilo as an educational tool, we conducted a virtual exercise in which evolving cases were monitored via the Siilo secure IMMA, as part of an educational program for students on clinical rounds. We discovered that students enjoyed case-based learning via the Siilo application. The students’ cooperation, participation and self-reported satisfaction rates on a questionnaire showed a high rate of satisfaction from the experimental educational approach. The majority of students found that the instruction was effective, easy to use and contributed to their success on exams. Students said they would gladly participate in similar educational exercises in the future.

The literature offers extensive studies on the importance of various communication applications for students and doctors. Zulfikar et al. found that using IMMAs increases motivation and knowledge among students [5]. Dar et al. [3] and Meerasai and Mohesh [8] showed increased student satisfaction from learning with instant messaging applications, and Hossain et al. [4] demonstrated that messaging applications provide an effective tool for communication and learning among medical students and doctors, and improves relationships between them. Another study by Mohanakrishnan et al. [6] found an advantage in transferring relevant information via messaging applications to prepare for frontal lectures, and a study by Dyavarishetty and Patil [7] demonstrated that students who participated in case-based learning via educational messaging groups earned higher scores on exams than their peers who did not.

This study was the first of its kind to use the Siilo application for virtual instruction of medical students. The application’s interface is based on the WhatsApp interface. It facilitates virtual communication, and is particularly suitable for medical teams, owing to its information security capabilities, which protect transmitted content, and its features that allow users to create cases and manage separate discussions in parallel.

The new application, created specifically for medical teams, is not yet well-known, but we found it to provide a user-friendly platform that is secure and well-suited for teaching students on clinical rounds. Moreover, it is possible that its use will instill in future doctors the importance of using secure virtual communication applications, while emphasizing the importance of safeguarding patients’ private information. Likewise, using the Siilo application has the potential to educate users towards organized work with social applications, to help manage complex medical cases that require cooperation between multiple teams using an orderly, dedicated platform.

Additional studies should examine satisfaction with the application among larger student samples, and should include comparative studies that evaluate success rates among students who used the application as an educational tool and those that did not. Further studies should evaluate the application’s efficiency and ease of use among medical teams when managing cases in real time.

**Conclusion**

The current study, which examined advanced teaching approaches using the messaging application Siilo, specifically designed to meet the needs of medical teams, demonstrated its efficiency as an educational tool, its user-friendliness and its adequate level of information security for communication among professional medical teams. Participants’ high satisfaction rate, cooperation, and anticipation of additional exercises of this kind indicate that this is an effective tool for enriching medical students during their clinical rounds. We encourage integration of this application as an integral tool in medical training programs, to enhance clinical instruction for students around the world.

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