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RISKOCA: A Smartphone-Based Digital Platform for Oral Cancer Self-Examination

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Abstract. We pioneered a smartphone-based digital platform for oral cancer self-examination, namely RISKOCA. It enabled anyone to self-submit their own oral images to evaluate the potential risk of oral lesions. Integrative artificial intelligence (AI) could immediately report if the image might have a type of oral cancer as well as the precise locations of the lesions. Participating specialist dentists would have to re-evaluate and confirm the results before sending back recommendation to the patients. High participation and satisfaction indicated the success of this pilot study. This project aims to promote oral public health and health surveillance, both nationally and globally.

Keywords. artificial intelligence, digital oral health, oral cancer self-examination

1. Introduction

Patients who live far away from hospitals are less likely to visit for a regular oral health check [1]. If they have persistent oral lesions and are not treated well, there is a high chance of these progressing into oral cancer [2]. Camera phone technology and artificial intelligence (AI) is ubiquitous and is widely used in clinics for various cancer diagnoses [3-4]. In this study, we pioneer a smart phone-based application to enable self-submission of oral images for automatically evaluating oral cancer lesions. Since the application is open to the public, we aim to promote oral public health and health surveillance, both nationally and globally.

2. Methods

We developed a smart phone-based web application that enabled patients to self-submit their own images to evaluate any potential signs of pre-cancer or oral cancer lesions. We also developed a specialized AI that was capable of simultaneously segmenting and

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classifying oral cancer lesions in photographic images (in prep). RISKOCA stands for "**Risk** assessment for **O**ral **C**ancer using **A**rtificial intelligence". The study was ethically approved by the CMU Faculty of Dentistry (No. 65/2566).

3. Results and Discussion

As of May 14, 2024, there were more than 1,400 participants enrolled in our program with 2,259 image submissions. Figure 1 shows the proposed general workflow. On the user side, they can see preliminary results. Finally, dentists must manually confirm each case. By analyzing the questionnaires, we got a score of 4.57 out of 5.00 (91.33%).

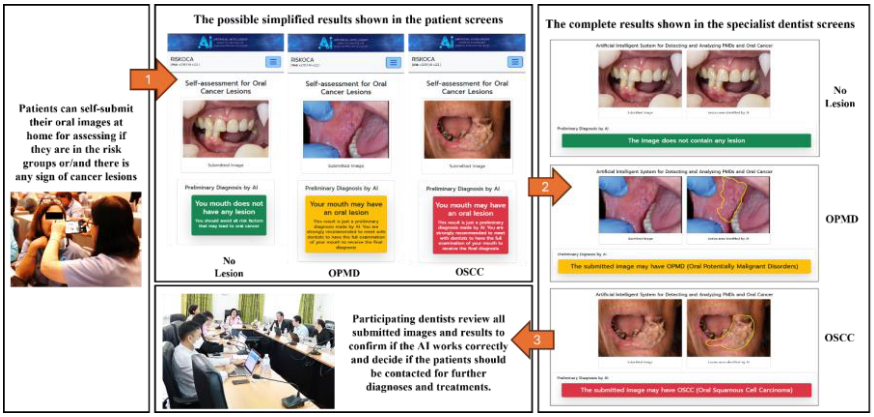

Figure 1. General workflow describing processes starts with patients submit oral images to the AI system (left), then AI generated a preliminary result (upper middle), participating dentists can log in and see details for each case (right), and finally the dentists review and confirm the results (lower middle).

4. Conclusions

We successfully launched a smart phone-based AI-integrated digital platform for self-examination of oral cancer. With the initial results, the platform can help dentists, particularly those who practice in remote places far from specialists. Patients with potential cancer lesions should receive early diagnosis and treatment before being too late. This may lead to a substantial promotion of public health and health surveillance.

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