Meeting Report

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Embracing the digital transformation in healthcare: insights and reflections from the Korean Society of Digital Clinical Medicine Summer Conference 2024

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Date: June 2, 2024
Venue: Seoul Dragon City Hotel
Organizer: Korean Society of Digital Clinical Medicine

I participated in the Korean Society of Digital Clinical Medicine Summer Conference 2024 as a medical student, along with members of Ewha Medical School's startup club, E-co (Fig. 1). The conference provided an invaluable opportunity to hear from distinguished speakers in the field of digital clinical medicine and to engage in discussions and idea exchanges with other attendees. It featured an array of booths, presentations, and panel discussions, serving as a platform to

Fig. 1. Photo at the Korean Society of Digital Clinical Medicine Summer Conference 2024 with colleague students and Ewha Womans University College of Medicine preceptors on June 2, 2024.

showcase the latest trends, technologies, and research achievements in digital medicine and clinical practice. The event was organized into sessions held in Rooms A and B. The morning sessions were joint for all attendees, while the afternoon sessions were divided into two separate tracks. Although I am not an expert in digital clinical medicine, I was inspired to briefly describe my experiences at the meeting because it impressed me.

Ethics statement

This was not a human population-based study; therefore, it did not require approval from an institutional review board or obtainment of individual consent.

Session 1. Prospects of digital health

The first session, titled "Prospects of digital health," began with a presentation by Director Ji-Hyun Ahn on "Trends and prospects of digital healthcare in Korea and abroad." This introductory lecture provided definitions of digital health and digital healthcare, discussed current market trends, and addressed regulations and ethical considerations. This comprehensive overview effectively set the stage for the remainder of the conference.

The second lecture, delivered by Professor Sang-Ho Cho from Hallym University Medical School, was titled "Digital health review through CES 2024." CES 2024, known as the world's largest electronics and IT exhibition, served as the focal point of this discussion. The lecture emphasized the technologies that garnered attention at CES 2024, particularly those that received the Best Innovation Awards. Notably, 8 out of the 27 award-winning products were related to wellness, highlighting the increasing significance of digital healthcare. Furthermore, eight of these award-winning products originated from Korean companies, showcasing the strong influence of Korean firms in the global IT market. The trends in Health and Wellness Tech at CES 2024 were summarized into three main categories: artificial intelligence (AI) integration in digital health, the digitization of care, and the personalization of care. During the lecture, Professor Cho introduced notable innovations such as the "motionsleep" smart pillow by 10minds and the "Mand.ro Mark 7D" robotic finger prosthesis by Mand.ro, both products of Korean companies.

The presentation was delivered by Mi-Jung Son, the team leader of the Digital Medical Device Task Force at the Ministry of Food and Drug Safety. Her lecture, titled "Current and future policies of digital medical devices," offered a comprehensive overview of industry and regulatory trends, culminating in a discussion about the Digital Medical Device Act. This act, which was enacted on January 23, 2024, and is set to be implemented on January 24, 2025, is designed to cater to the unique characteristics of digital medical devices. The existing legal framework, primarily focused on pre-market control, is tailored for traditional medical devices and pharmaceuticals and does not adequately address the distinct features of digital medical products. The new legislation defines digital medical devices as those that incorporate advanced digital technologies, such as AI and ICT, for use in diagnosing, treating, predicting, or monitoring diseases, and for maintaining or improving health. The presentation also discussed changes in product classification and grading, clinical trials, and approval processes under the new law. This lecture was particularly informative, providing detailed insights into the legislative history and the forthcoming Digital Medical Device Act, highlighting the importance of evolving regulations in step with the progress of digital healthcare.

Session 2. Directions of digital care: conventional vs. digital

The second session, "Directions of digital care: conventional vs. digital," contained presentations comparing traditional and digital treatments for four diseases: obesity, diabetes, insomnia, and arrhythmia.

Dr. Kyung-Sil Lee from Life Clinic opened the session with a presentation titled "Obesity: conventional vs. digital." Initially, I viewed obesity as irrelevant to my interests, but I quickly recognized that the widespread effort to lose weight is, in fact, a strategy to manage obesity. The presentation covered several apps I had previously used, such as InOut, Milligram, and Yazio, which added a level of familiarity to the discussion. However, I had not considered that these apps were free. The speaker pointed out that digital care is a business that must be viewed from the payer's perspective, as payers are essential for the industry's survival. When the payer is also the user, digital transformation becomes viable. For instance, in weight management, users would need to pay, but the abundance of free apps results in few users opting for paid subscriptions. The presentation also noted exceptions where patients willingly pay for services like Juvis Diet or 365mc Hospital, categorizing these under the "desire" domain rather than the "disease" domain.

The second lecture was given by Professor Soo Im from Seoul National University Hospital and was titled "Diabetes: conventional vs. digital." Professor Im explored the limitations of HbA1c levels, which reflect average blood glucose levels over a period of 2–3 months but fail to capture acute episodes of hypoglycemia and hyperglycemia or daily fluctuations in glucose levels. The importance of monitoring glucose variability stems from its links to oxidative stress, endothelial dysfunction, inflammatory responses, and retinal damage. Continuous glucose monitoring systems, such as Freestyle Libre and Dexcom G7, play a crucial role in addressing this need. The primary objectives of glucose management using continuous glucose monitoring include increasing the time in range and minimizing glucose variability (GV).

The third lecture, delivered by Professor Ho-Jin Choi from Hanyang University Medical School, was entitled "Insomnia: conventional vs. digital." Insomnia, which is recognized as the most prevalent sleep disorder, affects approximately 10%–15% of the population. Treatment options for insomnia encompass cognitive-behavioral therapy (CBT) and pharmacological interventions. CBT for insomnia (CBT-I) comprises several components: sleep hygiene education, stimulus control therapy, sleep restriction therapy, relaxation techniques, and cognitive therapy. A digital therapy device named "Somzz" was introduced during the lecture. This device employs CBT-I techniques via a sequential algorithm, providing real-time feedback, behavioral interventions, and a training program designed to treat chronic insomnia over a period of 6–9 weeks. The presentation also addressed the potential and challenges associated with digital therapy devices, including issues related to reimbursement, discrepancies in clinical trials, and patient willingness to pay.

The fourth lecture, by Professor Sung-Hoon Choi from Hallym University Medical School, was entitled "Arrhythmia: conventional vs. digital." This presentation explored traditional methods of diagnosing arrhythmia, such as ECG, alongside newer, non-invasive techniques. It also discussed the use of wearable devices for heart health monitoring, including Holter monitors and event recorders. The lecture highlighted the digital transformation in the diagnosis of heart disease, featuring advancements in telemonitoring and the application of AI in ECG, imaging, and electrophysiology. Additionally, it addressed the challenges of implementing these new technologies in Korea, including the development of monitoring systems, service providers, and reimbursement mechanisms. The potential of photoplethysmography to detect atrial fibrillation using optical sensors was a particularly intriguing topic. The presentation concluded with an

analogy to the Luddites, emphasizing the need for doctors to adapt to technological changes.

Session 3. MOU Session with the Korean Society of Heart Failure

In the afternoon, I attended sessions in Room B, which featured a session organized by the Korean Society of Heart Failure (MOU session) that included four lectures.

The first lecture was delivered by Dr. Sung-Ji Park from Samsung Medical Center and was titled "Easily conducting echocardiography using AI." Dr. Park discussed the traditional echocardiography process and the enhancements that AI brings to it. AI facilitates both image acquisition and analysis, streamlining the diagnostic process. The integration of AI into echocardiography, encompassing device manufacturing, image sorting, and digital storage, proved to be an exciting development.

Professor Shi-Hyuk Kang from Seoul National University Hospital gave the second lecture in this session, discussing management platforms for heart disease patients. He elaborated on the potential and limitations of digital technologies in 24-hour blood pressure monitoring for patients with hypertension. Professor Kang noted that digital healthcare reimbursement is probable only for conditions with established guidelines and demonstrable benefits for both doctors and patients, such as insomnia. He also emphasized the wider applications of digital technologies in lifestyle management, medication adherence, and rehabilitation.

The third lecture was by Professor Woong Kook from Seoul National University's Mathematics Department, titled "Mathematics, artificial intelligence, and digital medicine." Despite the complexity of topological data analysis, the central theme was that mathematical analysis of medical data can reveal geometric patterns and classify patient groups. Professor Kook demonstrated, using hospital data research, how mathematics, statistics, and AI can deepen medical insights and be applied to big data.

The fourth lecture, delivered by Seong-Eun Moon from Naver, was titled "Digital Health Based on Search Portals." This presentation captured my interest as it explored the ways in which data companies such as Naver are adapting to the digital healthcare environment. I found the discussion on the potential of language models to minimize manual errors in electronic medical records and enhance efficiency particularly intriguing. The lecture also stressed the importance of having access to large volumes of raw data to effectively train these models, underscoring the necessity for extensive data collection in the healthcare sector.

Session 4. Convergence of digital industries and healthcare

The final session in Room B was titled "Convergence of digital industries and healthcare."

Professor Sung-Gyun Kim from Hallym University College of Medicine gave the first lecture on "Predicting chronic kidney disease using AI." This presentation explored the use of AI for monitoring and predicting different facets of kidney disease. It included industry examples such as VUNO's DeepECG and Hativ, showcasing the effective application of AI in the early diagnosis and monitoring of conditions like end-stage renal disease and chronic kidney disease. The ability of AI to detect hyperkalemia through ECG, despite human limitations, was awe-inspiring.

The second lecture, presented by Dr. Gi-Hyun Jeon from Seoul National University Bundang Hospital, focused on the "Utilization of ChatGPT plugins in the clinic." Although I was not familiar with ChatGPT, I found Dr. Jeon's demonstration of its practical applications in a clinical setting

to be enlightening. Additionally, his YouTube tutorials on using ChatGPT for various educational purposes proved beneficial, illustrating how students can utilize AI to enhance their learning and research capabilities.

The third lecture, delivered by Professor Tae-Ho Heo from Seoul National University, was titled "The reality of medical platforms." This lecture examined the operational status and characteristics of various domestic and international telemedicine platforms. It also addressed the ethical and legal challenges associated with defining the scope of telemedicine and determining responsibility, offering a realistic perspective on the complexities of implementing telemedicine services.

Reflection

As a medical student passionate about biomedical engineering and digital healthcare, I found the Korean Society of Digital Clinical Medicine Summer Conference to be an invaluable experience. The conference covered a wide range of topics, from policy and regulation to the practical applications of AI and digital technologies, providing a comprehensive overview of the current landscape and future potential of digital clinical medicine. The opportunity to interact with experts and peers was particularly enriching, facilitating the exchange of ideas and experiences that will undoubtedly benefit my future studies and career. This conference has reinforced my commitment to integrating digital technologies into medical practice and research, and I am eager to contribute to the advancement of digital healthcare.

This experience has also highlighted the importance of keeping up to date with the latest advancements in digital healthcare, a field that is evolving rapidly. The insights I gained from this conference will be invaluable in shaping my future studies and research. I am dedicated to advancing my education in digital healthcare and biomedical engineering, and I am eager to explore how these technologies can enhance patient outcomes and advance medical practice.

Conclusion

Attending the Korean Society of Digital Clinical Medicine Summer Conference was an enriching experience. The knowledge and insights gained from the lectures and interactions with experts in digital healthcare have greatly enhanced my understanding of this rapidly evolving field. The conference covered a wide range of topics, from foundational knowledge of digital healthcare to in-depth discussions on regulatory frameworks and practical applications, which are all relevant to current and future medical practice. This experience has solidified my interest in digital healthcare and biomedical engineering, and I am eager to continue participating in future conferences and expanding my knowledge in this area.

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Authors' contributions
All work was done by Yerin Lee.

Conflict of interest
No potential conflict of interest relevant to this article was reported.

Supplementary materials

Not applicable.