Implement the AI and digital tools into "Innovative Hospital System"

AI technologies are required to bring back "deep empathy" in the health and medical care system."

AI (artificial intelligence) is essential for the realization of Society 5.0. Although there are various research projects and efforts for social implementation, the health and medical field is especially attracting attention. We interviewed PD NAKAMURA Yusuke, who is researching the "Innovative AI Hospital System".

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Bringing back "heartful care" in medical settings.

Q: Some may think doctors and patients will have less direct communication if AI is introduced to the medical system. What do you think about this?

PD: Actually, at points-of-care, you often see a doctor watching the monitor and keyboard of the computer while the patient is talking to the doctor. However, basically, the doctor should look at the patient's face, and it is especially important that a doctor makes eye contact when he/she is communicating with the patient. Actually, it is important to make use of AI to bring back this "heartful" part in the medical care system.

It works for COVID-19 and critical care

Q: One of your best outcomes is creation of a dictionary for medical terms. How will it be used?

PD: There are a variety of translation systems not only for the medical field, and it seems the overall accuracy has been drastically improving. However, a majority of medical terms are not registered in general dictionaries in the public translation tools. Therefore, 420,000 medical terms have been stored in our dictionary and make useful to translate the spoken language into text forms. Thousands of medicines and therapies were also registered in the dictionary, and colloquial expressions can be converted into text with high accuracy. However, in actual medical settings, it needs to separately recognize the speeches between the doctor and patient. So, there are several issues to be solved, including the directionality of the microphone. Meanwhile, it is very accurate when one person's talk is turned into text. For example, AI can identify doctor's or nurse's voice to automatically create a medical or nursing record. These may dramatically reduce the workload of doctors and nurses.

Q: How does the "Innovative AI Hospital System" handle COVID-19?

PD: We have introduced AI avatars for consultations about COVID-19. An avatar can talk with a consulter to learn about the symptoms, etc. As you know, non-contacted communication is a critical challenge for treatment of infectious diseases. If patients report their symptoms and conditions online rather than visiting doctors and nurses in person, accurate medical examinations by an interview can be implemented without risk of infection.

Q: If doctors do not have to make medical records by entering through keyboard through AI voice recognition and natural language processing, it saves time and reduce the workload in emergency conditions or disasters, doesn't it?

PD: Sure. Needless to say, every second counts at a critical care situation. So, doctors and nurses hardly have a time to make medical records. If AI tools can input the ever-changing patient's status and data into the medical record automatically, they would help medical workers enormously. Therefore, I believe AI will be particularly useful in critical care sites during emergencies and disasters.

Realize patient-friendly and speedy diagnosis and treatments

Q: I think liquid biopsy to diagnose early-stage cancers is an advanced medicine. Compared to other diagnostic methods, what is the benefit?

PD: Because liquid biopsy is a blood test, it can be applied to all patients to diagnose cancers, to select appropriate medicines and to evaluate responses to drug. Also, it can be useful to judge whether cancer cells remain after surgery or not. However, it would be difficult to detect 100% of all kinds of cancers only with liquid biopsy. Further, for example, lung cancer requires biopsy of lung tissues to prescribe medicines. Such tissue biopsy causes some risks of complications in patients. Hence, one of the major benefits of liquid biopsy is non-invasive, once it is applied, provides a minimum risk of complications. Although we need to solve some regulatory issues, I am confident that liquid biopsy can provide suggestions for a right drug safely and very quickly. For your information, it takes about two months to take lung tissues and provide an appropriate drug(s). However, newly developed liquid biopsy enables diagnosis within 24 hours. Therefore, to quickly provide appropriate treatments according to the patient's characterization, it is highly effective. To obtain approval as a clinical test, a liquid biopsy system is currently under a preparatory stage to begin clinical trials. Although it has been delayed due to the influence of COVID-19, the final clinical trial is going to start in 2021.

Q: When AI is applied to support doctors through suggesting treatment plans, etc., it is critical to secure reliability. How will you manage it?

PD: In current medical system, once the diagnosis is confirmed, an established treatment approach corresponding to it is applied. What we aim at is to improve the accuracy of diagnosis. For example, for a cancer, it is required to identify a treatment approach suitable to each patient. After all, it is necessary to improve the accuracy of characterization and provide an appropriate medical care. If AI can pick up and list multiple candidate diagnoses based on multiple keywords such as those related to symptoms and test results, it should become extremely useful as a diagnosis supporting tool for doctors.

AI will provide extra time and realize further advanced medicine

Q: For an international roll out, could you tell us about your specific efforts and future visions?

PD: Currently, we are expanding medical terms in Japanese language for AI dictionary registration to English. Once it is complete, conversion to multiple languages via English will become easier. This should enable a wider range of international roll out, in addition to English-speaking countries. Also, we are cooperating with Mitsui & Co., Ltd. for an international roll out of the Healthcare AI platform.

Q: Could you tell us about the progress of the Healthcare AI platform?

PD: The "Healthcare AI Platform Collaborative Innovation Partnership (HAIP)" approved by the Minister of Health, Labour and Welfare and the Minister of Economy, Trade and Industry launched in April 2021 with the aim of further accelerating efforts toward the wider implementation of the "Innovative AI Hospital System" by building a Healthcare AI platform. With the cooperation of the Japan Medical Association Promotion Center for AI Hospital & Clinic (JMAC-AI), we plan to reflect the advice from the medical sites and create a base for many medical institutions to use various medical AI services. First, we will conduct trial operation of medical image analysis software, install more applications to the platform, and then socially implement it in 2023.

Q: With the Healthcare AI platform, how will the future medical world change in 5 or 10 years, and what kind of benefits will patients enjoy?

PD: You may have the impression that bringing AI into the medical system makes it less humanized. However, it is the opposite. I believe what can never be replaced with AI is "heart-to-heart contact between humans". Today, doctors do not have enough time to spend for patients, and mainly work with data rather than observation of patients in person. Essentially, doctors and patients should restore the human relationship by leveraging AI for tasks that do not have to be done by humans. I believe that AI will help to save time, and doctors and nurses will be able to consider more empathy to patients and provide more highly-advanced medical services for them.