Virtual Doctors – a Future Medical Treatment Alternative?

Volume 6, No.2

April 2025

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Layout & Design: Oliver Behn

White Paper Series of the Chair ABWL:
Digitalisation and Process Management

Volume 6

The necessity to explore new medical treatment alternatives for the future is evident due to the scarcity of physicians. This need is particularly pronounced in rural areas, where a small number of doctors must care for a high number of often elderly patients.

Current State: Human-Guided Telemedicine

A common measure to address this scarcity is the establishment of measures for remote medical treatments. This approach is not new, as remote treatments have been conducted since the mid-2000s using video conferencing and on-site medical assistance. These approaches have since been further developed. Currently, there are numerous providers offering telemedicine booths. In these booths, remote treatments take place, but medical professionals are no longer required. Nowadays, patients perform some measurements themselves, which are partly automated, with the rest being guided by doctors through video instructions. These treatment methods are particularly popular in rural areas, especially when the illness is not severe but requires acute treatment. Examples of such cases include various seasonal infectious diseases.

Future State: AI-Based Telemedicine

Regardless of these treatment options, further developments are necessary, especially considering demographic changes. One approach is to use large medical datasets and make predictions through artificial intelligences, which then provide decisions for medical treatments. Ultimately, this creates virtual doctors. While artificial intelligences are already used today in various medical treatments, they currently serve almost exclusively to support decision-making by doctors. Therefore, it is important to determine how patients would tend to be treated exclusively by artificial intelligence. Diseases in which artificial intelligences already play a significant role in decision-making are particularly suitable for this investigation. Examples include the prescription of antibiotics based on various vital signs, health conditions, and patient lifestyles for the treatment of infectious diseases, or screenings for cancer prevention. The latter often involve image analyses, comparing images of potential cancer sites (e.g., photos of specific skin areas for melanoma checks) from patients with images of verified cancer sites.


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About the Acceptance of AI-Based Telemedicine

To measure the acceptance of AI-based telemedicine, we developed a scenario-based questionnaire, in which patients were initially presented with an approach to AI-based telemedicine. Such an approach is currently under development at the University of Marburg. In their decision-making process, our patients had to weigh whether they prefer treatment by artificial intelligence or physically by doctors, with the latter option requiring more effort. Through this survey, we found that the personal attitude that patients have toward AI-based treatment is crucial for usage intention. This personal attitude is directly dependent on the abilities that patients exhibit regarding artificial intelligence. Specifically, patients need to be proficient in dealing with information systems and have an understanding of the basis on which artificial intelligence makes its decisions. Furthermore, the perceived efficiency of treatment by artificial intelligence plays an important role in the decision-making process. If patients cannot understand whether the treatment is efficient or perceive it as inefficient, they are also unlikely to opt for treatment by artificial intelligence. Interestingly, the decision paths for usage intention differ according to the type of treatment that the artificial intelligence is intended to perform. While perceived efficiency and attitudes and skills related to treatment solely influence the decision for the prescription of antibiotics, the decision paths are more diverse in cancer prevention. In addition to efficiency, attitudes, and skills, perceived norms and rewards for not using AI-based treatment are relevant in the decision-making process for skin cancer prevention. This means that patients consider opinions of important individuals, such as family and close friends, regarding AI-based treatment norms. Furthermore, the importance of the reward for not using artificial intelligence in treatment indicates that patients may not necessarily lean toward AI usage in rare treatments, such as skin cancer screening. This is due to patients‘ concerns about causing errors

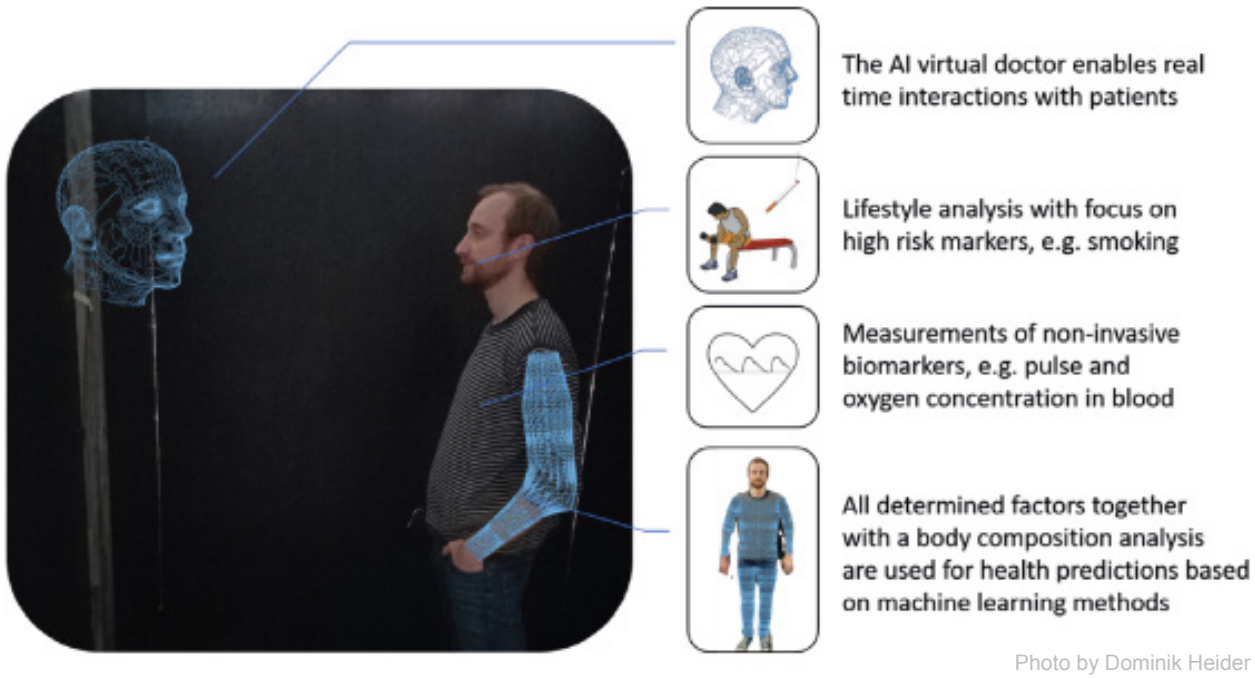

Photo by Dominik Heider

in the treatment process, as they are responsible for generating appropriate images of the relevant skin areas. Therefore, if patients judge AI treatment as inefficient, they are likely to accept longer travel distances and potentially wait times to be physically treated by doctors.

Conclusion

The findings of our survey benefit both science and practice. Scientists can use our scenarios and questionnaires to further investigate AI-based treatments, such as in cases of suspected lung cancer. In terms of practice, we recommend that developers of virtual doctors focus specifically on usability. It is crucial for patients to easily and quickly comprehend the basis on which artificial intelligence makes decisions. Furthermore, they need to be supported in the correct application of artificial intelligence to ensure treatment efficiency. For instance, they should receive feedback if an important predictor for the decision has not been measured correctly. Ultimately, if these factors are taken into account in both science and practice, AI-based medical decisions become excellent alternatives to conservative treatments. They can effectively prevent healthcare shortages in the future, especially in rural areas.

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