

Sasakawa Nursing Fellow 2024 Progress Report

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1. Background and academic goals

As a registered nurse at a university hospital in Japan, I often felt frustrated by inefficiencies in clinical workflows—challenges that not only impacted patient care but also placed a heavy burden on healthcare providers. While there is a growing movement toward integrating technology into clinical practice, many solutions remain underutilized. This is often due to clinicians' limited familiarity with technology and developers' lack of insight into real-world clinical needs when designing software applications and AI models.

The field of health informatics provides students with the knowledge and skills to harness healthcare data effectively and develop innovative technologies to enhance clinical workflows. This program allows students to learn how to analyze complex healthcare data, design and implement technological solutions, and bridge the gap between clinical practice and technical development.

Motivated to drive meaningful change, I decided to pursue a master's degree in health informatics to explore how technology can effectively address these issues. My goal is to develop the expertise needed to bridge the gap between the technical and clinical fields, ensuring that healthcare technology is both practical and impactful. By fostering collaboration between developers and healthcare providers, I hope to contribute to more efficient and effective clinical workflows that ultimately improve patient care.

2. Progress made during the first year

During my first year at Yale University, I mainly took courses on healthcare data science and artificial intelligence. Coming from a nursing background, these subjects were new to me and sometimes challenging, but also very interesting and rewarding. I also enjoyed learning alongside students from different backgrounds, including those with experience in math and statistics. Their perspectives helped me understand the material in new ways and made the learning experience more engaging.

Below are some of the most inspiring classes:

- **Introduction to Health Informatics:** In this class, I learned the fundamentals of clinical informatics, with a particular focus on the Clinical Decision Support System (CDS), a tool integrated into electronic medical records to assist with

clinical decision-making. Through this course, I gained a deeper understanding of how CDS supports medical professionals in making informed decisions, ultimately helping to prevent medical errors and improve patient outcomes.

- **Population and Public Health Informatics:** This class was about learning how to use informatics with a focus on population and public health. The weekly discussions in the class focused on topics related to the use of information technology. (e.g., AI and ethics) In the final project, me and my group members develop an app for ADHD symptom management.
- **Computational Methods for Informatics:** This course introduces the key computational methods and concepts necessary for taking an informatics project. I learned a wide range of data analysis methods and prediction models while implementing various algorithms. This was the most challenging class for me as someone without any computational background. I attended the office hours of TAs and the professor's every week, which was very helpful for making up for the parts I did not understand in class. This course allowed me to deeply consider how we can use this knowledge in clinical practice based on our clinical experience.
- **Applied Artificial Intelligence in Healthcare:** Recent advancements in machine learning (ML) have the potential to greatly enhance patient care. However, despite this promise, the adoption of ML applications within healthcare institutions remains limited, and even fewer implementations deliver meaningful value. This course is designed to equip students with the knowledge and skills needed to navigate the complexities of integrating ML into clinical practice. I found this class particularly engaging because it demonstrated how machine learning models can be applied to improve real-world clinical challenges. I was especially fascinated by the process of evaluating these models to enhance their accuracy, ultimately leading to more reliable predictive tools in healthcare.
- **Biomedical Natural Language Processing:** Now that large language models (LLM) like chatGPT are becoming popular tools to use, clinical fields also try to integrate LLMs for tasks like analyzing and summarizing the clinical notes on EHR. However, the nature of the clinical notes is very different from the articles and anything we can see on the internet. This course provides a systematic introduction to basic knowledge on natural language processing (NLP) and AI (e.g., linguistics, machine learning, and deep learning algorithms) and advanced NLP tasks.

3. Objectives for the second year

In my second year, I will focus on capstone projects, applying the skills I developed during my first year. I will work on both an individual and a group project. For my

individual project, I plan to use electronic health record (EHR) data to assess efficiency in hospital emergency departments. The details of the group project are still undecided, but I hope to utilize my data analytics and machine learning skills in a meaningful way.

Looking ahead, I aspire to work in a hospital setting to analyze clinical data and apply machine learning models to optimize clinical workflows. My primary goal for my second year is to bridge the gap between theory and practice by applying my skills to real-world clinical challenges.

4. Living Aspect

Yale University is located in New Haven, Connecticut, a small city primarily centered around the university. While the city itself may not have much to offer in terms of attractions, I've found it to be an ideal environment for academic focus. Beyond the classroom, there are numerous seminars and events that are both interesting and relevant to my field, and I enjoy attending them with friends from my program. On weekends and during breaks, my friends and I often take trips to nearby major cities like New York and Boston to make the most of our time outside of school.

5. Acknowledgement

I am deeply grateful to the Sasakawa Health Foundation for their support. Their funding has allowed me to fully dedicate myself to my graduate studies and enabled me to deepen my academic knowledge and make the most of this invaluable learning experience.