

Modelling of the Health Care Delivery System



Dr Meng Fanwen
Operations Research Specialist
Health Services and Outcomes
Research
National Healthcare Group

Dr Meng Fanwen traces his journey to becoming an operations researcher.

My journey began when I first obtained my bachelor degree in Mathematics in China, and then moved on to pursue my PhD in Operations Research (OR) at the National University of Singapore (NUS). Subsequently, I worked at NUS and University of Southampton as a research assistant, research fellow, and senior research fellow for many years.

My research interest focuses on a broad range of modelling work, ranging from basic mathematical formulations and their properties to computation and algorithm analysis, to applications in engineering, supply chain management and logistics, and many more. I enjoy challenging myself and am always keen to explore the mysterious world of mathematics to come up with practical applications to solve real-world problems.

My interest in Health Services Research (HSR) started when I was with The Logistics Institute – Asia Pacific, where I was involved in

Healthcare Supply Chain, a collaborative project with the NUS Business School, National University Hospital (NUH), and overseas experts from the United States. It was exciting to investigate health services problems using mathematics, statistics, basic and advanced OR models.

From there I went on to join the Health Services and Outcomes Research (HSOR) unit at the National Healthcare Group, and this was where I embarked on my journey as an operations researcher specialising in healthcare.

While working at HSOR, I furthered my knowledge through attending conferences and training, and developed myself through participating in research projects. I witnessed how research plays a critical role in improving patient care, learned the importance of using modelling to prepare for changing healthcare needs, and translational science. In particular, I have used mathematical modelling, computer simulations and quantitative analyses to tackle a range of healthcare problems.

With support from my Director, Dr Heng Bee Hoon and the team, I have been involved in various HSR projects, research grant applications, and publications. Among the projects involved, HSOR projects I collaborated with the Emergency Department (ED) of Tan Tock Seng Hospital in using modelling techniques for nurse shift planning. Clinical management of patients in the ED is complex due to the urgency, dynamic status, and uncertainty of patient's diagnoses. Workloads change greatly by day of week, time of day, and by shift. Thus, balancing workload with nurse staffing can be very complicated. A mixed integer programming was developed to derive an optimal nurse shift plan. To understand patient flow at ED, graph theory was applied to reduce the complexity of visualising patient flows. With the use of a mathematical mode, we were able to propose a solution for the hospital managers to implement at ED to improve manpower management and balance workloads.

Geriatric Care - From Frustration to Passion



Dr Liew Tau Ming
Registrar
Institute of Mental Health

Dr Liew Tau Ming shares how he ventured into geriatric research.

I remember as a medical student, I had a biased view of geriatric care. I told myself – “There is little that doctors can do for the elderly population. There is no cure to their illnesses. Neither can we bring back their youth”.

Little did I expect, I was posted as a young medical officer to a department which I was least excited about – Geriatric Medicine! In my initial months there, I remember feeling frustrated that one after another of my patients had this common diagnosis – ‘Dementia with BPSD’ (Behavioural and Psychological Symptoms of Dementia). It meant, to me, a diagnosis of hopelessness. How wrong I was!

Gradually, I learnt to appreciate that there was more to just curing a patient. The human touch and compassion I provided as a doctor made a huge difference to my elderly patients and their families. And it was heartening to bring joy and quality of life to them when their circumstances suggested to them otherwise. Over time, this interest in geriatric care grew into a consuming passion. I felt most alive when I am seeing elderly patients and their families, and noticing the impact I had in their lives. This passion was fuelled further when I met many great

teachers like Dr Lydia Au, Dr Lawrence Tan, Dr Philip Yap, Dr Seng Kok Han, Dr Joshua Kua and Associate Professor Chiam Peak Chiang.

Research - a key to good clinical care

It was in this context that I began to realise that there is more that we can do for the elderly populations. And, the current boundaries of geriatric care can be pushed much further through research. My initial involvement in geriatric research with Dr Philip Yap opened my eyes further to the world of research. I started noticing areas in my clinical practice which can be improved through research, and my limitations in research experience to bring such improvements. This led me to appreciate the need for sound research skills, as a prerequisite to a good clinician. I was most grateful when IMH supported my application for Master of Clinical Investigation, and the Ministry of Health awarded me the scholarship to do this. Associate Professor Chong Siow Ann had also been most helpful to me when I started this research journey in IMH.

The present and the future

With the funding from Master of Clinical Investigation and IMH Centre Grant, I currently have the opportunity to engage in a research very close to my heart – dementia caregiver support. This project is still in its infancy, but I am fortunate to have a great team involving Dr Philip Yap (Geriatrician), Ms Sanni Leong (Medical Social Worker), Ms Hia Soo Boon (Psychologist), Mr Mihir Gandhi (Biostatistician) and Assistant Professor Luo Nan (Health Service Researcher).

While there have been many challenging and exhausting moments so far, it was the grace of God and the encouragement of my wife that kept me persevering. I do not know what the future holds. If given the opportunities, I see fertile research grounds in the area of dementia and geriatric psychiatry. Ultimately, I hope to do what I set off doing – to bring comfort to the elderly people and their families.