

Application of Science to Medicine—The Clinician-Scientist

Zhongwei Huang, ¹*MBBS, PhD*, Eu Leong Yong, ¹*MRCOG, PhD*

Introduction

Without the clinician in the scientist, there can be little translation of scientific discoveries to benefit patients. In recent years, significant increases in medical research spending have not produced corresponding advances in new treatments or cures. Instead, laboratory discoveries remain in the “valley of death”, the gap between bench research and clinical application. The gap (cultural and linguistic) between the research scientist in the laboratory and the harried clinician managing demanding patients with complex health problems is getting wider. There are few scientists who truly understand clinical problems. Although clinicians can work with scientists to great effect, the existence of both competencies in one body has conceptual advantages. It can ensure that nothing is lost in translation. The term ‘clinician-scientist’ is not a creation of modern times but its origins can be traced even to the late 19th century.¹ However this unique individual is under threat as the numbers of clinician-scientists are not growing worldwide and such individuals are at the brink of extinction.²⁻⁴

The Challenge is Global

In the United States of America (USA), the percentage of medical doctors (MDs) receiving National Institutes of Health (NIH) funding has drastically decreased compared with Doctor of Philosophy (PhDs).⁵ Despite a remarkable increase in understanding of molecular mechanisms of diseases, animal models and through the revolutions in genomics, proteomics and systems biology, very few novel drug leads have made it to the bedside. There has been considerable debate in the literature about the causes of this phenomenon and how to bridge the abyss. One possible cause may be the clinician-scientists’ declining role in the medical research enterprise. The NIH has recognised the decline of the clinician-scientist as a major problem and adopted Clinical and Translational Science Awards (CTSA)

programmes to reverse the trend.²

Singapore’s Response

Various National Medical Research Council (NMRC) - Biomedical Research Council (BMRC) clinician-scientist support schemes have been in existence for more than 5 years.⁶ Fortunately, the numbers in Singapore are growing with the entry of new institutions like Duke University and Imperial College. The clinical research ecosystem is becoming more supportive year on year. A Chapter of Clinician-Scientists in the Academy of Medicine, Singapore promises more lobbying power. However, the training of clinician-scientists is long and complex. The clinician-scientist has to be master of 2 very challenging domains; rigorous medical specialty training coupled with the need for equally rigorous laboratory or clinical research training. Scientific training often requires dedicated time away from the clinic, resulting in demands for longer clinical training times from clinical accreditation committees.^{2,3}

Importance of Mentorship

Given these 2 complementary yet at times conflicting domains, it is intellectually and emotionally demanding for one to be trained as a scientist and a clinician at the same instance. A well-planned programme to educate and train these individuals with subsequent career development for aspiring clinician-scientists needs to be in place.⁴ Otherwise, our people are not geared for success. Successful mentorship is vital to career success of the budding clinician-scientist.⁷ Being a clinician-scientist seems to be an arduous task, and the career tracks are not transparent to many of our younger colleagues. It takes 10 years or more to complete residency and become a specialist in a procedural discipline. The added demands on the clinician-scientist to embark on research as well as meeting the requirements for all clinical competencies make the proposition not very

¹Department of Obstetrics and Gynaecology, National University Health Systems

Address of Correspondence: Professor Eu Leong Yong, Department of Obstetrics and Gynaecology, National University Health Systems, Tower Block Level 12, 1E Kent Ridge Road, Singapore 119228.

Email: obghead@nus.edu.sg

attractive in our fast-paced and expensive society. In order for these individuals to succeed, a nurturing environment is essential. Supervision, guidance and advice during the years of career development from a sympathetic and wise mentor are essential.

Surgical Versus Medical Disciplines

Clinician-scientist residents in surgical and medical disciplines need to be treated separately. Surgical residents require hands-on time in the operating theatre to hone their surgical skills. To ensure that clinician-scientist surgical residents are equally competent to that of surgical residents on the clinician track, this is unavoidable. Therefore, working hours and stress levels of surgical residents on the clinician-scientist track may seemingly be much higher than both surgical residents on the clinician track and medical residents on the clinician-scientist track.⁸ Hence, one of the most applicable educational models would be competency-based rather than time-dependent—this has shown to work for research pathway physicians and such an approach can be extended to other talented trainees who would benefit by customising training to meet career goals. Lipner and colleagues demonstrated that different training pathways undertaken by physicians or physician researchers lead to similar achievements in clinical judgment.⁹

Will Our Younger Colleagues Choose This Track?

Is the future hopeful for our younger colleagues to choose this not often treaded path despite the sacrifices expected? Are there individuals who believe that the efforts are worthwhile at the expense of less sleep, relentless amounts of work, longer time to become a specialist, sacrifices in their personal lives and perhaps a rather unsupportive environment (at the moment)? Do they feel that the track is sustainable and therefore continue to plough on? They must believe that sweet victories await those who believe and act on their beliefs—the clinician-scientist way, otherwise the efforts invested will not yield the expected rewards. However, more radical action are already in place, including major changes to the peer-review process, greater funding for translational research which includes CSA transitional awards, BMRC bench to bedside grant calls, and significantly more resources for the training and early

career support of potential clinician-scientists in Singapore's academic institutions. Such improvements should, with favourable winds, enable our clinician-scientists to conduct translational research that bridges the valley of death and transforms biomedical research discoveries into tangible clinical treatments and technologies for Singaporeans and the world beyond.

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