

Clinician-Scientists? What's that? By Dr Gerrard Teoh

INTRODUCTION

The archives of medicine record numerous examples of clinicians who had made landmark scientific discoveries that changed the way diseases are diagnosed and treated today. Most of these discoveries arose through the sheer curiosity and scientific ability of these doctors. However, it is also quite evident that their passion to achieve success; as well as the contribution of serendipity, equally (if not more importantly) facilitated these discoveries.

One such clinician is Dr H. B. Jones (i.e. Henry Bence Jones), who one and a half centuries ago, whilst in his early thirties, described a curious phenomenon that occurred when the urine of patients with multiple myeloma (MM) was heated. We now call this phenomenon Bence Jones proteinuria (BJP); and even today, numerous hospitals and institutions worldwide continue to use BJP as a test for MM. It came as no surprise that Dr Jones, who was trained in both medicine and chemistry, was in fact both an astute clinician as well as a skillful scientist: a Clinician-Scientist.

TRANSLATIONAL RESEARCH

Never before in its history has the practice of medicine seen such a great demand for medical evidence by patients and the general public, than today. Keeping pace with this ever-increasing demand is an explosion of new scientific knowledge; resulting in literally oodles of information arriving on our desks and computers every single minute. This hectic pace of knowledge creation; which has increased exponentially in recent years; has been fueled in part by the progressive amalgamation of the basic sciences (i.e. biology, chemistry and physics). Hence, the expression that "Knowledge is King", is probably an appropriate summary of the present state of affairs.

But unlike the past, most of the discoveries and new knowledge we observe today are by-and-large not the brainchild of clinicians, but rather non-clinicians (e.g. immunologists and cell biologists); and clinicians are in fact losing their relevance from right under their noses. Unfortunately, these ideas

(which no doubt by themselves have high scientific merit) may not arise directly from observed clinical problems; but from simple logic. All clinicians know, of course, that life is full of surprises that frequently defy logic; therefore, these scientific discoveries may not necessarily be useful and/or relevant to the diseases and patients being treated. Moreover, once having made the discovery, it is probably unwise to try to fit the square pin into a round hole as results could be rather damaging.

Hence, although ample new knowledge is available, it unfortunately still needs to be processed/translated by trained persons (i.e. clinicians) in order to become clinically useful products and services. The transformation of clinical ideas into relevant experiments; and finally into products and services in the clinic, is the challenging task of the Clinician-Scientist.

PARADIGM SHIFT

A paradigm shift is occurring among Clinician-Scientists. No longer are they just curious and passionate researchers relying heavily on serendipity; they now need to be equipped with the knowledge and skills of complex scientific methods; and become even more discerning and almost intuitive in sensing the needs and problems of the patients under their care. They will also need to make discerning judgements on resources and knowledge; to arrive at decisions that will positively influence patient care.

Because of information overload, there is a dire need to train more Clinician-Scientists. Unfortunately, the surest way of grooming Clinician-Scientists is through mentorship; and this is extremely slow. Nonetheless, we are living in really exciting times; with sufficient surprises to put a damper on the grindstone. Medical and scientific technology has progressed in leaps and bounds in the past decade; and this has provided us with newer and more sophisticated tools and approaches for research. Clinicians should seize these unprecedented opportunities; and participate and experience the exhilaration of riding the fast train through the world of medical science.

CLINICIANS HAVE AN APPOINTMENT WITH INFORMATION

But there is no "free lunch"; Clinicians have an appointment with information. And unfortunately, we do not really have much of a choice if we want to remain relevant; especially when faced with vigorously clamorous "customers". We either grab the bull by its horns or risk being sent into oblivion. Clinicians must re-invent themselves; they must learn to samba and play the beautiful game. Yesterday is obsolete today; and today, tomorrow. Some say that attack is the best defense. But in order to engage in fair battle, we will need to define the playing fields; and the positions that we want to play.

Fortunately, and rightfully too, every clinician has a personal choice; depending on his/her goals, ideals and aspirations. In a nutshell, you can either:

1. Ignore New Information

You are in defense; and you guard what you already have. If you falter, and let a man through, you pay the price and risk substitution.

2. Use New Information

You are in midfield and distributing play. You use new information effectively by moving them into areas of interest and need. You are right in the thick of things and an excellent service provider. Since there is a general preoccupation with health and the maintenance of health in the world today, you are a highly valuable component of the healthcare delivery service.

3. Create New Information

You are picking up speed and playing down the flanks. You are creating new information and directing them inwards and towards new opportunities and strategies. The opposition comes at you from different directions; however, your frequent forays into the frontiers of medicine ultimately pay off and are crucial to your team's success.

4. Translate New Information

You sport a unique pizza slice-shaped hairstyle and play in frontier zone. You

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constantly create new knowledge and make attempts to transform them into improved score lines. You are never satisfied with conventional reasoning; you are rebellious. Management and the opposition don't quite really know how to deal with you because you are always looking for new angles; but you ultimately bring home the prizes. For want of a better name, they call you a Clinician-Scientist.

THE CLINICIAN-SCIENTIST

Some prefer to call him/her a clinical-researcher because he/she spends greater than three quarters of his/her time in clinically-relevant research; and the rest of the time in clinical service. He/she is the commixture for clinical as well as laboratory knowledge; a melting pot for clinical and laboratory data; and its final transformation into useful clinical products and services. Workflow proceeds from bedside to bench, and back to bedside. Today we recognise three levels of Clinician-Scientists:

1. Level 1 Clinician-Scientists –

Mentee

One does not become a Clinician-Scientist overnight. You need to be groomed through an intense process of mentorship. Talent-rich clinicians who approach research almost as a hobby enter this grooming phase by working under an established Clinician-Scientist. You learn how to test out your ideas and to create new knowledge; especially knowledge that will withstand the tests of

time. You learn how to pan the ever-changing landscape of Medicine to look for relevant clinical problems that need to be addressed; and also for opportunities to provide new clinical products and services. You exit this level when you can confidently scale the rigour of peer-review. The currency is publications.

2. Level 2 Clinician-Scientists – Mentor and Innovator

You are on autopilot and grooming future Clinician-Scientists. You add value to your mentees and are basically your own boss and destiny. You are putting your innovative ideas into practice; and generating new clinically-useful products and services. Two fundamental differences separate your approach to problem-solving from that of a non-clinical researcher; i.e. you are principally a user of technology rather than a creator of technology; and through the use of available technology, you solve clinically-relevant questions and in the shortest possible time. Your principal goal is to solve clinical problems through scientific discovery. You are an innovator. There is no exit point; research is your hobby. The currency is patents.

3. Level 3 Clinician-Scientists – Entrepreneur

Although you continue to be both a mentor as well as an avid innovator, you are mainly in the process of bringing your invention into the clinic for validation. You continue to

add value but wear many hats. You interact constantly with clinical trialists; other institutions, hospitals and clinics; biotechnological agencies; pharmaceutical agencies; legal and approval agencies; and funding agencies. Your contributions include a steady stream of new talent; new products and services; and the development of novel therapeutic strategies for your patients. Again, there is no exit; research is in your arteries and veins. The currency is new clinically-relevant products or services made available "on the shelf" to as many patients as possible.

CONCLUSION

Obviously, not every clinician wants or needs to become a Clinician-Scientist. There must be goal-keepers, defenders, midfielders, wingers and strikers in any team. However, we must constantly aim to avoid relegation; and to remain relevant and tuned to the scientific advances in medicine.

For some of us who are inspired to become Clinician-Scientists, we will experience the thrills and spills of doing research at the frontiers of medicine. And if serendipity were kind, some of us might also succeed. And if we succeed, we must always remember that we do it because of those who suffer more; i.e. our patients. So listen to your patients, they are calling out to you.

My dear clinician colleagues, it is time for us to re-invent ourselves; our patients need us to bring out the Clinician-Scientists in us. ■