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Mini Review

Career Development and Progression for Emergency Physicians Training: From Apprenticeship to "Clinician-Plus"

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Abstract

Apprenticeship has always been the model of nurturing younger clinicians and medical students with "on the job" training. This period of experiential learning, astute observations and instructions are valuable in helping the growth and development of the next generation of professionals. The apprenticeship model is applicable across many disciplines of Medicine, including Emergency Medicine. This is also the model in use in the development of "Clinicians First; Clinicians Plus" program. Emergency physicians must be good, astute clinicians first. Then, based on their inclination, interest and talent, they have the option to select training tracks such as The Clinician-Educator, The Clinician-Scientist, The Clinician-Innovator or The Clinician-Entrepreneur tracks. These are just a few examples of the specialized training available. Each of the track will have a structured curriculum and training guidelines to ensure the necessary exposure, knowledge and information acquisition, immersive experiential learning with appropriate, dedicated mentors. For senior residents in Emergency Medicine, their growth in these different areas can be monitored using established frameworks. Commencing this immersion earlier, at the medical student level, is also possible. This is what is being done at Duke NUS Graduate Medical School. This unique approach helps prepare students not just to practice Medicine, but also, how to improve patients' lives and make a difference, whilst at the same be allowed to pursue and develop in an area they find exciting and stimulating. Not only that, but their contributions, innovations, research and educational prowess will help shape the future of Emergency Medicine and how it is practiced.

Introduction

Today, Emergency Physicians (EP) and Emergency Medicine Specialists run Emergency Departments (ED) across the world, which represent the 'front doors' of acute healthcare institutions and hospitals. The ED is the department in the hospital that has the most acute contact with the public. The practice of Emergency Medicine as an independent specialty is just over 50 years, but the practice of delivering acute, emergent care is as old as the practice of Medicine itself [1]. From the times of The Chinese Dynasty of the Three Kingdoms (280-220 BC) to the period of Julius Caesar (100-44 BC), The Great Crusades of 1023 AD where pilgrims needed acute care on the way to Jerusalem, Napoleon's invasion of Italy with the French Military surgeon Dominique Jean Larrey and The American Civil War (1861-1865), there has been delivery of acute care on the battlefields and at the frontline. The model of work during these times have always been based on the apprenticeship model, where young and upcoming doctors and surgeons worked closely with the senior, experienced ones in skills acquisition, job shadowing and deepening their understanding. They worked in partnerships, with close observation of their mentor's work execution [1-4]. This fundamental relationship continues till today, but has evolved to become more organized, structured and formal [5]. Apprenticeship refers to a system of training a new generation of practitioners of a certain trade or profession with 'on the job' training. This is part of the step towards giving them exposure, experience as well as leading to the license to practice independently [6]. William Osler represents a good example of a clinician dedicated to training younger colleagues and students. He is well remembered for his "hard work, enthusiasm, equanimity and keen interest in people". Osler was also the physician-in-chief and chair of Medicine at John Hopkins University. He was a strong proponent of teaching and especially that 'teaching should be at the bedside rather than in the lecture hall'. Abraham Flexner, though not a clinician, is accepted as one of the most influential medical educators, globally, who was a strong advocate of learning through curiosity. Flexner also supported the building of mutual trust between faculty and learners [7]. During periods of apprenticeship, various opportunities are made available for knowledge and skills acquisition. From the informal methods of the early years to the more organized, systematic, structured, comprehensive curriculum and assessment methods of today, we now even have 'embedded learning', 'by-the-way learning' or 'on the fly' learning in Emergency Medicine [7, 8]. More formal key performance indicators (KPIs) are definitely relevant today. Also, more sub-specialties of Emergency Medicine have developed and evolved. An alternative to using the term 'doctor', "clinician" is a substitute terminology. [1, 5, 9] "Clinician" refers to a doctor having direct contact with patients (versus those involved in theoretical or laboratory studies), who is qualified in the clinical practice of Medicine (or Emergency Medicine, in this case). All these changes have come about closely linked to progress in society, technological influence, development of structured and formal curriculum, educational tools and methodologies, changing needs and expectations of patients and communities, as well as the greater demands and accountability for the profession [8-10].

Clinician and Clinician-Plus (Clinician +)

Clinicians in particular, have a very organized, methodical and tidy mind, with a structured approach to things and situations. They are systematic and analytical. Good clinicians ask the relevant and appropriate questions. They have a level of curiosity that is crucial to help them decipher patients' diagnoses. Clinicians also serve as leaders in multiple contexts, thus they are active in leading and leadership roles. They are often also advocates for a variety of causes. [10-12]. Clinicians today are innovative, driven and have a sense of creativity and innovation, that are pushing boundaries in solving real world

clinical challenges. In particular, Emergency Physicians must be astute clinicians first, especially with their work at the frontline. Moreover, being the clinicians who have the first contact with undifferentiated, acute patients, their heightened levels of alert, fast thinking process and curiosity, becomes all the more important. [7, 9, 13-15].

Many of the challenges of healthcare today requires creativity and a new perspective, reframing innovation and entrepreneurial solutions which encompass both health promotion and disease prevention. Doing all these will also need a new-age leadership at the fore-front, excellent administrative skills and capabilities as well as strong research acumen. Over-arching all these is a strong clinical foundation, and a perspective on life-long learning. In their career trajectory they may discover their inclinations, passions and strengths in areas such as medical education, research, mentorship, leadership, entrepreneurship and others [15, 16]. Nurturing these interests whilst maintaining their role as active, up-to-date emergency physicians/ clinicians is a journey that requires balance as well as opportunities. This is the basis of the “Clinician First; Clinician Plus” initiative. It serves to ensure a good, steady pipeline of the relevant experts and expertise for the future. It also emphasizes the paradigm shift we want to see coming on board in healthcare training and systems of the future. It is part and parcel of future-proofing our healthcare system [17]. If these interest and inclinations are recognized earlier, the nurturing can commence during the medical school years. In this case, the runway for training might be longer, more layered with depth and be strongly scaffolded into the person. Some of the areas of interest Emergency physicians can pursue and be groomed for include those in Table 1 below. A few of these tracks are more established and have been around longer, whilst others are relatively new areas and training can be more ad hoc, experiential or opportunistic [18-22].

Table 1: Areas of Interest and Career Trajectory and Development for Emergency Physicians

Areas of Interest
Clinician-educator
Clinician-scientist, clinician-researcher
Clinician-entrepreneur
Clinician-innovator, clinician-inventor
Clinician-leader
Clinician-mentor
Clinician-quality champion
Clinician-advocate
Clinician-mediator
Clinician-Global Health physician
Others

The Clinician-Educator

Historically, in the practice of medicine, teaching is almost a ‘given’ (almost every clinician knows they have to teach in one form or another). This started as being very informal, mostly with bedside observation, without a formal curriculum being stipulated. With time and evolution of this apprenticeship model, it is now a very formal and structured process, with a framework and curriculum of what needs to be achieved, the learning outcomes for the learners as well as the level of satisfaction of the teachers [7, 8]. Clinician-educators (CE) must understand that their tasks today are different from what they experienced as students. The teaching process has become one that needs accreditation, to ensure all the necessary requirements are met. Teachers need to be trained to teach and ensure the structured transfer of learning is carried out efficiently and effectively. In view of these changes, developmental pathways for nurturing and grooming CE are essential and available in established teaching healthcare institutions. [16, 22]. Clinicians with inclination for teaching and showing qualities of potentially being a good medical educator should be identified early and

be given the appropriate advice, mentorship, practice and supervision [16, 17]. This can start during the medical school years. This is what is being done at Duke-NUS Graduate Medical School, where a “Clinician First, Clinician Plus” initiative has been instituted [17, 23]. This unique approach helps to prepare the medical school graduate not only for the practice of Medicine, but also, how to improve the practice of Medicine to improve lives. From the educational years, medical students should experience the type of healthcare model and systems that they will practice in. Starting early during medical school years help to inculcate their identities as both clinician and educator. It is part of the journey in transforming medical education to medical practice. The quality and future of clinical education will eventually be affected by the type of CE we nurture from now. The journey of a CE will span many years and the need to be able to learn, unlearn and relearn becomes very apparent. Much of the educator or CE development is also intra-individual, i.e.. The knowledge and skills are contributed by the educator themselves, based on personal insights, interpretation of their own experiences and learning by observation. It also involves a lot of self-reflection. Thus, many CE are self-selected, self-made, self-taught and self-authored. This is frequently supported and enhanced by peer learning and peer mentoring. This kind of development will require an environment where the social structure can harvest the right learning climate and attitude. Medical education does involve the process of socialization. This is closely linked to how our healthcare workplaces are structured, curated and planned. [18, 19, 24] (Figure 1) At Duke NUS, to summarize the CE exposure and training, the mnemonic CARE is used: they should be able to CONNECT with the relevant parties, ASSIMILATE all the relevant and necessary information as well as skills, with the ability to filter the noise, perform REFLECTION frequently along their journey of development and also, EXPLORE, new areas, methodologies, concepts, technologies and others which is future-relevant and will help to future-proof healthcare [17, 23].

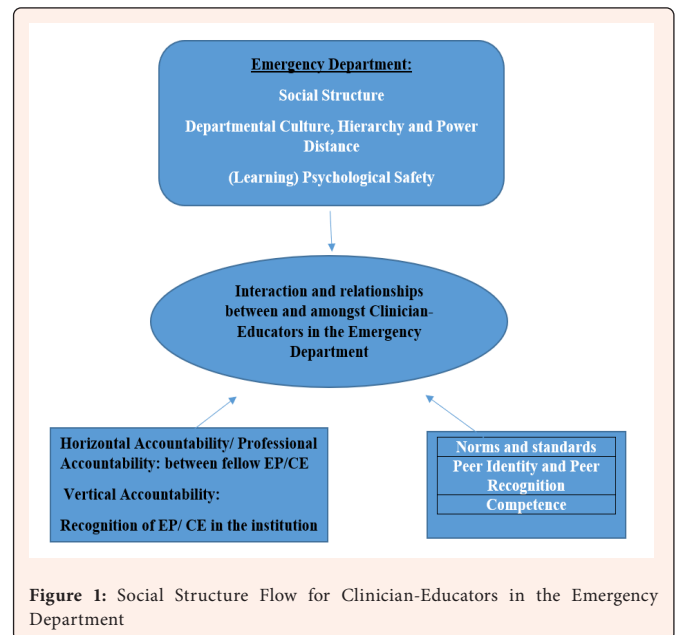


Figure 1: Social Structure Flow for Clinician-Educators in the Emergency Department

Emergency Physician CE can reference the Educator Development Framework from SingHealth Duke NUS Academic Medical Centre (EDF) (Figure 2) which is designed to guide CE development [23]. It provides a shared mental model of the various educator roles. This can help CE strategize their plans to become more effective. The framework focuses on how to be more engaging, reflective and inspiring as a CE. All the 3 roles are crucial as CE integrate educator competencies and values [23]. For a novice CE, having an appointed mentor to assist and partner them in negotiating the framework is useful. Personal sharing, experiential learning and trust building between the novice and mentor CE is important. For the faculty and senior Emergency Physicians, this can be a part of the process of continuous lifelong learning and professional development.

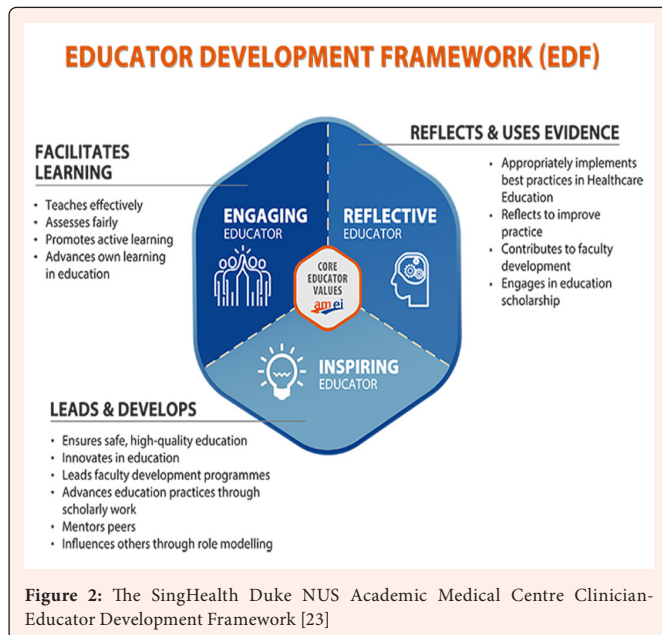


Figure 2: The SingHealth Duke NUS Academic Medical Centre Clinician-Educator Development Framework [23]

The Clinician-Entrepreneur and Clinician-Innovator

Being a clinician and an entrepreneur may seem worlds apart at first, but with deeper analysis and reflection, a clinician would be a good candidate to be involved in the conceptualization, innovation, invention and marketing of healthcare products or equipment. They would have both the clinical as well as product knowledge; the combination of which is useful. Developing a clinician entrepreneur (CEn) requires partnership with some workforce development programs. In fact, links and networking with industry, vendors and the appropriate trade organizations are very useful. It helps to connect the clinician with the relevant networks to advice, fund, market, sell and establish their products. [25, 26] For clinicians interested to become CEn, attending some relevant courses, job shadowing and placements can be very useful to expose them to the industry. Otherwise they may not be able to see this perspective if they just stay within the healthcare institutions. A CEn requires a creative, curious and inventive mind, that must be able to think outside the box. They may have to experiment, conduct trials, and build prototypes, rather similar in some aspects to doing research. They must be willing to face set-backs, failures or delays in the outcomes but must also be willing to continue trying, editing, changing, uplifting or even taking a completely different approach. A high level of commitment, patience and passion is required. When they attain the desired business outcomes, the satisfaction can be overwhelming with a sense of accomplishment. As a CEn, they create value for their invention. They can also bring about 'value-sharing' with other professionals e.g. their clinical colleagues and patients. Commercialization skills and product knowledge can be coupled with the background clinical information can benefit patient care and healthcare delivery [25-27]. There are companies today that take on CEn and help with their incubation, internships and development. They have to acquire the necessary skill-sets, understanding and capabilities as just medical training is insufficient for the pursuit of medical entrepreneurship, which requires a new set of multi-skills. These CEn must learn to build a business ecosystem based on passion, perseverance and patronage [25]. They will, moving into the future, be looking at more technology-based solutions, devices and pathways, using disruptive thinking and approaches. Newer areas to delve in include immersive learning technologies, 3D printing, wearables to monitor population health and even more healthcare data analytic tools. These may provide benefits such as economic growth and even inward investment in healthcare and sciences sectors. A comprehensive CEn program, should offer the interested clinicians networking opportunities, internships, formal accredited curriculum with the desired outcomes clearly outlined, mentoring and supervision with the appropriate industry partners, exposure to business and economic conferences, funding options and grants opportunities, guidance for start-up and requirements for a successful set-up of a company or business, amongst others CEn are often also Clinician-Innovators (CI). They are clinicians with innovative ideas which may be linked to patients' diagnostics, medical management and other aspects of healthcare practice and improvement of quality of life [28-31]. As the practice of Emergency

Medicine evolve, there will be an acceleration in the adoption of technology, use of new diagnostics and big data. CI will help to address current and future healthcare challenges through product design, development and implementation. This can bridge the gap between academia, practice and industry. Just like the CEn, the CI will thrive when provided with an eco-system and network that promotes appropriate growth and learning. This eco-system will usually include creation of awareness, mentorship and support for creation and innovation projects and products, application of appropriate grants and grant writing, commercialization and start-up requirements and industry partnerships. These elements are very similar to that for the CEn development, thus in many institutions the CEn and CI tracks run parallel. One of the training courses that both the CEn and CI can attend is the Stanford BioDesign Course [32, 33].

The Clinician-Scientist, Clinician Researcher and Clinician Investigator

Clinicians have direct contact with patients and are actively involved in care provision. Scientists, on the other hand, conduct research and experiments; the spectrum of which can be very broad (e.g. bench and basic sciences research, clinical trials). Clinician scientists (CS) conduct research and are involved in clinical practice. Both are combined or integrated appropriately. For CS, they would have to decide which is their dominant identity, of the two. This can also be linked to the proportion of time they spend doing both. The time distribution for CS is at least 70% for research and the rest being clinical exposure and management. They have to maintain versatility within the dual career tracks. The delineation of dedicated time is crucial to ensure sufficient time allotted for the different activities. In our Academic Medical Centre (AMC) Singhealth works closely with Duke NUS Medical School in this area to ensure the provision and integration of resources such as research facilities, laboratories, mentors, supplies and other products. Clinical data across the disciplines and specialties are available from Singhealth institutions. In fact the integration of the two entities has resulted in the formation of Academic Medicine Research Institute (AMRI) [17, 34- 36]. For Emergency Medicine Residency, there is a dedicated CS track, where the resident spends an additional year doing research activities. The budding CS will be matched with senior mentor, who can share, advise and even work together with their mentees. They will both plan the year's curriculum, the projects and trials to embark on. During this year, they are also expected to attend and present at conferences as well as provide regular updates on their research. The CS is also encouraged to complete their Masters in Clinical Investigation or an equivalent degree [36, 37]. CS have also to be very proactive in sourcing for funds and grants as these will help pay for the costs incurred in the conduct of the research. Annually there are a variety of grants, released at different times and by different organizations [17, 36-38] which they can utilize and tap on The "Clinician scientist" terminology discussed above is often institution-specific. In some cases, the term Clinician Researcher or Clinician Investigator is used instead. Whichever term is used, the specifics and definition of the scope must be clearly delineated to avoid confusion. This is especially so with the many overlap potentially possible across these "Clinician-+" tracks.

Conclusions

A new breed of emergency physician is emerging, with enhanced, exciting and coordinated roles in their career trajectories. They will be leaders in the future of EM across the globe. They are the "Clinicians +" who will continue to maintain high clinical standards of practice in emergency departments, but they will also have to work differently, from the existing models. There will be multiple immersive and experiential growth tracks for them to embark on. These new "Clinician +" tracks are more established in some institutions whilst still developing, in others. Having medical students, residents and even practicing Emergency Physicians getting involved, will certainly help in the provision of new services as a spin-off in the ED. They will be put through a dynamic, robust and exciting curriculum, based on the needs and demands of the future. Medical schools and healthcare institutions must partner and collaborate, in order to help in the provision of integrated and seamless training programs to nurture these clinicians. This will ensure continuity from the undergraduate into the postgraduate years [39, 40].

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