PERSPECTIVE

Becoming a practitioner, a communicator, and an innovator of biomedicine

Running title: AAA PCI of Biomedicine

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ABSTRACT

A search of PubMed for articles published in English up to February 25, 2023, to identify relevant published literature using the search terms “practitioner”, “communicator”, and “innovator”. The author aims to identify what the clinical and/or biomedical scientists as well as scholars & researchers should become, and how to become the advanced practitioners, better communicators, and excellent innovators, so as to better develop the profession and career and better serve medicine and society, and also realize better self-worth. These ideas are helpful in the professional development of young scientists and scholars in the early stage of career. All in all,we should strive to become the advanced practitioners, better communicators of cardiovascular disease (CVD), and excellent innovators as the scholars & researchers, in particular the pandemic and post-COVID-19 era. At the same time, we should strive to work with the abilities and knowledge for human better cardiovascular health and life.

KEYWORDS

cardiovascular disease, communicator, innovator, practitioner, scholar & researcher

**1 | INTRODUCTION**

As we know, several waves of the COVID-19 pandemic have significantly changed people’s daily life. In fact, lifestyle highly link to cardiocerebrovascular disease and COVID-19 vaccination can protect both maternal and infants’ health [1-3]. After participated in a series of online academic activities, such as literature reading, conferences, seminars or forums, ranging from life science and clinical medicine to humanities and social sciences, the author thinks that we should strive to become the practitioners, communicators, and innovators of cardiovascular disease (CVD) as the clinical and biomedical scientists as well as scholars & researchers, in particular the COVID-19 pandemic and post-COVID-19 era.

**2 | BECOMING AN ADVANCED PRACTITIONER**

First, we should be good at both the practice and communication, then the innovation. We should become the “practitioners, communicators, and innovators” in the professional field of cardiology, particular in the COVID-19 era [4,5], and reject misinformation [6,7]. Many famous scientists often together have these “three things”, and make super first-class achievements on the first-class platform. Moreover, they have first-class teams and first-class members, and can gather wisdom to become big Vs. However, the former two are the majority, still not many of the latter.

Current medical students should be encouraged to actively and meaningfully participate in multiprofessional teams during workplace learning [8]. And an advanced practitioners should pay more attention to the best evidence-based clinical decision-making [9]. For example, a clinical trial confirmed that low-dose aspirin did not prevent depression among healthy older adults [10], thus, a better communicator should help a qualified practitioner to avoid no evidence-based pharmacotherapies. Since there are often miscommunication between patients and practitioners about no evidence-based pharmacotherapies, sharing notes [11] and novel digital tools such as health APP [12] could improve the outcomes and clinical quality by optical medical treatment and reduce clinical documentation errors.

At present, evidence-based medicine and clinical guidelines got more supports from new models based on online information, and clinical practice can be guided by high-quality evidence from the electronic health record and online learning systems of health [13], therefore, better interpreting, applying, and communicating research findings may improve health outcomes and health care due to better access to care and better universal health coverage. Particularly, advances in digital health (telehealth, telemedicine, mobile health, and remote patient monitoring), internet access, and cellular technologies enhance health care and improve health outcomes in older adults with CVD [14].

**3 | BECOMING A BETTER COMMUNICATOR**

As we know, the pattern of communication links to the efficiency of communication [15], thus, a better communicator should have not only innovation but also a good attitude for improving communication. For example, clinical trials confirmed that more effective communication may overcome current vaccine hesitancy and increase COVID-19 vaccinations in the pandemic era [16]. In fact, good communication of scientific knowledge should make science shared beyond academic circles [17] so that more common population can understand these knowledge. A better communicator should have the ability to master the art of communicating, and do more effective communication with a clear, concise, and easy to understand language. Sometime some people often share false and misinformation on social media platforms (such as Twitter), therefore, it is important to accuracy for reducing the sharing of misinformation online [6].

Currently, due to the limitations of the working platform, we may not be able to effectively practice some clinical techniques. But we can still conduct positively and communicate reasonably, and become a good communicator. At the same time, we should innovate actively to make up for the lack of practice. How to do the first-class work on a non-first-class platform? Innovation, innovation, and innovation more. Due to the scientific and technological progress and innovation in the field of internet, we can still carry out effective academic exchanges even in the COVID-19 era. So we can thank the ease of online and offline academic activities in today's digital age. For example, as an effective social media and an online messaging platform, twitter helps us easily studying public communication about CVD [18].

**4 | BECOMING AN EXCELLENT INNOVATOR**

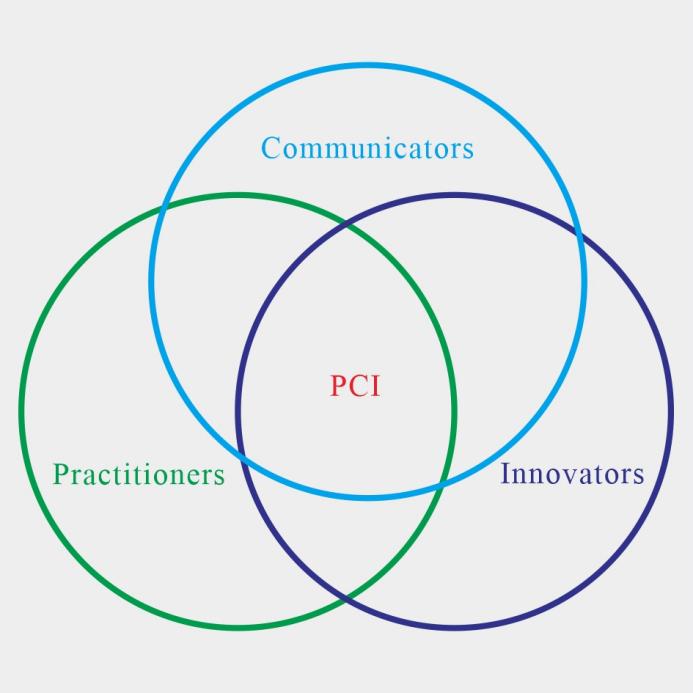
As an innovator, one should have an essential skill of creative thinking for overcoming a series of challenges [19]. There is a high relationship between the practitioners, communicators, and innovators in the clinical and biomedical scientists as well as scholars & researchers, and who with these features may easily develop innovative disciplines and research fields, such as panvascular medicine focusing on atherosclerotic diseases [20], radiotheranostics [21], and a new branch of biological structure-editing [22]. Indeed, innovation is the engine of scientific progress, and people can all improve their ability to think innovatively through instruction and practice based on evidence-based creativity training programs [23]. For example, innovation is needed for current understanding of drug harms and for laboratory analysis due to limitations of common laboratory assays [24], and there are a series of powerful tools for enhancing innovation [23].

Generally speaking, the practitioners and communicators are often more valued and reused by the workplaces due to the related immediate economic and social benefits. Definitely, current the World Health Organization (WHO) Living Guidelines [25], national or local guidelines on antivirals for Covid-19, novel medical and device therapies are helpful to many patients with CVD [26-28]. In fact, innovation in the COVID-19 pandemics is particular vital and helpful to combat the SARS-Cov-2 infection and its major variants (Delta, Omicron, XBB, EA.5, and JN.1) [29]. However, some “innovators” are often disliked in the early stage, or even ignored in many ways, and related papers had often not been published in time. For example, the innovative magic polypill, which finally published in *European Heart Journal* [30]*,* is good for the countries, the people and the world, but universal health coverage may not be there yet due to not more propagation, popularization, and promotion. Herein, exclusively being a “third party” (innovator) often does not work in reality, we should have to do all three. That is to say, more practice and wider communication.

Think it over, is “no self-interest, exclusively benefit people” the only way out? In fact, the practitioners and communicators are both egoistic and altruistic, while the innovators are often not recognized in the early stage of developing new technologies and creating fresh concepts. Only after the new technologies and novel concepts are widely accepted and popularized, and after the working fruits have greatly economic and social benefits, can both altruistic and egoistic be achieved. Therefore, an independent innovation is a painful process, it needs persistence and perseverance so as to catch up. Frankly, everything should be patient, and believe that the altruistic thinking and fruits could eventually have a selfish day if both career and profession are altruistic.

So far, new biomarkers and novel agents are more used in clinical practice so as to improve clinical outcomes. For example, urinary albumin to creatinine ratio [31] was independently associated with increased risk for a spectrum of adverse cardiovascular outcomes in patients with diabetes. Clinical trials confirmed that dapagliflozin [32] significantly reduced risks of cardiovascular death with contributions from lower rates of sudden death and death from progressive heart failure. And among economically disadvantaged adults at elevated risk for major adverse cardiocerebrovascular events (MACCE), innovative strategy is helpful due to increasing in physical activity [33].

We should optimize the current innovation ecosystem through professional associations, collaborate on medical device innovation, and better serve clinical practice [34]. For example, innovative artificial intelligence (AI) medicine is making great progress in these fields, such as automated clinical decision making, medical imaging analysis, and interventional procedures, and changes the practice of interventional cardiology due to the development of AI-based technologies [35]. And optical coherence tomography (OCT) [36] and cardiovascular computed tomography (CT) combining spectral or photon-counting CT or advanced quantification of CT data via AI, machine learning, and radiomics [37], are likely to become an increasingly critical enabler across the whole advancing field of cardiovascular medicine. Herein, these innovative medical devices greatly change current clinical practices and medical modes [38,39], in particular the field of cardiovascular medicine, and got more health benefits.



**Figure 1.** Becoming excellent practitioners, communicators, and innovators (PCI) of cardiovascular disease (CVD). This figure shows that there are special closely associations among practice & practitioners, communication & communicators, and innovation & innovators. As the clinical and/or biomedical scientists as well as scholars & researchers, we should strive to become qualified advanced practitioners, better communicators, and excellent innovators, that is, PCI of three stars, so as to better service for global health and life.

**5 | SPECIAL LINKS AMONG PRACTICE, COMMUNICATION, AND INNOVATION**

In fact, there are special closely associations among practice & practitioners, communication & communicators, and innovation & innovators (Fig. 1). One can expand self-knowledge and experiences by advanced practice, broaden experiences by more effective communication, and increase ability by excellent innovation, herein, develop novel solutions and get high-impact individual professional development. As excellent clinical and biomedical scientists as well as scholars & researchers, we should become innovation-minded and research-minded practitioners and communicators with curiosity, self-reflection, and critical thinking [40]. The clinical settings and patients would be beneficial if there are a number of clinical scientists who are advanced practitioners, better communicators, and excellent innovators (Table 1).

In the pandemic and post-COVID-19 era, as the practitioners, we now can easily follow the WHO, national, or local the guidelines to fight against the Omicron infection, for example, the use of the antiviral pill Nirmatrelvir-Ritonavir (Paxlovid) [41]. We can also take part in a series of clinical trials to confirm the efficacy and safety of new therapies or antiviral agents. As the communicators, we can take part in a series of the academic conferences, seminars or forums to share and conduct our clinical experiences, and exchange those good ideas. However, as the innovators, we should further explore its clinical epidemic features and the molecular mechanisms of novel variants of SARS-CoV-2, for example, the Omicron XBB.1.5 [42]. Indeed, after Paxlovid treatment, rehospitalization, emergency visits are rare [43], then, FDA authorized pharmacists to prescribe Paxlovid for COVID-19 [44].

**Table 1.** Current PCI of Health System and Universities in China

Year Practitioners\* Communicators# Innovators\*\*

(Doctors *vs* Nurses)

2021 428.7 501.8 (1:1.70) **1844.4 (**42.4 & 13.2**)** 333.2 (50.9)

2020 408.0 470.0 (1:1.15) N/A N/A

2015 303.9 324.0 (1:1.07) N/A N/A

2012 261.6 248.5 (1:0.95) N/A N/A

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**\*The total numbers of practicing (assistant) physicians and registered nurses in China (Unit: 10000), and the doctors/nurses ratio; #There are full-time teachers in all levels and types of schools in China (National master's and doctoral supervisors in universities); \*\*The total numbers of current postgraduate students and doctoral students in China (Unit: 10000). These data were checked from internet.**

Currently, novel vaccines, new antiviral agents (such as VV116) [45], and other fresh treatments have been continuously developed. In fact, the magic “polypill”, that is the E(e)SEEDi [40], is very helpful to everyone in the pandemic and post-COVID-19 era due to improvement of human immunity. As a virtual polypill, this innovation is worthy of practicing and communicating around the world. In addition, the updated “traditional Chinese medicine (TCM) hot pot” published in Clinical Complementary Medicine and Pharmacology is a big breakthrough in the field of TCM [46], which makes Chinese herbs prescription easier to learn and understand, more feasible and effective in combating both major infectious diseases (such as COVID-19) and non-communicable diseases (such as CVD, diabetes, and cancer) due to the novel program “Bark-Flower-Fruit-Grass-Leaf-Nucleolus(seed)-Root (BFFGLNR)”.

Innovative patterns and optimal strategies, for example, the Mayo Clinic OB Nest model-- a new model of prenatal care [47], are needed for improving quality of care for patients with heart failure [48], and clinical applications of cystatin C testing [49], practical tips on use of 3-dimensional transesophageal echocardiography (3D TEE) [50], and addressing the challenge of COVID-19 with new, strengthened practices and protocols [51]. In short, more advances in the field of biomedical science will bring big breakthroughs in clinical treatment. For example, novel therapeutic strategies of CVD and cancer add new and better choices for clinical practice [52-54].

Currently, cardiologists need better evidence-based communication skills [55], and as we know, it usually takes an average of 17 years from evidence-based practices to related routine use in the real world [56]. Favorable new product innovations in a healthier and more sustainable food system link to evidence-based improvements in cardiovascular health outcomes [57]. In fact, innovations in cardiovascular instruments are not only helpful in best clinical practices [58] but also may change clinical practices and applications [59]. Herein, communicators in the related platforms like the National Institute for Health and Care Excellence (NICE), should be good at promoting the adoption of innovative diagnostic and therapeutic technologies into clinical practice through the publication of guidance and briefing documents or high-level papers in the top journals [60,61], and these innovative documents (e.g., clinical trial guidelines) and their application may i[mprove public health and health outcomes [62] by scientific pratices and effective communication.](https://pubmed.ncbi.nlm.nih.gov/28329235/)

All in all, modern biomedicine and epidemiology provide crucial methods and tools for emerging infectious diseases (such as COVID-19) [63] and major non-communicable diseases (mNCDs) [64-67] including CVD, diabetes, cancer and CDC strips [68], as well as translational research [69]. At the same time, innovations for high value primary care practices [70-73] as that in both Australia and China [30,46,74] will be great helpful in management of mNCDs including CVD, diabetes, and cancer. We should train the next generation of Cardiologists, Epidemiologists, and Other biomedical scientists (CEO), and improve their skills of practice, communication, and innovation in their career paths so as to ensure a strong workforce that able to tackle public health crises and issues [75].“One World, One Health”. This vision should become a global consensus.

**6 | CONCLUSION AND OUTLOOK**

As the clinical and/or biomedical scientists as well as scholars & researchers, we should strive to become qualified advanced practitioners, better communicators, and excellent innovators of CVD, in particular the COVID-19 pandemic and post-COVID-19 era. Among these, innovation is the most important ability because it can drive the development of both science and society as well as the scientists and scholars & researchers themselves. At the same time, we should strive to work with the abilities and knowledge for better global cardiovascular health and life.

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**AUTHOR CONTRIBUTIONS**

C.H. contributed to conceptualization, methodology, data curation, investigation, visualization, writing-original draft, writing-review & editing; The author read and approved the final manuscript.

**CONFLICT OF INTEREST**

The author declares no competing interests.

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