



Intensive Care in developing countries

A new era of critical care research in China



The first intensive care unit (ICU) in mainland China was built up in the Peking Union Medical College Hospital in 1982 [1]. During the early years of Chinese Critical Care Medicine, a high priority was given to improvement of basic knowledge and skills for the management of critically ill patients rather than research. The predominant scientific fruits of Chinese intensivists during this period were case studies presented at the domestic annual meetings of societies related to emergency medicine, anesthesiology or surgery.

The Chinese Society of Critical Care Medicine (CSCCM), which was founded in 1997, laid the foundation for the development of Chinese Critical Care Medicine. Yearly growing numbers of practitioners were hence organized, and provided a variety of training programs, not only related to knowledge and skills, but also to scientific research in Critical Care. Very soon, articles of Chinese intensivists appeared in international peer review medical journals [2,3], although still limited in numbers as shown in Fig. 1.

Fortunately, Chinese Critical Care Medicine met a rapid economic growth in the following two decades. Moreover, the Chinese Ministry of Health (CMH) placed an emphasis on the development of the Society since the beginning of 21st century, as they recognized an increased burden of critical illness [4]. As a milestone, Critical Care Medicine was officially recognized as a specialty of clinical medicine in 2009. Notably, a follow-up administrative regulation, which required to build up one ICU at least in every grade II or III hospital, drove the rapid expansion in the number of beds, practitioners and ICUs in China. Data from the first nationwide ICU resource questionnaire survey in 1999

demonstrated there were 316 ICUs with an average number of beds of 6.4 ± 4.8 in the 155 hospitals that responded [5]. By 2011, according to reports from Dr. Wu J, there were 2858 beds in a total of 211 ICUs in Guangdong province only, where the GDP (gross domestic product) growth ranked top three in China [6]. Moreover, the second nationwide survey conducted in 2015 showed that there were over 50,000 ICU beds, with 26,000 ICU physicians in near 5000 general ICUs in mainland China (unpublished). Over 3 million critically ill patients were yearly admitted to this type of ICUs. While Chinese Critical Care Medicine grew up, significantly, its research became more and more active. Before 2015, there were just a few projects in Critical Care research, which were mainly conducted by the Chinese Critical Care Trial Group (CCCTG) [4]. As shown in Fig. 2, the registered trials by Chinese intensivists increased rapidly during the past three years. In addition, they have been involved in international multicenter studies more actively than ever before [7,8]. As a result, publications in SCI (scientific citation index) journals attracted more and more attention during recent years. This suggests that Chinese Critical Care Medicine has become an important part of the big family of Critical Care Medicine around the world.

Caring for the biggest population of critically ill patients all over the world, Chinese intensivists could have made a distinguished contribution to critical care medicine. However, our achievements are actually far below what we expected. For instance, publications by Chinese intensivists are only one-tenth of the America colleagues in 2019. Nevertheless, more and more manuscripts have been accepted, especially by Critical Care Journals in the last 5 years (Fig. 3). Notably, there has not yet been a

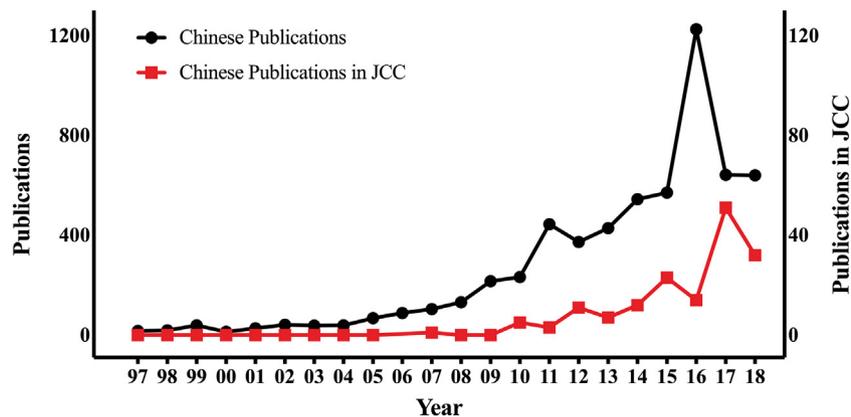


Fig. 1. The annual SCI publications of Chinese intensivists. Legend: Advanced searching was performed in the InCites™ database (<https://incites.thomsonreuters.com>) using “research area” as “Critical Care Medicine” and refining the location as “China mainland” with date limitation from 1997 to 2018. Curve with solid line and circle spot shows all publications of Chinese intensivists on SCI journals, but solid line and square spot represents publications of Chinese intensivists on Journal of Critical Care.

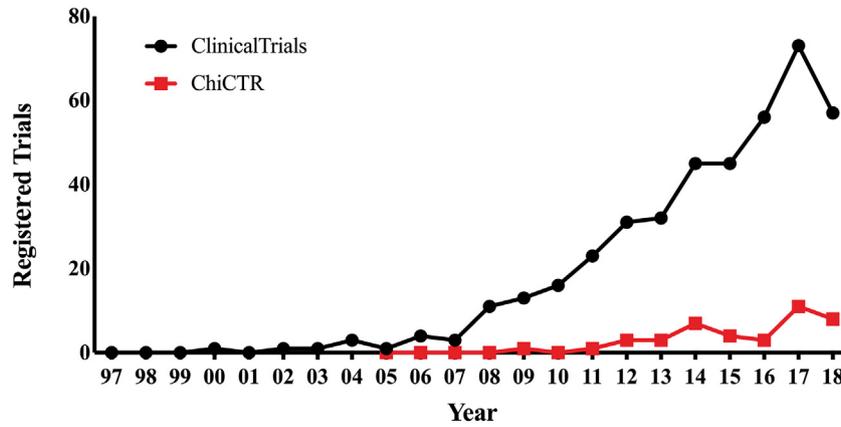


Fig. 2. Yearly registered trials by Chinese intensivists from 1997 to 2018. Legend: Advanced searching was performed on Clinical Trials (www.clinicaltrials.gov) and Chinese Clinical Trials Registry (www.chictr.org.cn) by using the Country as "China" and terms as "Critical Care Medicine" OR "Intensive Care Unit" OR "Critical Care" OR "ICU" date limitation from 1997 to 2018.

Chinese publication in the Critical Care fields in a journal with impact factor over 20. Quite evidently, the Chinese contribution to Critical Care research has not yet matched with its number of intensivists, the population size of critically ill patients and the economic growth in China.

An appeal was made that "Critical Care Research in Mainland China: More Needed on the International Stage" in 2013 [1]. As mentioned above, Chinese intensivists had indeed taken a big step forward in Critical Care research. A series of recent academic activities suggests that a new era in Critical Care research in China is on the horizon. The most impressive event was Chinese Critical Care Research Forum (CCCRF), which was firstly held in December 2017 [9]. This meeting provided a platform for Critical Care researchers in mainland China to share their study projects and/or preliminary results of completed studies. In addition, international or domestic senior investigators were invited to review the projects and make valuable comments on study design, data collection, statistical analysis plan, and presentation of the results. This will certainly help Chinese researchers to improve studies that result in more publications in the near future. In addition, CCCTG has been enhancing its influence on Critical Care research in China. Recently, an advisory panel of 20 Chinese experts for scientific research in intensive care was organized by CCCTG. This panel aimed to design and conduct high quality trials in China by strengthening cooperation among clinical centers and laboratories. It is reasonable to believe that Chinese trials in critical care medicine with high impact results will start to emerge soon. Moreover, rapid development of ICU data

and the use of artificial intelligent will nourish critical care research in China as mountains of more reliable clinical data become available.

It is a great honor to share our development history in critical care research with readers of Journal of Critical Care. Stressed by the editor-in-chief professor Jan Bakker [10], the Journal of Critical Care helps the authors, research community and clinicians to prosper Critical Care Medicine around the world as being an official journal of World Federation of Societies of Intensive and Critical Care. In fact, it gave a warm hand to Chinese intensivists in the past decade as shown on Fig. 1. Undoubtedly, it is the right platform for all intensivists to widely communicate study results, experiences, achievements and vision for future as well.

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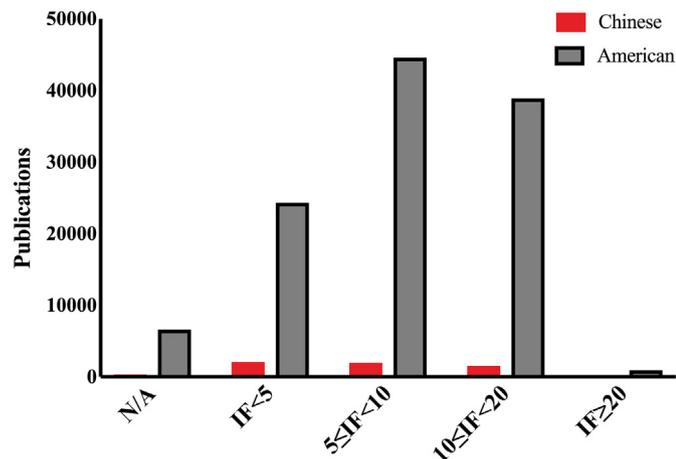


Fig. 3. Publications of Chinese intensivists in comparison with American colleagues from 1997 to 2018. Legend: Advanced searching was performed in the InCites database of WOS using "research area" as "Critical Care Medicine" and refining the location as "China mainland" or "USA" with date limitation from 1997 to 2018. The data were classified according to journal impact factor by "N/A", "IF < 5", "5 ≤ IF < 10", "10 ≤ IF < 20", "IF ≥ 20". IF: impact factor.

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