Pediatrics in China has a long history. This field of medicine has developed more rapidly since the founding of the People’s Republic of China, especially after the country implemented the reform and opening-up policy. Many accomplished and virtuous pediatric experts and scholars have dedicated their professional lives to the development of the discipline, the healthy growth of children, and the health of the Chinese people. Professor Huakang Zhou is one of these experts.

Born in 1914, Prof. Zhou is one of the founders of China’s modern pediatrics, having made great contributions to pediatrics-related treatment, teaching, research, and prevention. He was a diligent student while taking medical preparatory courses at Yenching University and later studying at Peking Union Medical College. In 1940, he graduated from the college with a doctor’s degree and received the college’s top accolade, the Wenham Prize. He was then employed by Peking Union Medical College Hospital (PUMCH) as a resident. The hospital was forced to close in 1942, and Prof. Zhou went to Zhonghe Hospital as chief resident doctor and was promoted to attending doctor the next year. He visited the University of Minnesota Medical School for further study in 1946 and returned home in 1948. One year later, he was appointed director of pediatrics at PUMCH to develop the hospital’s pediatrics department. In 1958, he collaborated with some other well-known pediatricians, including Dr. Futang Zhu, to establish the Institute of Pediatrics, Chinese Academy of Medical Sciences.

Prof. Zhou was devoted to the development of domestic pediatrics. He led the Chinese Pediatric Society (CPS) of the Chinese Medical Association and the editorial board of the *Chinese Journal of Pediatrics* for a long period of time. With an ambition to promote the development of pediatrics in China, he was dedicated to improving expertise, serving the public, advancing medical research, identifying and fostering talents, and making development plans. He did not seek huge strides but made constant efforts together with pediatricians such as Dr. Futang Zhu to lay a solid foundation for pediatrics in China, especially its rapid development since the reform and opening-up.
policy.

**Be practical and aim high**

Pediatrics emphasizes clinical practice with a priority to solve children's health problems. As a pediatrician, Prof. Zhou put patients' practical problems first, and his medical research and laboratory work centered on clinical practices.

In the early 1950s, infectious diseases such as infantile diarrhea and viral pneumonia threatened the life of most children in China. In the face of these urgent clinical issues, Prof. Zhou and his department focused on infantile diarrhea. He turned his own office into a laboratory to study the etiology of the disease, water-electrolyte balance, and fluid therapy. After continuous observation of each pediatric patient with measurement of electrolytes and assessment of acidosis using a flame photometer, the most advanced instrument at the time, Prof. Zhou and his colleagues established the 4:3:2 fluid infusion protocol, paving the way for the preparation of various infusion solutions. The clinical application of these research results substantially reduced the fatality rate of infantile diarrhea.

As of 1958, when Prof. Zhou assisted Prof. Zhu in establishing the Institute of Pediatrics, Chinese Academy of Medical Sciences and became deputy director of the institute, he had led medical staff to study diseases such as infantile diarrhea, viral pneumonia, bacillary dysentery, and poliomyelitis. Aside from further improving fluid solutions, they also explored clinical therapies for the infection with pathogenic *Escherichia coli* and adenovirus pneumonia. Thanks to relentless efforts by pediatric experts like Prof. Zhou, childhood infectious diseases were under control.

The combination of his practicality and farsightedness was one of the reasons many pediatric experts recognized him as a leader. He identified pediatric development trends based on domestic and foreign conditions. In the early 1970s, Prof. Zhou realized the necessity and possibility of developing neonatal medicine within pediatrics. He published many articles in this field, enhanced the cooperation between pediatrics and obstetrics at PUMCH, and worked together with other professors such as Xiaocheng Ji to make neonatal medicine an important research topic of the hospital. Prof. Zhou encouraged excellent doctors, including Shimin Zhao, to study neonatal medicine abroad and helped them contact foreign experts. He made efforts to introduce advanced technologies and equipment to set up a neonatal intensive care unit, and he initiated cooperative studies on premature infants to decrease the incidence and fatality rate of newborns and increase the survival rate of premature infants. Prof. Zhou published many papers on newborn care, placing the pediatrics department of PUMCH in a leading position in China. He also introduced genetic outpatient services at an early time, displaying his clinical foresight.

Under the leadership of Prof. Zhou, the pediatrics department of PUMCH made great achievements despite some unfavorable factors. The department won the National Medicine and Health Collective Award in 1975, the Ministerial Achievement Award of the National Medicine and Health Conference in 1978, and the Advanced Group of National Health Front in 1983. The department was the only one in Beijing to provide services to foreign pediatric patients. With patience and prudence, Prof. Zhou and his department provided quality services to foreign patients and won their praise. The pediatrics department of PUMCH has since inherited Prof. Zhou's scrupulous and practical working style to protect child health and promote the development of pediatrics in China.

**Sustainable development through strategic planning**

The CPS and the *Chinese Journal of Pediatrics* are two major platforms for Chinese pediatricians. Beginning in 1950, Prof. Zhou served as the secretary, the accountant, a member, the vice chairman, and the chairman of the CPS; beginning in 1955, he worked as editorial board member, the deputy editor, and the editor-in-chief of the *Chinese Journal of Pediatrics*. Via these two platforms, Prof. Zhou and some other top pediatricians including Futang Zhu, Cuizhen Chen, Zufei Su, Jinx Deng, Zhenting Qin, and Ruiping Wu made joint efforts to advance pediatrics in China. With his outstanding coordination and rigorous work attitude, Prof. Zhou became the closest assistant of Prof. Futang Zhu, who was a principal leader of the CPS and the *Chinese Journal of Pediatrics*.

Exhibiting a down-to-earth spirit, Prof. Zhou was committed to every aspect of the CPS. International exchanges were a priority of the CPS, and Profs. Zhu and Zhou did not stop contributing to the development of pediatrics even when the organization was forced to suspend its operation. In accordance with the One China principle, they promoted inclusion of the CPS in the International Pediatric Association (IPA) as the sole representative of China in 1973, with support from international colleagues (e.g., Prof. Thomas Stapleton, the executive director of the IPA at that time). The CPS was one of the first societies of the Chinese Medical Association to join authoritative international academic organizations. In 1980s, the Society increased international exchanges by participating in the IPA Congress as well as joining the Asia Pacific Pediatric Association and attending its international pediatric activities.

The CPS took part in the 5th, 8th, and all subsequent events following the 14th IPA Congress. In 1947, Prof. Zhou was invited to attend the 5th Congress in New York, where he introduced China’s experience in preventing and controlling kala azar. He also led teams to participate in the 15th, 17th, and 18th Congress in 1977, 1983, and
1986, respectively. He became close colleagues with well-known pediatricians worldwide because of his English proficiency. International peers respected Prof. Zhou for his erudition, modesty, and generosity. James Grant, the executive director of UNICEF at that time, and Yoshiyuki Kokubun, a founding father of pediatrics in Japan, played positive roles in pediatric development in China and exchanges between China and the rest of the world.

Prof. Zhou used foreign visits as opportunities to cultivate pediatric talents, and many members of his teams became leading figures in the field of pediatrics in China. For instance, Zaifang Jiang and Xiru Wu were appointed chairmen of the CPS. Prof. Zhou prioritized the overall benefits of pediatrics in China above geographical preferences in terms of forming teams for international academic exchanges, fostering talent, and selecting cadres to ensure that pediatricians had opportunities to show their talent. He also visited more than 10 provinces and autonomous regions, including Xinjiang, Qinghai, Gansu, and Inner Mongolia, to introduce the latest medical developments, teach local medical staff, conduct clinical practices, and promote the development of local pediatrics.

During his term as CPS chairman from 1985 to 1989, Prof. Zhou strengthened the Society’s organizational construction and established divisions to promote the development of pediatric sub-disciplines. He paid attention to the combination of CPS work and national healthcare work and pushed for exchanges and interaction between the CPS and the international pediatric community.

Prof. Zhou was appointed editor-in-chief of the *Chinese Journal of Pediatrics* in 1981, not long after the journal resumed publication (it had suspended publication in 1966), and was confronted with problems such as manpower shortages and staff turnover. He organized the editorial board and reviewers to hold review meetings and discuss measures to improve the magazine’s quality. To encourage more doctors to publish articles in academic publications, Prof. Zhou opened two columns, “Abstract” and “Clinical Experience,” to enhance communications between authors and readers by sharing physicians’ clinical experience. In 1987, the *Chinese Journal of Pediatrics* won the second prize at the second editor work conference of the Chinese Medical Association. In 2007, Prof. Zhou received the Special Contribution Award of the Chinese Journal of Pediatrics for his exceptional contributions to pediatrics over the years.

Even at his age of 96, many years after his retirement, Prof. Zhou still cared about the development of pediatrics in China and often asked about the then conditions of domestic and foreign pediatricians who contributed to China’s pediatrics. He still could remember their names.

**Rigorous attitude and extraordinary medical skills**

Prof. Zhou’s colleagues and students have been impressed by his logical way of thinking. The pediatrics department at PUMCH often receives patients with difficult and complicated conditions. When diagnosing these patients’ conditions, Prof. Zhou usually listened to the case report, examined the patients, asked about their disease history, checked them repeatedly when necessary, and even stayed with the patients for some time to observe key or abnormal symptoms. For instance, he identified a lower jaw swelling on the chubby face of a baby with a persistent high fever, and after performing an X-ray examination, he confirmed that the patient had developed infantile cortical hyperostosis. Prof. Zhou collected comprehensive and accurate first-hand information based on careful observation, reviewed complicated symptoms, conducted comprehensive analyses of various symptoms, and checked results to focus on key points and ignore misleading details. He explained to his subordinates that pediatric patients cannot express their pain and that their conditions change rapidly, emphasizing that it is more important to carefully observe the conditions of pediatric than adult patients.

Prof. Zhou attached great importance to the application of new technologies while emphasizing the acquisition of basic skills. After first- and second-tier doctors and anesthetists had failed in the performance of a particular lumbar puncture operation, Prof. Zhou extracted cerebrospinal fluid in only about 10 minutes. He told the first-tier doctors that although advanced technologies and equipment are important, if you fail to extract cerebrospinal fluid, computers cannot make a diagnosis no matter how advanced they may be. He devised a simple solution based on rehydration therapies for infants with diarrhea for grassroots application. He treated many pediatric patients with difficult and complicated conditions while also paying attention to common diseases. Prof. Zhou also established a therapy for rotaviral gastroenteritis by combining traditional Chinese medicine with Western medicine and formulated therapies for rickets. He emphasized reasonable and precise medication use and never used so-called symptomatic drugs. He emphasized that a doctor should know not only a drug’s effectiveness but also its adverse reactions. During ward rounds, he always repeatedly discussed the various indications for medication to illustrate the balance between their advantages and disadvantages. The pediatrics department of PUMCH has strictly enforced the indications for medication over the years.

**A virtuous teacher with students across the country**

Prof. Zhou held important posts at the PUMCH pediatrics department, the Institute of Pediatrics, the CPS, and the editorial board of the *Chinese Journal of Pediatrics*, and he tutored numerous graduate students. He never took an authoritarian position but instead aimed to foster talents and teams. He used encouraging words instead
of tough reprimands and hollow didactic words, and he made himself an example for others. Prof. Zhou was impartial and helpful, subtly influencing colleagues and students with the principles of pragmatism, prudence, and perfectionism. Many of them became directors of pediatrics departments at major hospitals and owed their success to the training provided by Prof. Zhou during their study or work at the PUMCH pediatrics department.

Prof. Zhou also highlighted clinical practice and scientific research to create optimal, conditions for the growth of talents. Beginning in 1979, he arranged for more than 10 pediatricians to study abroad and helped them select research directions and pay tuition fees. Many doctors wrote to him to report their performance abroad and received timely instructions from him. To enhance international communications and narrow the gap between domestic and international pediatrics, Prof. Zhou compiled teaching materials and organized environments in which doctors could learn English.

Prof. Zhou showed great care for his graduate students. He selected topics for them, followed up on their progress, helped them solve problems, and revised their papers. His student Min Wei was concerned that she might not be able to finish her thesis because of her lack of experience in laboratories. Prof. Zhou made great efforts to help her contact laboratories and developed neurodermatitis due to overwork. He contacted the Children’s Hospital of Philadelphia for Min Wei to pursue further study, paving the way for her future career development. When neonatal medicine was on the rise in China, Prof. Zhou’s graduate student Qi Li introduced the cutting-edge topic of the adrenocortical functions in newborns with suffocation and shock. Prof. Zhou considered that China faced substantial challenges in the prevention and treatment of infection in premature and low-birth-weight infants, so he advised Qi Li to study neurodevelopment assessment methods in newborns and premature infants as well as bacterial migration in the skin of newborns. Prof. Zhou’s practical attitude and care for pediatric patients and the country’s medical development impacted Qi Li’s scientific research for the following 30 years.

Care for patients

Doctors are called “angels in white” because of their responsibilities of treating patients and their love for life, which give spiritual comfort to patients plagued by diseases, encourage them to overcome diseases, and help them to embrace a better life. Predecessors like Prof. Zhou are role models in patient care.

Aside from treating patients at large medical institutions such as PUMCH, Prof. Zhou also toured rural areas to provide medical and teaching services to local patients in the 1950s and 1960s. He focused on easing pain and curing disease in rural patients, and he realized the importance of publicizing medical knowledge in areas with insufficient medicine. Based on his experience in rural areas, he compiled *Q&As About the Health of Rural Children*, which has been translated into many languages and of which more than two million copies have been printed. The book was priced at only RMB 0.09 to ensure that it was affordable to farmers. Prof. Zhou believed that the gradual improvement of medical services based on health knowledge and education is important in rural medical care.

During his long career as a doctor, Prof. Zhou had a deep affection for his patients. A rural patient in Xiangyin County of Hunan Province had to stay at home because of frequent epileptic seizures. After receiving treatment by Prof. Zhou, the number of seizures was reduced considerably, but the patient lacked access to drugs. Prof. Zhou offered tablets to the patient every week for 10 years. In the early 1960s, a little girl developed rheumatoid arthritis that led to joint malformation and walking difficulty. Prof. Zhou treated the patient and encouraged her and her family members to enable the patient to live independently despite the joint malformation. He visited the patient several times a year and provided her with supplies. As her activity increased, the patient experienced spiritual improvement and began hand-making crafts. Several years later, she got married and had a daughter. Prof. Zhou helped her family open a small shop and told them to let their daughter go to school and learn a skill. In 1998, Prof. Zhou, accompanied by staff from the Beijing Child Development Center, visited the patient, seeing her small shop amid a forest of high rises. The patient, aged around 50 years, had led a happy life despite her joint malformation, with her daughter working in the tourism industry.

People usually describe Prof. Zhou as learned, rigorous, humble, upright, indifferent to fame and wealth, and enthusiastic about his career and helping other people. Prof. Xiru Wu said that she had few opportunities to see him in recent years and only sent a greeting card to him before the New Year’s Day; each time he would reply with cards or letters. His handwriting remained neat and firm. He treated his old friends seriously, just as he addressed academic issues throughout the past decades. He is a role model in medical ethics, scholarship, personality, and many other aspects.

**CONFLICT OF INTEREST**

No conflict of interest exists with this manuscript.