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Building an Entrustable Professional Activity (EPA) based model for physicians: The case of pediatricians in China

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Doctor of Management

Supervisor:
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BUSINESS
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Marketing, Operations and General Management Department

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Declaration

I declare that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and that to the best of my knowledge it does not contain any material previously published or written by another person except where due reference is made in the text.

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作者申明

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Abstract

Considering the scarcity of medical resources in China and the lacking of sound ground-level medical systems, the 19th National People's Congress of the Chinese Communist Party put forward the goal of building a comprehensive medical service system that is of high efficiency, good quality, and Chinese characteristics. One of the grounds upon which those purposes are built is medical education and for such there is a need to structure a medical competencyframework. This research is set to systematically contribute to such endeavor by means of entrustable professional activities targeting an important Chinese medical body: pediatricians, both general and specialized.

To achieve this purpose the research was based on two empirical studies of an exploratory nature. The first, qualitative, was intended to depict the professional situation of pediatricians in third-tier hospitals, which was conducted via two focus groups and interviews to specialists. It allowed the understanding of the medical practice and education in pediatrics supporting the need to systematize the competencies framework. Using international standards for entrustable professional activities (EPA), a second empirical study was developed, of a quantitative nature, that started by validating a list of EPAs with a population of 60 pediatricians to ascertain its transferability to the Chinese hospital context. Lastly, departing from these results, a questionnaire was developed to evaluate EPAs as well as a list of competencies (crossing European and American standards) and some deontological values. The questionnaire was addressed to pediatricians in China by means of the Chinese Medical Association and 776 valid answers were collected.

Taking as formative constructs a set of EPAs for general pediatrics and gastroenterological specialized pediatrics, findings firstly showed the psychometric quality of the measures. Subsequently the Structural Equations Modelling supported a hierarchical model composed of four EPA blocks of increasing complexity that have a differential effect upon each of the gastroenterological pediatrics specialty EPAs. Lastly, the deontological values were found to predict all EPA blocks, thus corroborating their central role in medical education.

These findings set the basis for a sequential design of competency development in

Pediatrics. These competencies, expressed as EPAs, are the ground for medical education and practicing pediatrics in general and subspecialties, of which gastroenterological pediatrics is an example.

Keywords: EPA (Entrustable Professional Activities); Medical education; Pediatricians; Training
JEL: I110; I110; I180; I230

Resumo

Considerando a escassez de recursos médicos na China e falta de provisão de um terreno sólido para os sistemas médicos, o 19º Congresso Nacional do Partido Comunista Chinês propôs o objetivo de construir um sistema de serviço médico alargado que seja de elevada eficiência, qualidade e com características chinesas. Um dos princípios sobre o qual estes propósitos são efetivados reside na educação médica e para tal existe a necessidade de estruturar uma matriz de competência médicas.

Esta investigação é desenhada para contribuir sistematicamente para tal objetivo através das atividades profissionais confiáveis (EPA) dirigidas a um corpo médico chinês importante: os pediatras, quer na generalidade quer nas especialidades.

Para alcançar este propósito, a investigação teve por base dois estudos empíricos de natureza exploratória. O primeiro, qualitativo, procurou compreender a situação profissional dos pediatras em hospitais terciários (centrais), o que foi concretizado por via de dois grupos focais e entrevistas a especialistas.

Permitiu compreender a educação e a prática médica em pediatria apoiando a necessidade de sistematizar a matriz de competências. Utilizando padrões internacionais de atividades profissionais confiáveis (EPA), um segundo estudo empírico, de natureza quantitativa, foi realizado, encetando pela validação de uma lista de EPAs com uma população de 60 pediatras para avaliar a sua transferibilidade para o contexto hospitalar chinês. Por fim, partindo destes resultados, foi desenvolvido um questionário para avaliar as EPAs bem como uma lista de competências (cruzando standards europeus e norte-americanos) e alguns valores deontológicos. O questionário foi dirigido a pediatras na China por via da Associação Médica Chinesa, e recolhidas 776 respostas válidas.

Tomando como construtos formativos um conjunto de EPAs para a pediatria geral e a especializada gastroenterológica, os resultados mostraram primeiramente a qualidade psicométrica das medidas. Subsequentemente, por via de equações estruturais foi corroborado um modelo hierárquico composto por quatro blocos de EPAs de complexidade crescente, que exercem um efeito diferencial sobre cada um dos EPAs da subespecialidade pediátrica gastroenterológica. Por último, os valores deontológicos têm valor preditivo sobre todos os blocos de EPAs, assim reforçando o seu papel central na educação médica.

Estes resultados constituem a base para o desenho sequencial do desenvolvimento de

competências médicas em Pediatria. Estas competências, expressas como EPAs, constituem o terreno para a educação médica e para a prática clínica na pediatria geral e nas subespecialidades, do qual se fez exemplo a pediatria gastroenterológica.

Palavras-chave: EPA (Atividades Profissionais Confiáveis); Educação médica; Pediatras; Formação
JEL: I100; I110; I180; I230

摘 要

针对中国的医疗资源相对短缺、基层医疗制度不健全等现状，中国共产党的十九大提出了力求建设高效、优质、中国特色的综合医疗服务体系的目标，要实现这些目标的基础前提是医学教育，因此需要构建一个相关的医学能力体系构架。本次研究是通过可信赖（委托）的专业活动，选取中国的重要的具有代表性的医疗机构里面的儿科全科医师与儿科专科医师，进行系统的探索和研究。

为了保证这次研究的科学性，本次研究的思路是基于探索性研究：定性和定量混合模式的实证研究，定性研究是通过两个焦点小组和专家访谈进行深入了解三级医院的儿科医师的专业情况，主要用于系统化支撑儿科实践和教育的理念。定量的实证研究，首先选择具有代表性的 60 名儿科医师对可信赖专业技术活动清单进行论证，旨在确认可以成果转移至中国的医疗环境。最后，根据这些结果研发出一套调查问卷来评价可信赖专业活动以及一份能力建设清单（跨越欧洲和美国标准）和伦理的价值观，整个问卷的投放对象在中华医学会儿科分会的专家中，共收到有效问卷 776 份。

以儿科全科医师和儿科消化医师为研究对象，构建了一套可信赖专业活动的评测，也是首次体现了量表的心理测量学性质。同时，通过了结构性方程模型构建支持了一个分层模型，该模型由四个可信赖专业技术活动模块组成，通过这些模块复杂性不断叠加，发现对于每个儿科消化专业的可信赖专业技术活动都有不同的影响。同时最后发现伦理指标可以促进和预测所有的可信赖专业技术活动模块，从而证实它在医学教育中所发挥的中心重要作用。

这些发现为儿科专业能力的发展顺序设计奠定了基础，这些能力的体现形式为可信赖专业技术活动，这是医学教育和实践的转化的基础。

关键词：可信赖式专业技术活动；医学教育；儿科医师；培训；

JEL: I100; I110; I180; I230

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Acknowledgments

I’m so thrilled that I’m about to finish the doctoral dissertation. I’m filled with gratitude. It’s an enormous project to me. I’m greatly moved by my mentor, Professor Nelson. In the last three years, he has been travelling back and forth between Portugal and China offering me help and support. It is him with his personal charisma, profound thoughts and broad vision, who opened up my mind to novel scientific ideas. He taught me by practice the academic rigor and norms. He helped me with the refining of the theme of this dissertation, data verification and analysis, from which I saw his hard work and wisdom. He is a great teacher and also a true friend. His erudition, openness, rigorous academic attitude and interdisciplinary innovative thinking have left a deep impression on me, which I shall benefit from for my whole life.

I also thank Professor Xu and other colleagues and friends from Ruijin Hospital and Ruijin Hospital North. They offered me solace and help whenever I was in difficulties.

I have learned a lot from doing this research and also from those difficult times. That also makes me grateful all the time, to those who’ve helped me. It’s so heartwarming. No words can express my gratitude. Thank you, all my friends who’ve helped me and cared about me.

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致 谢

在此刻完成博士论文的时刻，我的内心感到无比的激动，除了感激还是感激，可以说这是一个浩大工程，在完成这个研究的三年过程中，我最感动的是我的导师 Nelson 教授，他不辞辛劳几度奔波于中国与葡萄牙之间，正是他，以他独有的风度，深邃的思想和广阔的视野，打开了我科学研究思想，并且身体力行的示范了学术的严谨与规范，从主题的修改、数据的验证以及分析都凝聚了他的努力与智慧，他既是一位好老师，也是一位好朋友，他严谨的学术态度，渊博的知识，学科交叉的创新思维以及宽容的个性给我留下了深刻的印象，使我终生受益。

同时感谢上海交通大学医学院附属瑞金医院、瑞金医院北院许教授等同仁的大力支持，每次在我困难的时候给与我安慰以及帮助。

研究与困境让我收获了很多，同时让我始终秉持着一颗感恩的心，感恩一路帮扶过我的人，心中充满温暖。

最后千言万语也难完全表达出我的感激之情，感谢所有关心帮助和支持我的朋友。

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Chapter 1: Overview

1.1 Introduction

This chapter will provide information about the background of the Chinese Medical Reform, its guiding principles and features as compared with other international healthcare systems. It will also provide a reflection on the problems and challenges of the medical reform that motivates ongoing advanced research to find empirically based solutions.

1.1.1 Background of P.R China Medical Reform

In the process of China's medical development, it is worth discussing how to make Chinese medical reform meet the needs of people and adapt to the requirements of the market development in the new era. The vigorous promotion of China's medical reform will not only be helpful to improve the accessibility and fairness of China's health services, but also safeguard the health of all the people and solve the problems of "difficult and costly access to health care services", "supporting hospitals by overselling drugs" and "government functioning as both regulator and operator", in its bid to facilitate Chinese people to enjoy better health services. Based on the current situation of medical reform in China, the problems that hamper the progress of Chinese medical reform are analyzed and the optimized development strategies are formulated to ensure that China's medical reform can make greater progress.

From the global perspective, medical reform is an effort to meet the healthcare needs of people and continuously improve the quality of medical services in order to ensure that people can enjoy better medical services. The concept of health care reform was first proposed in China in 1994 in the hope of achieving the rational allocation of medical resources. With the advancement of medical reform (Xinhua News, 2009), the Opinions of the CPC Central Committee and the State Council on Deepening the Health Care System Reform (hereinafter referred to as “Opinions”) was first proposed on March 17 2009 in order to deepen the reform of the health system. The “Opinions”, which falls into six parts, aims to alleviate the problem of "difficult and costly access to health care services ", reduce the burden of medical expenses for residents, and improve the medical and health

system in the urban and rural areas, with the ultimate goal of providing safe, effective, convenient and affordable health services for the people. Therefore, the medical reform should be performed according to China’s actual conditions, people’s needs and socioeconomic factors rather than following a set of fixed rules. Only in this way can the potentials of the medical reform be fully unleashed and the high-quality health services are available to the people.

China's current medical reform is mainly focused on improving the hierarchical medical system, the urban basic medical security system, the basic medical insurance system for urban workers, the urban public medical system, the labor insurance system, the urban and rural residents' critical disease insurance system and the new rural cooperative medical system, in an effort to strengthen the basic medical services in China, broaden the scope of beneficiaries of medical reform, and meet the needs of more people. Meanwhile China's government should formulate more health policies, such as the abolition of the government pricing for most drugs and drugs zero profit in order to effectively safeguard the people’s rights and interests in health needs.

The effective implementation of medical reform in China is also helpful to construct a perfect medical system and create a more fair and efficient medical environment. Microscopically, it can improve the Chinese patients' satisfaction with medical services, thus bringing more economic and social benefits to the medical industry. Macroscopically, it can effectively improve the medical environment in China’s urban and rural areas on the whole, thus promoting the development of China's economy and giving full play to the benefits of reform. Based on the present situation of the development of medical reform in China, efforts should be made to identify the existing prominent problems in medical institutions and push forward medical reform according to actual conditions, which is helpful to establish a more perfect medical system, a more standardized medical process as well as more open, fair and transparent medical services, thus reducing the occurrence of medical disputes, relieving the problem of " difficult and costly access to health care services " and maintaining the harmony and stability of Chinese society.

1.1.1.1 Present situation of the medical reform

The number of people seeking health services is on the rise, as evidenced by the increasing number of admission and the utilization rate of beds both in public hospitals and private hospitals. With the progress of China's medical reform, the medical service ability is also improving year by year. However, there is still a lot of room for improvement. The

government should further formulate reasonable medical reform policies and improve the medical compensation mechanism in the grass-roots hospitals.

1.1.1.2 Current situation of the cultivation of medical talents

Ensuring the universal coverage of basic health services and cultivating more excellent medical talents have become top priorities in China's health care reform. A survey on the number of health workers in county-level hospitals and the current situation of trainings afforded to them was conducted between 2010 and 2017 in areas such as Beijing, Shanxi, Anhui and Zhejiang and although China is fully aware of the importance of training general medical personnel to rural grassroots hospitals, the general practitioners are still not sufficiently educated and trained. When the number of medical (assistant) practitioners significantly increases, the trainings for them are also urgently needed.

1.1.1.3 China's medical reform still in ice-breaking stage

Since the launch of medical reform, major progress has been made in following aspects: firstly, the basic medical insurance system covering 1.3 billion Chinese people in urban and rural areas has been initially established; secondly, the well-established mechanism of "supporting hospitals by prescribing unnecessary and expensive drugs for patients" in basic-level hospitals has been basically eliminated and the links between hospitals and drug suppliers have been cut off; thirdly, the funds of the basic medical institutions have been guaranteed and the medical environment, service abilities and level have been improved. By expanding the scope of public health services, Chinese hospitals have significantly strengthened their abilities in responding to public health emergencies and major infectious diseases.

1.1.2 Comparison of Chinese and foreign medical reform

1.1.2.1 Comparison of health coverage in Chinese and America

The medical reform in America is mainly aimed at improving the coverage rate of medical insurance; medical reform in China, in contrast, is intended to ensure the equitable access to health services for all people. In this regard, China has formulated relevant medical insurance policies with a view to increasing the coverage of medical insurance in rural and remote areas, so that the sick people can afford the health services and avoid being reduced to poverty caused by diseases. American people enjoy a series of welfare policies, such as perfect payment system and insurance services predominantly covered by

commercial insurance. Kim (2016) indicates that the US government has made major reforms in the infection control system, the emergency medical service system and the intensive care system. The US government has announced a plan poised to establish an organized infectious disease response system in order to reduce the risk of infections, provide first aid for infectious diseases and prevent the occurrence of future catastrophic medical events. Jung and Tran (2016) pointed out that the ACA-based medical aid program in America has reduced the capital accumulation, labor supply and total output, counteracted the effect of Medicaid expansion and narrowed the private health insurance market by adjusting the effect of moral hazard, tax revenues and equilibrium price. Under the initiatives of American medical reform, most medical insurance programs are required to provide health assessment for children and depression screening for adults. The study by Siddiqi et al. (2017) suggests the voluntary bundled payment care improvement (BPCI) model has been used in the medical insurance and Medicaid services to reduce medical costs for patients and improve patient care. Orszag (2016) argued under the medical reform in America, surgical education must be separated from the overall medical reform initiatives and even the financial burdens of some hospitals in order to reduce the pressure of the trainees potentially working as doctors in the future. Berinsky (2017) reckon that compared with the current laws, the Trump health care program will reduce the health spending of the insured people and meanwhile increase that of consumers, thus adding to the federal deficits in varying degree. Maclean and Saloner (2017) contend that with the advancement of health care reform to Massachusetts, health insurance coverage is expanding while medical insurance and family doctors programs remain to be improved. The American federal governments have played a significant role in broadening the coverage of medical insurance in the process of medical reform. Meanwhile, remarkable results have been achieved in strengthening supervision, enhancing financial investment, and curbing the increase of medical costs, which can be used for reference in China's medical reform.

1.1.2.2 Comparison of health insurance system in China and Australia

A comparison of health reform in China and foreign countries suggests that compared with the developed countries such as Australia, China still largely lags behind in formulating health insurance system. For example, the Australia's medical security system covers not only Australian citizens, but also the permanent residents in Australia and even the Chinese people living in countries that have signed agreements with Australia such as

Ireland, Italy and Denmark. Besides, Australian citizens also enjoy free medical services in public hospitals, partially free general medical services and free imaging inspection. In contrast, due to the exceedingly uneven distribution of medical resources in China's urban and rural areas, residents in towns and rural areas do not have the privilege of health insurance coverage as most urban dwellers. Chen, Barros, and Hou (2016) pointed out that efforts should be made to implement the policy of granting government subsidies to public hospitals, encourage social capital to sponsor health care undertakings, establish diagnosis system, and improve the coverage of medical insurance, which can help promote the medical system reform. The government subsidy and medical insurance reform can improve the cost efficiency of Chinese hospitals, while hospitals in coastal areas and 3A hospitals have negatively contributed to the results. Hou, Meng, and Zhang (2016) suggest that the faster improvement in medical services in rural and underdeveloped areas in the process of health care reform can be attributed to the government's additional subsidies to these areas. Fayanju et al. (2017) pointed out that patients not covered by medical insurance have greater demand for in-patient services. Chen and Chen (2018) argue how to solve the problem of "difficult and costly access to health care services" and optimize medical reform plans has been heavily studied in current theoretical research and reform practice. Zhao (2018) concluded that deepening the reform of medical insurance payment method should on one hand protect the interests of insured people, and on the other hand meet their medical needs. Among the medical service system in China, the New Rural Cooperative Medical Scheme is led by government aimed at providing basic healthcare for rural residents participating in the program. However, some poor families in rural areas cannot afford the insurance fees and thus lose such health coverage, resulting in the widening coverage gap between rural and urban areas.

1.1.2.3 Comparison of hierarchical medical system reform in China and UK

Based on the idea of hierarchical medical system proposed by WHO, Britain established the "gatekeeper" system in medical reform, under which the patients are first diagnosed and treated by community general practitioners. Only the patients whose diseases cannot be dealt with by GPs are transferred to the higher-level medical institutions. Such hierarchical medical system can provide a timely and cost-saving treatment for patients with good results. Singer (2017) found due to the pragmatic attitude of foreign people towards disease treatment, the hierarchical medical system has been effectively implemented in foreign countries. Oberlander (2017) pointed out that different types of

medical institutions in Britain are tasked with coping with different kinds of diseases, ensuring the reasonable allocation of medical resources. Pickens et al. (2017) found under the coordinated efforts by family doctors, specialty hospitals and general hospitals, the British's hierarchical medical system has provided highly efficient health services for patients according to their actual conditions, greatly shortening their waiting time for treatment. In terms of China's medical reform, hospitals can reform the hierarchical medical system according to China's actual conditions and actively promote the implementation of policies in order to serve the patients better. Lin (2018) pointed out that, under the background of medical reform, China's medical service system is not perfect. In this regard, the public hospitals in China should optimize the internal control system and mobilize the urban and rural medical resources in a coordinated way to achieve the sharing of patients' information and medical resources. By implementing hierarchical medical system, the patients are separately treated in different hospitals at various levels according to the severity of disease conditions. Qin et al. (2018) pointed out because the basic health service system in China is still under construction, the beds in urban community health centers (stations) are not enough. However, the coverage rate of grass-roots medical institutions in rural areas is increasing year by year and the qualification rate of infrastructure standardization construction is also steadily improving. The basic medical resources in China are basically sufficient, laying sound foundation for the smooth implementation of hierarchical medical system. Dai et al. (2018) pointed out although the number of health talents in the grass-roots hospitals is increasing, the growth rate is slow, and the situation allows for no optimism. Besides, after the implementation of hierarchical medical system, the fragmented medical services and the low utilization rate of resources may easily lead to the rapid expansion of the large hospitals and produce powerful crowd-out effect on the grass-roots medical institutions, thus hindering the development of the basic medical hospitals in China. Therefore, the hierarchical medical system model in Britain can be used as reference for promoting the reform and development of hierarchical medical system in China.

1.1.3 Problems in China's medical reform

1.1.3.1 Ambiguous role of government in medical reform

The current medical reform in China still faces great challenges. Jin (2017) pointed out the deepening of medical reform is a complex project covering a wide range of

highly-correlated interested parties. Therefore, aside from the high attention from Chinese communist party and government, joint efforts by the whole society are also needed to promote the innovative development of medical reform. The unclearly defined role of government in medical reform results in government doing too much or doing little, which will worsen the problem of “difficult and costly access to health care services” and have negative effect on medical reform. The basic-level hospital lacks the perfect medical equipment and the level of medical technology is low. The reform of the public hospitals is progressing slowly and perfect operating mechanism that meets public nature and functional requirements is still not in place. In addition, the performance appraisal mechanism is also absent, hindering the development and progress of China's health undertakings. Zhu (2017) found China's health reform is a complicated system overhaul covering a wide range of highly correlated interested parties, which has bearing on the national interests and people's livelihood.

1.1.3.2 Lack of perfect medical service system

Due to the imperfect medical service system and chaotic medical market, the medical reform faces many obstacles. Because of lack of effective management system in place, the rampant artificially high drugs price, inefficient medical services, doctors’ receiving red envelops for personal gains and chaotic market order have negatively affected the progress of the Chinese medical reform. Because the reasonable compensation mechanism for revenue loss caused by the abolition of “drugs maintaining medicine” mechanism has not been established and meanwhile there is no sufficient financial support from government, hospitals have no choice but to raise service charges to make up for the lost revenue. It can be seen that the hospitals’ profit-generating mechanism has not fundamentally changed and thus the medical cost burden of patients fails to be alleviated. During the advancement of medical reform in China, the operating costs and employees’ salaries in some hospitals are still covered by the service charges. The problems of “drugs-maintaining-medicine”, doctor-patient conflicts and “difficult and costly access to health care services” still exist.

1.1.3.3 Poor drugs regulation

The drugs production and procurement are in disorder. The medical reform has not solved the problems of “artificially high drug prices, commercial bribes and drugs kickbacks” and drugs regulation has not been effectively implemented. Currently, drugs are mostly procured by pharmaceutical companies through public bidding and thus the drugs

specifications, quality and prices have not been put under unified management, which can result in the rising medical costs of patients. During the drugs circulation process from pharmaceutical companies to hospitals, more circulation links will lead to higher drugs prices and longer circulation time, which will indirectly increase medical costs and put an unaffordable burden on the already overstretched costs of patients.

1.1.3.4 Lack of hierarchical medical system

Many prominent problems in China's medical system have caused troubles to patients and hindered the development of health undertakings. Because of uneven distribution of medical resources in urban and rural areas, the patients in remote areas have to take bus to faraway cities to see a doctor, only to find the large hospitals in cities have been flooded with patients. Patients always feel totally exhausted after queuing up to register and purchase drugs. It is undeniable that with the deepening of medical reform, the situation has been improved more or less. However, without effective hierarchical medical system in place, patients with common or frequently-occurring diseases and those with critical diseases must compete for limited medical resources in big hospitals, leading to the excessively long waiting time and delayed treatment. Therefore, the problem of difficult access to health services is still prominent.

1.1.3.5 Uneven allocation of medical human resources

In the process of medical reform in China, the medical human resources are not reasonably distributed. The large hospitals in big cities are always the home to the high caliber and competent health professionals. In contrast, it is difficult to find the qualified medical employees in basic-level hospitals. Most employees in grass-roots hospitals have poor service ability and know little about modern medical information technology such as medical management system, medical software and auxiliary medical equipment. The poor ability (professional skills) and low quality (moral ethics and responsibility) of some doctors have hindered the progress of medical reform. The uneven distribution of medical human resources makes it difficult to make overall progress in medical reform across China and meanwhile negatively affect the sustainable development of China's medical reform and cause damage to the reform's results.

1.1.4 Countermeasures for development of medical reform in China

1.1.4.1 Clarify authority and responsibility of government in medical reform

It is necessary to clarify the responsibilities of the government and relevant administrative departments and strengthen their roles in Chinese medical reform. The government should avoid functioning as both regulator and operator. Firstly, the government should properly control the extent of decentralization and play its due role in medical reform. Intervening too much or doing nothing would be counterproductive; secondly, the hospital's revenues from drugs and services charges paid by patients at their own expenses should be strictly controlled and put under unified management of government financial sectors and health departments. In this way, the rampant practice of unreasonable charges in public hospitals can be eradicated; thirdly, efforts should be stepped up to reform public hospital system in a scientific way based on China's actual conditions. The government should standardize the hospital's revenue and expenditure. For example, the hospital's spending on infrastructure construction and equipment purchase should be jointly approved by the government financial sector and health departments. In addition, the government should give public hospitals necessary financial supports to change the self-financing mechanism of public hospitals and ensure the basic income of medical employees; finally, the government should focus on solving the problem of "difficult and costly access to health services" and push forward the medical reform in a coordinated way.

1.1.4.2 Perfect medical service system

During the advancement of medical reform, efforts should be made to improve current medical service system in China. The government should work closely with medical institutions, public hospitals in particular, to set long-term development goals and scientifically promote medical reform according to China's actual conditions and present situation of medical system. First, the government should provide financial subsidies for grass-roots hospitals and equip them with modern medical equipment in order to improve their service capabilities; second, the government should help hospitals to establish scientific compensation mechanism for revenue loss incurred from the elimination of "drugs maintaining medicine" mechanism in order to effectively reduce patients' cost burdens; third, hospitals should establish scientific performance assessment system and strictly prohibit any behavior associating diseases treatment with personal gains; lastly, the

government should grant the medical organizations greater freedom and establish a variety of mechanisms. The government should act in close coordination with medical institutions to actively integrate the sources of the whole medical service system, perfect medical service system, improve medical market order in an endeavor to ensure the sustainable development of China's medical reform.

1.1.4.3 Strengthening the reform of the drug supply system

Efforts should be made to promote the reform of the drug supply system in China's medical reform. Firstly, drug administration should strictly supervise drug safety, establish strict entry criteria for pharmaceutical enterprises, reapprove the qualifications of drugs manufacturers, eliminate outdated capacities, promote the merger and reorganization of drug production enterprises, improve the R&D capacity of drugs manufacturers so as to ensure the quality and safety of drugs and safeguard the interests of patients; secondly, drug regulator should standardize the business conducts of pharmaceutical manufacturers, reduce the circulation links between the "drug manufacturers - circulation traders - hospitals - patients", and strictly prohibit behaviors artificially raising drugs price in process of sale in order to ease the patients' financial strains on medical costs; thirdly, drug administration should reapprove the current drugs lists, clean up the information of drug names and prices, standardize the drug pricing, and ensure the drugs with same ingredients, quality and curative effect are sold at same price, in an effort to prevent drugs from being sold at artificially high prices; finally, it is necessary to perfect the centralized drug bidding and purchase procedures and improve the supply and distribution channels of drugs. The government should publish drug production bidding information (drug name, specifications, quantity and prices) and authorize licensed drug dealers to centrally procure in order to reduce the circulation links between drug manufacturers and ultimate customers and circulation costs.

1.1.4.4 Improve hierarchical medical system

In order to reasonably allocate medical resources, hospitals should establish effective hierarchical medical system. First, it is necessary to establish basic-level hospitals network covering urban and rural areas across China in order to ensure people's equal access to medical service and meet their basic healthcare needs; secondly, the government should vigorously strengthen the service ability of grass-roots hospitals and improve the medical morals and service awareness of employees in basic-level hospitals. The basic-level

medical institutions play a crucially fundamental role in advancing medical reform. Therefore, each grass-roots health worker should fulfill his duties and do his part in order to bring the role of basic-level hospitals into full play in medical reform; thirdly, based on the ideas of "urban-rural integration" and "integration of hospitals and community health centers", the two-way referral system and bidirectional flow of medical staff system should be established between urban-rural areas, hospitals and community health centers in order to improve the medical level of basic-level health organizations and reasonably allocate medical resources, ultimately alleviating the problem of "difficult and costly access to medical services"; fourthly, the community health centers can implement the hierarchical medical system on a trial basis. The sick community residents are first diagnosed and treated in community centers. Patients with diseases that cannot be dealt with by community doctors will be referred to higher-level hospitals. In this way, the patients' waiting time for treatment has been significantly shortened and medical reform will gradually take effect.

1.1.4.5 Strength efforts to provide sufficient training for medical staff

The hospitals should attach importance to the in-service trainings and enrich the medical knowledge of medical staff. Only the doctors passing assessment tests can stay their posts while those who failed many times will be eliminated from their posts in order to guarantee the overall quality of medical staff. Effective measures should be taken from the following several aspects: firstly, the government should offer free education for medical students sent to work in targeted areas after graduation. Efforts should be made to improve the professional skills and comprehensive quality of medical staff by providing various forms of regular trainings so that they can grasp modern information technology knowledge and skillfully operate modern medical system. Besides, regular assessments are conducted to examine the training effects; secondly, the hospitals should make efforts to cultivate the general practitioners through job-transfer trainings in different departments. The hospital administrative staff should be offered the trainings aimed at improving their management knowledge and creative awareness so that they can better contribute to the improvement of the medical management system in medical reform; thirdly, the township hospitals should strengthen efforts to cultivate medical talents and encourage their medical workers with professional qualification to participate in the adult higher education program to enhance their education level; finally, the township-level hospitals should explore new further education model for medical staff and provide on-the-job trainings in various ways.

The government should guide medical colleges to change education concept and invest more in further education. Summing up, the township-level hospitals and urban hospitals above second-level Grade A hospitals should step up efforts to provide trainings and distance education for medical staff, make full use of different kinds of health and educational resources and carry out diverse forms of medical education activities to improve the overall quality of doctors.

Pediatrics is the branch of general medicine that involves the medical care of children and adolescents, especially infants. The task of pediatric care is to safeguard mental and physical health, provide health care and carry out disease control and prevention for infants and adolescents with a goal of reducing the incidence of children's diseases, mortality rate and improve their health. The ages of people under pediatric care is variously ranged across world. In China, the age range of people under pediatric care is from birth to 14 years old.

A high-quality pediatric care system plays a crucial role in improving pediatric care level and safeguarding children's health. There are still many problems in China's pediatric care, which hinders the development of health services in Chinese pediatrics. In this study, the current situation of pediatric care in China is presented based on literature review on relevant studies at home and abroad and meanwhile feasible and concrete countermeasures to further promote China's pediatric care are offered.

Overall, the P. R. China medical reform endeavors to follow a set of principles that foster the people's equitable access to healthcare and, as all large medical systems analyzed, is challenged by its overarching complexity and by the many issues that require constant improvement. Research focused on all dimensions that can contribute to a better understanding and leverage the reform effectiveness is therefore timely.

1.2 Research issues and framework

This chapter will explain the motivation to conduct the present study that is focused on pediatrics, mostly professional competencies linked to Entrustable Professional Activities (EPAs). It will start by showing the research questions and offer a preview of the research method so to facilitate the grasp of the study design and make further reading more intelligible.

1.2.1 Research problem

Hospitals in China are organized according to a three-tier system that recognizes a hospital's ability to provide medical care. Further, these three grades are subdivided into 3 subsidiary levels: A, B and C. Higher level hospitals are generally more capable of dealing with complex and critical diseases. The third-grade hospitals boast the best medical resources (most advanced equipment, highly competent doctors and best platform and are the last stop for referrals from lower-level hospitals.

In China, medical entities that can provide pediatric care include children specialized hospitals, pediatrics department of general hospitals, maternity and child care centers and some community health centers. The children specialized hospitals are the highest-level medical institutions in Chinese pediatric medical system serving as the ultimate guardian for children health.

Hospitals at different levels play different roles and have various functions. However, the roles of hospitals sometimes are conflicting. The tertiary hospitals own the best medical resources while the secondary general hospitals take an intermediary role between primary and tertiary hospitals. Therefore, how to define the role of pediatrics department in tertiary general hospitals and what qualifications the pediatricians working there should have needs to be studied.

Due to the long cultivation cycle of pediatricians and woefully insufficient pediatricians in China, currently, the main force for pediatric care mainly comes from children specialized hospitals, pediatrics department of general hospitals as well as maternity and child care centers. The pediatricians in children specialized hospitals have clear direction for development according to their division of labor based on specialization. However, when it comes to the pediatrics department in general hospitals, things get a little complicated because there are general practitioners and pediatricians in such medical entities. Therefore, how to balance and coordinate the roles of GPs and pediatricians? How to define the core competencies of pediatricians in pediatrics department in general hospital?

1.2.2 Research purpose

In order to shorten the education development cycle of pediatricians and ensure the pediatricians are qualified for the pediatric care, with the pediatric digestive specialists as

the research subject, this research explores the competencies of pediatricians in third-level general hospitals, which provides the scientific basis for the talent cultivation and selection in the pediatric subject construction in general hospitals, to accelerate the transformation of pediatric education results to pediatric clinical care and further unleash the potential of pediatric care in third-level general hospitals.

(1) We start by analyzing the purpose and significance of the research on competency of pediatricians in the third-level comprehensive hospitals based on competency model, as well as summarize the research results of competency in the medical field.

(2) Then, we study the competency factors for pediatricians in third-level hospitals considering the characteristics of pediatrics department in comprehensive hospitals and based on the training index for key clinical professionals, manual for children diseases, and management standards for diagnosis and treatment based on digestive endoscopy in pediatrics.

(3) Then, based on the selected competency factors, we intend to design a competency model for pediatric medical staff in comprehensive hospitals. This has a multi-dimensional nature and will be sent to pediatric medical staff for data collection. The research data will be processed and analyzed through statistical factor analysis to test for psychometric quality (reliability and validity).

(4) Lastly, we target job responsibilities for pediatricians in third-level comprehensive hospitals.

1.2.3 Research questions

1.2.3.1 Main research question

Due to the lack of pediatricians, a large number of new pediatric physicians are in urgent need. Therefore, measures should be taken to shorten the cultivation period of pediatricians in order to increase the supply of pediatricians in short time and meanwhile various forms of training should be offered to improve their service abilities and skills. According to the current situation of Chinese pediatric care, the competencies for pediatricians in general hospitals are studied in this study.

The main research question is:

What are the general competencies of pediatricians and which ones contribute to build the specialized gastro-intestinal pediatricians' competencies?

1.2.3.2 Sub-questions

Stemming from this main question, it is required that some other sub-questions be answered. Namely: 1) What is Pediatric discipline setting in the third-level comprehensive hospitals? 2) What kinds of competencies or accredited activities (EPAs) should pediatricians have in the third-level comprehensive hospitals? 3) How to EPAs relate with each other and the domains of competency? 4) How do general pediatrics EPAs relate with digestive specialized pediatrics EPAs? and 5) In which extent does ethics foster EPAs in general and digestive specialized pediatrics?

1.2.4 Preview of the method

We selected pediatricians as the main source of data for this study due to the purpose of measuring their conceptions about competencies, EPAs and ethics. Therefore, we opted to conduct a survey by questionnaire among pediatric health workers (taking Pediatric Gastroenterology as an example) in two third-level hospitals including Pediatrics Department in north district of affiliated Ruijin Hospital of Shanghai Jiaotong University and Pediatrics Department of Ruijin Hospital. The questionnaires are sent to pediatricians, nurses, medical technicians, scientific researchers and management personnel. The data collection is based on stratified random sampling surveys. The Ruijin Hospital and northern branch hospital of Ruijin Hospital are chosen as research objects largely based on following facts: first, with profound hospital culture, the pediatrics department of Ruijin Hospital comes out first among the pediatrics of Shanghai general hospitals, which is a comprehensive medical department integrating healthcare, scientific research and teaching and has wards, emergency room, outpatient department, Children Gastric Motility room and pediatric laboratories. It has developed many superior subspecialties including Children Gastrointestinal & Digestive specialty (honored as China's clinical key specialty in 2011), Endocrine and Genetic Metabolism specialty (treatment center for disorders of sex development is established), Children Asthma and Allergy specialty (treatment center for children asthma is set up), Children Homeopathy specialty and Children Psychology specialty. Currently, it serves as the standardized training base for pediatric resident physicians, pediatric digestive specialists, pediatric endocrine and genetic metabolism specialists, pediatric physicians in Shanghai. According to Shanghai Regional Health Planning (2011-2020), it is among the five medical consortiums in Shanghai. With its advantage position, it led the efforts to establish the Shanghai central medical consortium.2.

As a new 5+3+1 third-level comprehensive hospital in the suburb of Shanghai City, the northern branch hospital of Ruijin Hospital is located in the densely populated area of Jia-ding District. In order to meet the needs of pediatric care, teaching and scientific research, quicken the homogeneous development of the two hospitals, and achieve the goal of establishing itself into the "regional medical center", the northern branch hospital, in accordance with the general requirements of "strengthening public welfare, mobilizing enthusiasm and guaranteeing sustainability", puts itself under the unified management of its parent hospital, Ruijin Hospital in discipline construction, talent training and resource allocation. It is under this background that the competence factors of the pediatricians in the third-level comprehensive hospital are discussed and confirmed, which has a more realistic significance and may be used for reference to the cultivation of pediatricians and construction and development of pediatrics.

1.2.4.1 Data sources

Due to the complexity of the subject and its organizational context, we opted to collect data in a multiphase and from distinct sources. Mixed methods were considered more suitable to our purpose. Therefore, we started by focusing on grasping the context concerning pediatrics, interviewing experts, interviewing groups of professionals, understanding job content, and launching a survey by questionnaire.

(1) Situational approach: focus on the surrounding factors influencing the development of pediatrics and identify what kinds of competencies pediatricians should have to cope with the ever-changing environment. In order to increase its adaptability to the social environment in which it operates, an organization must perfectly be aware of the external conditions and their potential effects on the organization.

(2) Experts interview: head and deputy head of pediatrics department of Ruijin Hospital, head of pediatrics department of northern branch hospital of Ruijin Hospital and some experts with senior title are interviewed to elicit what kinds of competencies pediatricians should have from perspectives of hospital managers.

(3) Behavioral event interview: a predetermined interview outline is prepared for two group interviews, each group including 7-9 interviewees. The competency factors are extracted from the written records of group interviews using semantic encoding. The contents of interview outline include: childhood diseases, medical prescription, drugs catalogue, relevant clinical treatment methods and problems to be solved in pediatrics

department of general hospital.

(4) Job analysis: based on the daily work procedures, rules and regulations and job contents, the job responsibilities and role of pediatricians in general hospitals are summarized and classified in order to elicit job competency factors.

(5) Questionnaire survey: questionnaires were sent to pediatric digestive care physicians, nursing staff, management personnel in the Ruijin Hospital and the northern branch of Ruijin Hospital. Besides, the pediatric digestive care physicians who are the members of the pediatrics division of Chinese Society of Digestive Endoscopology of Chinese Medical Association, pediatric digestive care division of Chinese Medical Association and pediatric gastroenterology of Microinvasive Society of China Maternal and Child Health Association are also included.

The questionnaire survey is efficient and cost-effective, which cover a wide range of groups with a large number of sampling data collected. A Wechat group was established for respondents to fill questionnaire online on condition of anonymity in order to dispel their concerns and thus they can express their views more objectively. The global design for the empirical study is depicted in Figure 1-1 and Figure 1-2.

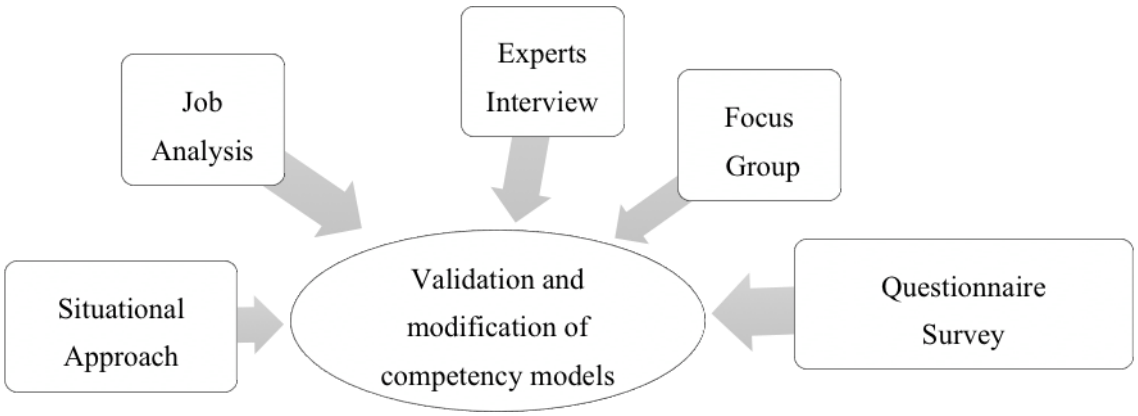

Figure 1-1 Multisource data

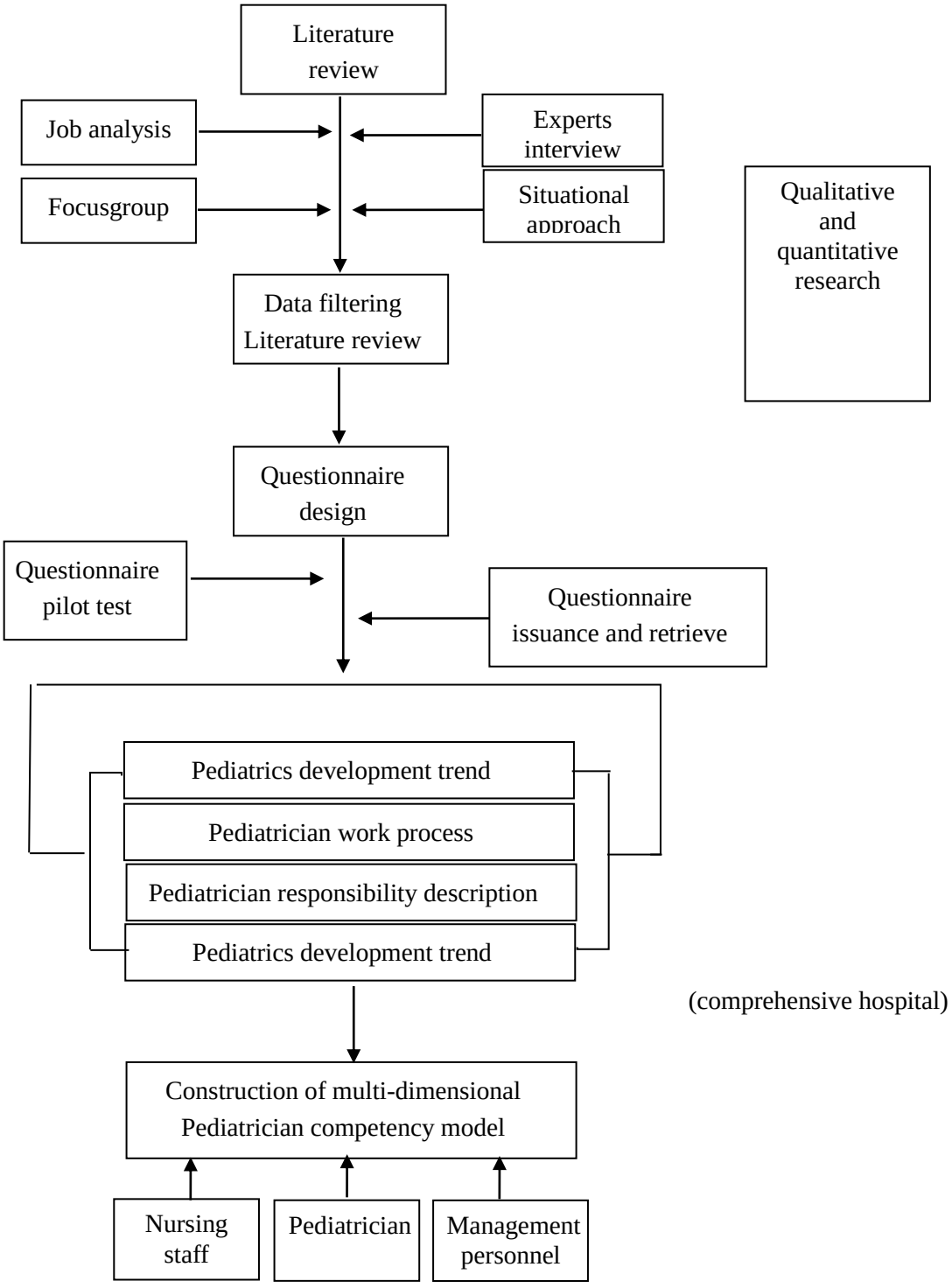

Figure 1-2 Research path

Chapter 2: China Pediatric Development and Competency

2.1 Introduction of pediatric care in China

2.1.1 Scope and features of pediatrics

According to Gui and Xue (2015), Pediatrics is a medical science that studies the physical and mental health and disease prevention spanning all ages from fetus to adolescence age. The task of pediatrics is to explore the theories of pediatric care and summarize the experience in practice in order to improve the disease prevention and control level, reduce the incidence of diseases and mortality, maintain and improve the children's physical, psychological and social adaptability and well-being.

Pediatrics covers a wide range of areas from children healthcare to diseases prevention, which includes:

Preventive pediatrics: refers to a prevention-focused pediatric care, which includes: prevent and control infectious diseases, strengthen children’s immune system, improve children’s health, maintain children’s mental health, prevent accidental injuries, identify birth defects, and early screen hereditary diseases.

Developmental and Behavioral Pediatrics: focuses on the laws and characteristics of children’s physical acts, language, cognition and emotions as well as the effects of surrounding environment and biological factors on the children’s development and behaviors. When children are found to have behavioral deviation or disorder, they can get early treatment.

Clinical Pediatrics: focuses on the disease occurrence and development laws and clinical diagnosis, treatment and rehabilitation in order to reduce mortality of diseases and improve children’s health. With the development of science and technology, the pediatrics is further subdivided into Pediatric Respiratory, Pediatric Cardiology, Pediatric Gastroenterology, Pediatric Hematology, Pediatric Neurology, Pediatric Herpetology, Pediatric Endocrinology, Pediatric Emergency Medicine, and Pediatric Psychology. Although the subject classification is similar to that of internal medicine, they differ vastly in research contents and intrinsic law.

Gui and Xue (2015) argued Pediatrics has its own characteristics when compared with other clinical domains. Child development is a continuous process having a unique course for every child. Due to the significant individual, age and sex differences, the children's health assessment and diseases diagnosis and treatment should not be conducted according to the same standards. Children are easier to recover from serious damages caused by diseases. In case of critical illness, as long as they survive critical period, they can recover quickly after proper treatment. However, children are weak in self-protection. Being vulnerable to external adverse factors, they are more likely to suffer from diseases and behavior deviation, which perhaps have a lasting effect throughout their whole life.

Pediatrics can be divided into preclinical medicine and clinical medicine. From perspective of anatomy, during periods of child growth, children's body shape and organs gradually develop and mature with age. Therefore, the children's health condition and disease in this period should be diagnosed according to the development law at different ages. From perspective of organ function, children's organ function becomes gradually perfect with age but children's normal physiological and biochemical level such as heart rate, respiratory rate, blood pressure, biochemical test values of serum and other body fluids at different ages is different. If the organ function has not matured, many diseases can occur. For example, infants' exuberant metabolism needs to be supported by plenty of nutrients. However, their digestive and absorptive function is still not mature, indigestion is more likely to occur. From perspective of immunity system, before infants' nonspecific immunity function, humoral immunity function and cellular immune function are fully established, their immunity against infection is weaker than adults. Gui and Xue (2015) found in early childhood, infants' IgA and IgG levels are low and respiratory and gastrointestinal infections are more likely to occur.

According to Bagwell et al. (2017), the Canadian Association of Pediatricians pointed out based on ethical considerations, the nursing regionalization during pediatric surgery can improve surgeon pediatricians' sense of happiness and reduce job burnout. The Australian Nursing and Midwife Committee members formulated nursing competency standards, including four aspects: nursing practice conforming to professional standards, compliance with ethics, critical thinking ability, caring ability, therapeutic and cooperative ability. According to Kumar et al. (2017), a three-year prospective study by two provincial hospitals in Cambodia found virus is detected in most of the hospitalized children with acute respiratory infection. Therefore, the understanding and application of the

pathogenesis knowledge by pediatricians is a necessary condition for improving the clinical management and prevention.

Bernsonleung and Urion (2018) pointed out the resident physicians have been offered more clinical skills trainings. A two-year longitudinal course for resident physicians specialized in children neurological and neurodevelopment disorder provides a repeatable model and theoretical framework, which has been highly praised by trainees and teachers and used as part of the training program to improve the quality of pediatric talents training. The American Association of Colleges of Nursing suggests that nursing graduates should have core competencies such as critical thinking, communication ability, assessment skills and practical operation ability. Petrass and Blitvich (2018) argued that improving the emergency treatment knowledge of pediatric health care workers can enhance competency of pediatricians and treatment effect of pediatric diseases. Links (2018) pointed out hospitals should put efforts to improve the pediatricians' ability in skills acquisition, professional competence and proficiency level. McCullough et al. (2018) found the ability-based trainings for medical staff can help quickly improve their professional skills.

According to Bunjitpimol, Kumar, and Somrongthong (2018), the cultural knowledge, attitude and practical ability of the nurses in the intervention group can help improve the nurses' cultural knowledge, standardize their behaviors, adjust their attitude and improve their post competency in a hospital. Weech-Maldonado et al. (2018) reckon many medical institutions still have not taken cultural competence as the driving force of hospital development and strategy implementation. Encouraging the individual's growth and development is an effective measure to enhance the cultural competency of medical talents and promote the development of medical organizations.

2.1.2 An overview of China's medical system

China's medical system includes hospitals, primary health care institutions, professional public health institutions, and other medical and health institutions. Meanwhile, the hospitals are classified into comprehensive hospital, TCM hospital, traditional Chinese and Western medicine hospital, minority hospitals, nursing home and all kinds of specialty hospitals to meet different needs of people. In China's medical service system, hospitals play a very important role in providing medical services to citizens. Similarly, the grass-roots health institutions and other medical institutions also include medical education institutions, medical examination centers, talent exchange centers and

many other health institutions, which jointly form Chinese medical service system to serve the public.

Chinese hospital system

The Chinese hospital system includes public hospitals and private hospitals, which undertake the same social responsibility. However, the number of public hospitals in China is currently decreasing year by year while the number of private hospitals is on the rise. This is because the implementation of new policy of medical reform in China has included the private hospitals in the medical insurance system. In addition, apart from obligatory responsibility, private hospitals must shoulder basic social responsibility and support responsibility.

(1) Basic social responsibility

The private hospitals must shoulder the basic responsibility of healing patient and preventing diseases.

(2) Obligatory responsibility

The private hospitals must take the patient as the center and undertake the basic social responsibility and moral obligations. However, at present, due to the low level of medical technology and poor medical equipment, private hospitals still cannot compete with public hospitals. In order to improve treatment and service level, the private hospital should introduce excellent licensed medical professionals to meet the people's health needs at different levels and provide good medical service for the patients.

(3) Support responsibility

Unlike the top-down operating system in public hospitals, private hospitals take the market-oriented mode. The support responsibility of private hospitals complements the responsibilities of public hospitals. Private hospitals should strictly follow the medical principles, put patients first, prohibit excessive medical services, safeguard patient rights, uphold integrity in serving patients and build a harmonious doctor-patient relationship.

Chinese pediatric care system

With more attention being paid to children's diseases by Chinese party and government, the pediatric care of China has made great progress and the pediatric medical service system is continuously improving. Chinese pediatric medical service system mainly includes pediatrics department in general hospital, maternal and child health care institutions, children's specialized hospitals and grass-roots health service institutions at

various levels, which can effectively control children's diseases and promote pediatric service ability.

There are still some problems in the pediatric service system, for example, the shortage of pediatric medical resources in pediatrics, woefully insufficient pediatricians, and unsatisfactory working conditions of pediatricians. The White Paper on the Current Situation of Pediatric Medical Sources released by the Pediatric Society of Chinese Medical Association and Chinese Medical Doctor Association suggests that if the number of pediatricians per 1,000 children by 2020 is expected to reach 0.69, 86,042 pediatricians are still urgently needed in China. Therefore, it is urgent to innovate the training methods for pediatric talents and make efforts to increase the number of pediatric talents and improve the pediatric service system in China.

A review of medical collaboration

According to the medical collaboration theory, the specialization and cooperation is an organizational form of large-scale socialized production, which aims to jointly achieve the work goal and improve the work efficiency through reasonable division of labor and cooperation between professionals in different fields. In terms of medical collaboration, the medical professionals from different fields of expertise should expand the scope of cooperation and strengthen the connection between different health professions. In the medical field, through appropriate organizational forms, each person will be arranged to the right position and work together with others based on clear willingness to cooperate and ways of cooperation, in order to give full play to the individual’s professional potential and improve the overall medical service level.

Medical team spirit

Nurturing medical team spirit means hospital should strengthen cooperation within a department and across departments in order to improve the operating efficiency of medical organization. In terms of pediatric talents training, the hospital should nurture the team spirits of pediatric talents and good work mentality and arrange each person to a suitable position that can unleash his great potential. Besides, the hospital should align individual interests with whole interest, increase the cohesiveness of team to ensure the team members work together to complete tasks and bring collective potential into full play.

2.1.2.1 Development history of pediatric care in China

Embryonic stage

The pediatric care in China first emerged from ancient times to the Northern and Southern Dynasties when although the theoretical system of pediatrics had not been established, people began to provide treatment for sick children. The representative pediatrician is Bian Que, a famous doctor in ancient China.

Formation stage

The pediatric care made rapid progress from the Sui Dynasty to Qing Dynasty and theoretical system of pediatrics had been established in that period. Due to the significant contributions of great physicians such as Sun Simiao and Qian Yi, the treatment methods of children's diseases had been continuously developed and the pediatric theories had been unceasingly enriched, which have laid solid foundation for modern pediatric care in China.

Mature stage

With the great support of Chinese Government, China established the Chinese Academy of Pediatrics and pediatric societies are also set up in different provinces and cities. Besides, the establishment of pediatrics medical school, compilation of pediatric medical textbooks and innovative research on pediatrics has significantly contributed to the improvement of pediatric care in China.

However, with the sustainable development of China's economy, in order to meet the challenge of aging population, China shifted its birth policy from "two-child fertility policy for couples where either the husband or the wife is from a single-child family" to "universal two-child policy". Although the new fertility policy can alleviate the problem of aging population, the number of newborn babies will significantly increase, which will present challenges to China's pediatric care already woefully short of pediatricians.

2.2 Pediatric policies in China

2.2.1 Hierarchical medical system

In the development of pediatric care in China, the National Health Commission of the People's Republic of China formulated a guideline on separate treatment according to the severity of disease in 2016 (Chinese Central People's Government, 2015) in order to promote the hierarchical medical system across China. Meanwhile the pilot hierarchical

medical services have been conducted in about 70 percent of cities across China to ensure the timely treatment and alleviate the shortage of medical resources.

2.2.2 Children's health insurance

The Chinese government introduced Children's health insurance policy aimed at providing basic healthcare for children and meanwhile preventing the delayed treatment incurred from being unable to afford the high medical expenses. The sick children covered by health insurance can enjoy rapid treatment and high-quality medical service without worrying about the expensive medical fees.

2.2.3 Medical costs control

The National Health Commission has also continuously strengthened the reform of medical insurance payment methods and introduced different kinds of payment methods depending on disease type, service unit and diagnosis results in its effort control the unreasonable increase of medical costs (Legal weekly, 2017). Meanwhile, multiple measures have been taken to reduce the drugs price and medical costs for pediatric care, for example, fully implement centralized drugs purchasing mechanism in public hospitals, include more kinds of negotiated homegrown drugs into medical insurance catalogue, and reduce the price of patent and exclusively-produced drugs. Besides, in order to narrow the gap between urban and rural areas in medical insurance, the per capita financial subsidy for rural residents has been continuously improved to give the rural family with two children easier access to medical services.

2.3. Development of pediatric care in China

2.3.1 Current development of pediatric care in China

2.3.1.1 Distribution situation of pediatricians in China

According to a report published in Science and Technology Daily (2018), in recent five years, the total number of Chinese pediatricians has fallen from 105 thousand to 100 thousand, with an average number of pediatricians per thousand children being 0.43, and at least 200 thousand pediatricians are in urgent need in China. Currently, the underserved pediatric services and insufficient number of pediatricians have seriously hindered the effective implementation of the new birth fertility policy, specifically known as "two-child

fertility policy for couples where either the husband or the wife is from a single-child family". According to the comparison of distribution of pediatricians across China between 2010 and 2015, the pediatricians and assistant pediatricians as percentage of total medical practitioners are presented in Table 2-1.

Based on Zhao (2017), from 2010 to 2015, the pediatric assistant physicians as percentage of total medical practitioners across China remain at 3.90% while the percentage of pediatricians has declined from 5.50% in 2010 to 4.20% in 2015. With the gradual implementation of "Universal Two-child Policy" across China, the demand for pediatricians is increasingly growing. However, the shortage of pediatric assistant physicians and pediatricians has negatively affected the long-term development of Chinese pediatric care.

Table 2-1 Pediatricians (assistant) pediatricians

Year	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Assistant pediatricians	3.90	3.90	3.90	3.90	3.90	3.90
Pediatricians	5.30	4.30	4.30	4.30	4.20	4.20

Note: As percentage of total medical practitioners (%) (2010-2015)

Source: Zhao (2017)

2.3.1.2 Allocation of beds in pediatric care across China

China has a large population of children, so how to safeguard children's health and reduce disease incidence has far-reaching implications for China's future (Lu, 2016).

Table 2-2 Number of pediatric beds per thousand children across China

Item	*Pediatric medical resources*
Number of pediatricians per thousand children	0.52
Number of pediatric beds per thousand children	2.05

Source: China Information Industry (2016)

According to the White Paper on the Status of Pediatric Medical Resources in China, there are more than 410 million pediatric outpatient visits and over 91 million pediatric emergency cases in 2014. However, the insufficient beds in all kinds of medical institutions (shown in Table 2-2) have affected the timely treatment for children patients and reduced their satisfaction, which hampers the long-term development of pediatric care.

Table 2-2 shows the pediatric beds in China is woefully inadequate as manifested by the fact that the number of pediatric beds per thousand children is only 2.05. With the

number of newborn children rising, the demand for pediatric beds is on the rise. Therefore, the serious shortage of pediatric beds cannot meet the demand of growing children patients, thus reducing the quality of pediatric care.

2.3.1.3 Current situation of pediatric care in China

The new "universal two-child" policy in China increases the demand for pediatric outpatient services. However, the efforts to implement hierarchical medical services to optimize the allocation of pediatric resources produce no immediate effect. The fact that pediatric outpatient departments in big hospitals are always flooded by large number of children patients has worsened the problem of "difficult access to pediatric care". It is reported that the daily outpatient visits served by pediatricians in non-specialty hospitals is twice the number of the outpatient visits received by their counterparts in children hospitals in China. The statistical data of pediatric outpatient services between 2014 and 2015 are shown in Table 2-3.

Table 2-3 Statistical data of pediatric outpatient services in China (2014-2015)

	Out-patients		*In-patients*	
Pediatric outpatient visits (Unit: ten thousand)	Pediatrics (Medical institutions)	Pediatrics (Community centers)	Pediatrics (Medical institutions)	Pediatrics (Community Centers)
2015	47505.2	9706.9	2061.0	303.5
2016	49765.9	9571.9	2195.9	305.5
2017	54167.1	9791.4	2360.6	321.5
Growth rate （2010-2017）	14%	0.8%	14.5%	

Source: China Information Industry (2018)

According to the above table, the growth rate of pediatric outpatient visits registers only 8.07%, which shows the number of pediatricians is insufficient and pediatric outpatient services are in short supply in China.

Under the background of the new two-child policy, the factors that restrict the sustainable development of Chinese pediatric care are studied in this study, which include pediatric services in short supply, poor pediatric medical environment, low pediatric service level and shortage of pediatric medical resource. Furthermore, the countermeasures to solve these problems are offered in a bid to promote the development of pediatric care in

China.

2.3.2 Adverse factors affecting development of pediatric care in China

2.3.2.1 Lack of modern child-specific medical equipment

The medical resources are unevenly distributed in China, most of which concentrate in the big hospitals in large cities. It is the same case with pediatric resources. In rural and economically underdeveloped areas, the township hospitals are in short of modern pediatric equipment or equipped with outdated equipment, if any. By contrast, in economically developed areas such as Pearl River Delta, the hospitals are generally equipped with high-end medical equipment. In some cases, however, even though the equipment resources are not insufficient, there is no guarantee that they can be effectively utilized. For example, in understaffed pediatrics departments, most advanced pediatric equipment is always left unused, resulting in the waste of resources. The child-specific medical equipment refers to the medical facilities specially designed for children according to their mental and physical characteristics in order to calm their emotions and carry them through a comfortable treatment experience, which include pediatric intensive care facilities, pediatric conjoined dental multifunctional equipment, pediatric open MRI machine, and special ambulance for newborn children. However, in most hospitals, such child-specific equipment are virtually absent and the quality of pediatric care is affected.

2.3.2.2 Lack of pediatric service resources

According to a report published by China Information Industry in 2016, the growth rate of pediatric outpatient visits reaches 8.07%. However, there are only 92 hospitals (including pediatrics department in general hospitals and children hospitals) providing pediatric care for children in China, which cannot meet the growing demand for children health care. Worse, some pediatrics department in general hospitals have been gradually “marginalized”, their service capability is declining. Compared with adults, children have weaker immune system and thus they are easily infected with diseases during outpatient treatment or hospitalization.

Due to lack of basic pediatric medical resources such as competent pediatricians and medical equipment in rural areas, children patients in remote areas have to be taken to visit children hospital in big cities. As a result, those hospitals are crowded with large number of patients and create conditions for epidemic diseases to spread.

2.3.2.3 Woefully insufficient beds for children patients

The pediatric care needs less medication, examinations and medical fees, therefore its human resources costs are significantly higher than those of other medical departments. For this reason, the pediatrics department in general hospitals has been gradually marginalized by reducing number of beds and children wards, causing children patients in general hospitals to flock to children hospitals. According to Table 2-3, the pediatric resources are unevenly distributed in China. The number of pediatric physicians per thousand children is 0.52; the number of beds per thousand children is only 2.05 (China Information Industry, 2018).

The shortage of pediatric resources also makes it difficult for hospitals to cope with nearly 10,000 outpatient visits each day. Compared with extremely high number of outpatient visits in peak period, there are only several hundred beds in wards of hospitals, making it difficult to get a bed for children patients. Therefore, parents of children patients have to queue for a bed. Besides, the noise pollution caused by overcrowded people in children hospital is also harmful to children's mental and physical health.

The hospitals' ability to rescue critically-ill children in emergency conditions is still low. Without effectively integrating regional medical resources, children hospitals and other hospitals cannot achieve complementary advantages. Besides, the collaboration with other disciplines is not close and expert consultation mechanism not perfect. Children are more likely get sick when seasons change or temperature fluctuates. During these periods, the large number of children patients cramming into pediatrics department always competes for insufficient beds, putting strains on already underserved pediatric care.

2.3.2.4 Shortage of pediatricians

In order to answer the call of "universal two-child" policy, some medical colleges in China have expanded enrollment or resumed to enroll medical students studying pediatrics. Despite this, it is difficult to alleviate the problem of serious shortage of pediatricians.

In China, the pediatric care is characterized by high costs, low profits and less financial support from government. The low position, high workload and low salary have de-motivated pediatricians and most of whom choose to work in other hospitals, or study abroad or enter pharmaceutical companies. Due to the vast gap in pediatric resources, the tertiary hospitals are always flooded by children patients despite insufficient beds and pediatricians, while most pediatric departments in grassroots hospitals are rarely visited by

patients. The incomes of pediatricians mainly come from the charges of drugs and medical examinations. Unlike doctors in other departments who tend to prescribe unnecessary drugs, pediatricians are extremely cautious in prescribing medicine for children patients (Hu, Dong, & Gao, 2016). The workload of pediatricians is twice or three times more than that of physicians in other departments, however, they earn far less than the latter, which leads to the huge loss of pediatricians. With the introduction of "universal two-child" policy, the loss rate of pediatricians under 35 is the highest. The grassroots hospitals also see the great loss of pediatric physicians.

There are many factors contributing to the decline in the number of pediatricians. First, few medical colleges open pediatrics courses; second, the cycle of cultivating a qualified pediatrician is very long; third, the pediatrician is a job featuring high risk, high challenge, high workload and low income. The job is very challenging and highly risky for several reasons: first, children have weaker immune system and poor adaptability, unsatisfactory treatment results can lead to different kinds of complications; second, children and adults differ vastly in clinical manifestation. Sometimes, children's diseases are complex, always accompanied by congenital, hereditary and infectious diseases, making it difficult to diagnose; third, young pediatric physicians make up majority of pediatricians and thus they are more likely to make mistakes in diagnosis and treatment because of lack of experience; fourth, children are always treasured like pearls by parents and any unsatisfactory treatment result will cause dissatisfaction from parents and further lead to medical disputes. All these have contributed to the loss of pediatricians.

2.3.2.5 Lack of medical information management system and advanced high-tech diagnostic and treatment technologies

With the implementation of universal two-child policy, the number of newborn children will significantly increase, which presents challenges to the traditional pediatric management system. Especially in some areas with highly mobile population, non-household population has growing demand for pediatric care and prenatal care. Without modern information management system, it is difficult to manage such massive and ever-increasing volume of data. Therefore, measures must be taken to solve this problem.

Most hospitals lack modern treatment technologies. When health human resources are limited, the traditional diagnosis and treatment cannot meet the growing need for pediatric care. If the online visual medical services, which are unrestricted by time, space and

distance, can be utilized, they will give more children easier access to pediatric care. However, the internet-based pediatric care needs more support from advanced technologies and therefore is currently not realistic. Besides, some complex children diseases must be diagnosed and treated face to face. Thus, the hospitals should put efforts to modernize pediatric care by means of more advanced technologies.

2.4 Competency theory

The concept of competency was initiated by David McClelland in 1973, which refers to enduring characteristics of people that are found to consistently distinguish outstanding from typical performance in a given job or role, including attitudes, values, traits, cognitive skills and motive dispositions. Job competence is the ability of an individual to perform a specific task properly. The competencies of pediatric physicians mean pediatricians are competent for their jobs and meanwhile perform excellently. Xu et al. (2018) argued job competency refers to the ability of a high-performing employee to be highly qualified for a job. In order to nurture job competencies, hospitals should guide pediatric talents to acquire knowledge and skills, nurture traits and shape attitudes through observing, listening, perceiving, inquiring and thinking in clinical practice. The core competencies of pediatric talents include not only the professional skills and innovative scientific research abilities, but the interpersonal communication ability, self-cognition, observation and judgment abilities, anti-frustration ability and care skills. Pediatric professionals with these competencies could have excellent performance in pediatric care.

2.4.1 Literature review on competency research in China

From the perspective of job competency, it is necessary to carry out training for pediatric talents in China to improve their comprehensive ability. The relevant studies on post competency in China are as follows.

(1) Hospitals should construct competency index system and standardize training model for pediatric talents. Han et al. (2017) pointed out that the establishment of the competency index system for general practitioners provides an objective basis for the training, assessment and evaluation of doctors, and thus has practical application value. Xu and Jiang (2016) found in order to improve the competencies of pediatric talents, efforts should be made from the following two aspects: first, from the perspectives of knowledge,

skills and social roles, hospitals should identify and determine the competencies for medical professionals; second, with job responsibilities as the core and healing people as the goal, hospitals should carry out knowledge trainings oriented towards specific medical talents. Yang and Chen (2017) pointed out from the perspective of job competency, strengthening the cultivation of medical students who will be sent to targeted areas after graduation can alleviate the shortage of pediatric talents. Wang (2017) argued that the establishment of post evaluation index system for pediatrics specialists will provide a scientific basis for the evaluation of pediatricians and improve their job enthusiasm. Li et al. (2017) think that introducing the competency model into nursing management system and constructing competency model of pediatric nurses has potential application value for the selection, cultivation, promotion and distribution of pediatric nurses. Tang, Zhang, and Zhang (2016) found the multi-agency cooperation model can improve the internal identity of clinicians at county-level hospitals and improve the enthusiasm of clinical pediatricians. Fang et al. (2017) pointed out that children, as a special group, should be carefully observed for a long time. Infants aged from 42d to 6 months should be given physical check on a monthly basis. The construction of pediatric service satisfaction evaluation index system can help to improve the quality of pediatric talents. The medical students should be offered the target-oriented multi-disciplinary professional courses integrating Maternal and Children Health Care, Child and Adolescent Hygiene as well as Pediatrics in order that they can grasp a wide range of pediatric knowledge. Chen and Wang (2017) pointed out that in order to evaluate the competence of the pediatric physicians, hospitals should build a competency index system that can comprehensively reflect the competencies of pediatric health workers, which can promote the standardization of the pediatric nursing management and give full play to its application value.

(2) The application of competency-based theory can help to improve the scientific research ability of pediatric talents. Bai (2017) points out that enhancing the scientific research ability of pediatric talents has become the top priority in nurturing their competencies. argued based on the theory of competency, hospitals should guide pediatric talents to apply their classroom knowledge to clinical practice, improve their clinical practice skills and professional ethics so as to become qualified clinicians in the future. Liu (2016) suggested that improving the professional skills, theoretical level and comprehensive quality of pediatric talents is helpful to enhance the job competency. Zhou et al. (2017) found improving pediatric talents' competencies surrounding basic ability,

professional quality, doctor-patient communication skills and medical knowledge is helpful to strengthen team awareness and improve the competency of pediatric health workers. Liu (2016) points out that improving the competencies of pediatric physicians in professional spirit and quality and doctor-patient communication skills can help to improve the comprehensive quality of pediatric talents and meet the requirements of pediatric care. Zhu et al. (2016) reckoned that improving the teaching quality and further exploring the evaluation method of pediatrician abilities is helpful to standardize the competency training for pediatricians and improve their quality

The research on post competency theory is helpful to alleviate the shortage of Chinese pediatric talents. Tu, Wang, and Xie (2018) pointed out that in order to improve the competency of pediatricians, hospitals should innovate talents cultivation methods, insist on the demand-oriented principles, start with the strengthening of job competencies, attach important to knowledge construction and take initiatives to stimulate the work enthusiasm of pediatric talents. Huang, Zhang, and Tan (2016) pointed out that the post competence improvement can help improve the professional skills and overall quality of Chinese pediatricians. Xia et al. (2018) suggested the medical college should offer subject-based pediatric education, summarize the existing problems in pediatric talents cultivation, learn from other countries, establish job competency requirements in a targeted manner and improve the training methods of pediatricians, so as to cultivate more talents who can meet the needs of pediatric care. Sun et al. (2017) pointed out that, based on the theory of post competency, hospitals should actively carry out the selection and training of pediatrics talents in order to provide theoretical basis for improving the pediatricians' basic knowledge, emergency knowledge and emergency skills. Zhu et al. (2016) suggests that the post competency theory is of great significance for the cultivation of pediatric talents and the standardized training of pediatricians, which can help improve the training quality of pediatric talents. Cheng et al. (2017) argued, from the perspective of post competence, medical colleges should blaze new trails for pediatrician cultivation and train pediatric talents who can meet the needs of the new situation. Liu, Shi, and Qiao (2017) pointed out that hospitals should encourage pediatric health workers to regularly participate in various forms of trainings to constantly improve post competency. Yao, Zhang, and Liang (2017) pointed out that hospitals can manage pediatric human resources in a dynamic way through position change at the same level and rotational training program according to the needs of different posts, which can stabilize the pediatric talents team.

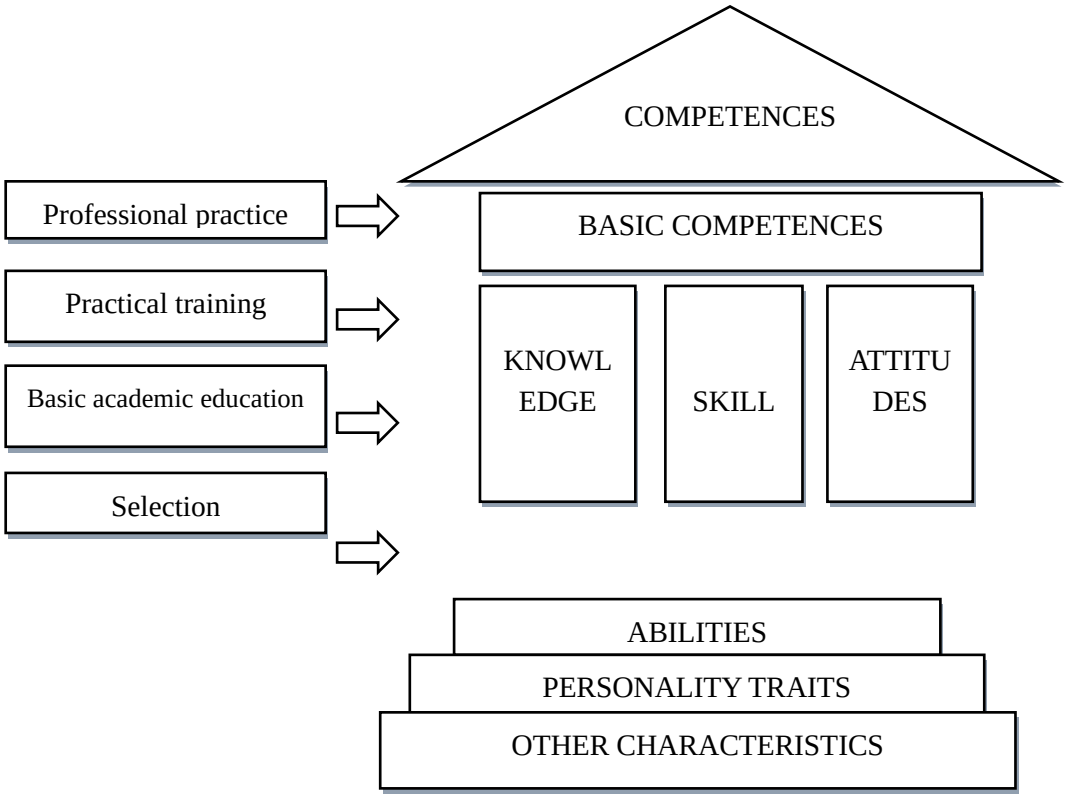

Figure 2-1 A model of competence

Source: Bartram and Roe (2005)

Li (2016) found due to the insufficient funds and less attention to trainings, the pediatric doctors in basic-level hospitals have received little in-service training. Therefore, the hospital managers should pay more attention to the continuing education of pediatric talents, improve the on-the-job training and continuing education system so that they can provide better service for the patients and promote the healthy development of pediatric health. Nie and Dai (2017) pointed out that hospitals should consider establishing medical consortium. By carrying out cooperative pediatric care across regions and provinces, the medical consortium can maximize the efficiency of high-quality pediatric resources and meanwhile lay the foundation for the establishment of hierarchical pediatric care system in China.

Functional analysis of the competency (see Figure 2-1)

A systematic and intensive research by British Psychology Society (Bartram, 1996a) provides detailed information about the work contents and performance requirements, which is used as reference to the competence assessment and formulation of learning norms.

In the 1990s, the British Psychological Society (Bartram, 1995, 1996a, 1996b)

launched a program sponsored by the British Department for Education and Employment aimed at developing a set of professional standards for applied psychologists. After a series of symposiums and broad consultation, the core competencies for applied psychologists specialized in educational psychology, clinical psychology, counseling psychology, occupational psychology, clinical neuropsychology, health psychology and forensic psychology are formulated.

Although this endeavor in Psychology is not directly related with the topic of this thesis is does entail useful learning from the methods applied to produce the standards. Namely, the process involved was:

(1) To define the main objectives of applied scientific discipline. This is very important because it identifies the main purpose of the profession and defines the boundaries and scope of the profession, from which the competency of the profession is elicited.

(2) To analyze the function. This is a technique used to established standards with the mind set on questioning "What do we need to do in order to achieve this goal?", The answer to this question is oriented toward the main objective, which plays an important role in determining the relationship with the occupational field.

(3) To decompose the key roles by repeating the question "What do we need to do in order to achieve this goal?". This role provides a series of functions. For example, in BPS plan, the key role 1.0 covers ethical practices and professional standards, and it is subdivided into four units (1.1 to 1.4). These units include upholding standards, maintaining competitiveness, professional contribution and personal development.

(4) To further subdivide the functions into components necessary to illustrate the implementation of the function. For example, to preserve the legal, moral, and professional standards of Applied Psychology (initialization 1.1), psychologists need to prove they can establish an information security system (element 1.1a), establish an information communication system (1.1b), and ensure to comply with legal, moral and professional practices (1.1c). The detailed information required by performance and knowledge is then specified in each component, which illustrates the performance and knowledge that applied psychologists need to prove to justify their qualifications. The same applies to Pediatricians.

The research results are interesting because: First, the program shows that

psychologists selected from different professional fields can match their major roles and functions with main professional goals. In other words, as a professional psychologist, he is unique and different from professionals in other disciplines. This common sense and its related "people-oriented practicing method" are common to all psychologists involved in the British program. Secondly, from a later discussion outside the UK, it can be seen that, at a higher level of explanation, the functional analysis of this program has captured the essence of psychological competence in a way that other countries are willing to recognize. Third, the results of functional analysis help to define competence (namely performance standards) and generate evaluation criteria (the "rules of evidence") to decide what type of evidence should be sought to judge whether a person is competent.

The current occupational standards consist of three interrelated parts:

(1) Establish clear performance standards and identify criteria for working environment when relevant performance occurs, which defines "output".

(2) Establish a set of learning norms or "input", which define what knowledge and skills are needed to meet standards.

(3) Establish a set of evidences, which defines how to judge whether a person is up to standard. These requirements outline what types of evidence an evaluator needs to examine.

Holmboe et al. (2010) pointed out that competency-based medical education (CBME) requires a powerful and comprehensive assessment system, which is very important to students, procedures and even the public. When designing CBME assessment system, people responsible for medical education must pay attention to various environments of clinical training. CBME further requires a more sustainable and frequent assessment process based on standards, sustainability, and work tasks. The assessment methods and tools used should meet the minimum quality requirements and meanwhile quantitative and qualitative measures and methods should be used to judge the progress of the students. Like all changes in medical education, CBME is an ongoing work. Considering the importance of CBME assessment, more collaborative research is needed among medical education circle to address several major challenges in performance assessment, including "best practices" in the context of institutional culture and how to provide the best training for teachers so that they can become the best evaluators. Finally, we must bear in mind that our ultimate goal is the professional knowledge, not competence. CBME should not end after medical education but go through the whole professional career of a doctor.

Spencer (1993) believed that competency refers to a person's potential characteristic associated with effective or excellent work performance, which represents a way of thinking or behavior across scenarios that can last a long period of time. There are arguably five kinds of competencies including motivation, trait, self-perception, knowledge and skills. In fact, according to Bartram and Roe (2005) a competency requires four cumulative conditions: that is can be learned, that it is described by a verb of action, that it corresponds to activity with a beginning and an end, and that it must be relevant for job performance. Thus, personality traits are not competencies (they are described with verbs such as "to be", that are stable across time and cannot be taught), abilities are not competencies also (they share the same features of personality but concern intelligence and other forms of interacting with environment), knowledge is not competency (as per se does not suffice to determine good job performance, it must be mobilized), skills are not competencies (in the sense that they can be taught but are of a less complex nature, like typewriting), attitudes are not competencies (in the sense that they are not described by a verb of action). All of these are important to build competencies but should be taken more as building blocks of competencies instead of competencies themselves.

For complex tasks, competency is more important to an employee than professional skills, intelligence and education background in delivering better results. Competency is a harmonized combination of skills, knowledge and behaviors crucial for an organization, personal performance and improved performance. With competency being heavily studied, the connotation of the traditional competency has been further enriched. Competency includes not only professional skills, but also self-perception, social role, motivation and other psychological factors. The research on competency has also been extended to the field of human resource management and a number of cross-organizational competency models have been constructed, which provides a series of management assessment standards for the organization, and requires organizations to use a series of techniques such as tests and simulation techniques to evaluate the competence of the managers and predict their potentials in the future. With the wide application of competency model, the management assessment center is established and further developed. A competency model is defined as a combination of competences required for specific tasks or performance objectives, including motive dispositions, traits, self-image and social role, and knowledge and skills level.

In order to understand the current working conditions and loss of pediatric residents

so as to explore coping strategies, Lu (2010) conducted a questionnaire survey among 120 pediatric residents and interviews with six management personnel in three affiliated Children Hospitals of Shanghai Jiao tong University. Results show the overall job satisfaction of pediatric residents is 28.85%. The main reasons for the loss of pediatric residents include hard work, low income and no good prospects for development. The pediatric residents are not satisfied with their working conditions, which leads to the low working efficiency and loss of pediatric specialists. Therefore, China should pay attention to the pediatric education, cultivate and reserve talents for the development of pediatrics, make great efforts to invest in pediatrics and even the whole health services, reduce the economic burden of hospitals, shape the values of the pediatric residents and establish a harmonious medical environment. In order to understand the current working conditions and loss of pediatric residents so as to explore coping strategies, Lu (2010) conducted a questionnaire survey among 120 pediatric residents and interviews with six management personnel in three affiliated Children Hospitals of Shanghai Jiao tong University. Results show the overall job satisfaction of pediatric residents is 28.85%. The main reasons for the loss of pediatric residents include hard work, low income and no good prospects for development. The pediatric residents are not satisfied with their working conditions, which leads to the low working efficiency and loss of pediatric specialists. Therefore, China should pay attention to the pediatric education, cultivate and reserve talents for the development of pediatrics, make great efforts to invest in pediatrics and even the whole health services, reduce the economic burden of hospitals, shape the values of the pediatric residents and establish a harmonious medical environment.

A preliminary study by Jin (2017) on pediatric medical consortium introduces the Anhui Children Medical Consortium established by Anhui Children's Medical Association and Anhui Provincial Children's Hospital in August 2014, whose member hospitals cover all regions and areas across Anhui province, consisting of 38 provincial third-level hospitals, second-level hospitals, community health centers and private hospitals. Relying on the pediatric medical resources of the Beijing Children's Hospital group and Anhui Provincial Children's Hospital, the medical consortium provides following medical services: appointed registration, hierarchical pediatric care and two-way referral, transfer of critically ill children to upper level hospitals, remote consultation, large-scale equipment examination, mutual recognition of examination results, information sharing. It has explored a unique pediatric medical consortium model.

A survey by Gao et al. (2016) of the pediatrics department in the new "5+3+1" third-level northern branch hospital of Ruijin Hospital in suburb areas and its parent Ruijin Hospital in downtown area in Shanghai suggests that there are many problems in the development of pediatrics in comprehensive hospitals, such as insufficient medical resources, fewer cases, high turnover of medical personnel, poor scientific research ability. Due to the deep-rooted and rigid mechanism, there is little space for the Ruijin Hospital to carry out exploratory reform. In view of the above problems, it is an opportunity for the pediatrics in the new suburb comprehensive hospital to make a bold trial in a bid to enhance its strength. Through improving pediatric care and strengthening efforts in software and hardware environment, talent training, department management, the construction of the subspecialties and special specialty, the pediatrics department can improve the economic and social benefits, properly balance the relationship between economic benefits and public nature establish a benign cycle of discipline construction and provide better medical services for the patients.

Gao and Tao (2015) made a preliminary research on the occupational stress of pediatric health workers in a Shanghai hospital in order to provide suggestions for the construction of pediatric talents teams. With 115 pediatricians and nurses as the research objects, a questionnaire survey was conducted from Jan to Dec 2014 to explore the occupational stress of medical staff in pediatrics. Meanwhile, these respondents are required to take professional paper test. The result shows the occupational stress of pediatricians and nurses is respectively 3.02±0.87 and 3.67±0.79, significantly higher than the average level of the whole hospital ($p<0.05$); the occupational stress of nurse is significantly higher than significantly higher than that of pediatricians; the difference of occupational stress between pediatricians and nurses with different education background is statistically insignificant ($p>0.05$); the occupational stress of nurses with different education background is higher than that of pediatricians and the difference is statistically significant ($p<0.05$); the pediatricians suffer the highest pressure from strained doctor-patient relationship (3.01±0.93); the score of paper test of pediatric health workers is average (61.07±6.18); the score of pediatricians (64.28±7.89) is higher than that of nurses (57.32±8.12), and the difference is statistically significant ($p<0.05$).

The results show the problems in pediatric talents construction include high working pressure, tense doctor-patient relationship and poor professional quality. Under background of medical reform, in order to explore the main development model of pediatrics

construction in general hospitals and provides certain basis for the development path of pediatrics, another research is conducted. 2,000 children patients receiving the pediatric care in the hospital in question from Jan to 12 2015 are chosen as research objects. During this period, the new health model is adopted. Another 2,000 children patients visiting the pediatrics in this hospital from Jan to 12 2014 is used as control group. The patient satisfaction, daily outpatient visits and cost differences are compared between the new health model and old one. After new health service model was introduced, the patients' satisfaction improved from 87.95% to 94.75%; the daily outpatient visits increased to 230 from 179 ($p<0.05$); the overall profits increased from 23,2064 million yuan to 24,0689 million yuan and the cost to income ratio reduced from 95.04% to 91.80%; nursing costs reduced from 12.56 yuan to 11.39 yuan per visit. The medical costs are reduced mainly by lowering the costs of drugs and consumables. The introduction of new health model has brought many advantages: effectively promote the development of pediatrics, improve services level, increase daily outpatient visits, speed up the development of the pediatrics department, improve the patient satisfaction and reduce overall medical costs, reduce the financial burden of the patients, and increase the profits of pediatrics department (Gao et al, 2016).

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The medical costs are reduced mainly by lowering the costs of drugs and consumables. The introduction of new health model has brought many advantages: effectively promote the development of pediatrics, improve services level, increase daily outpatient visits, speed up the development of the pediatrics department, improve the patient satisfaction and reduce overall medical costs, reduce the financial burden of the patients, and increase the profits of pediatrics department (Gao et al, 2016). The fundamental purpose of the discipline construction is to strengthen the comprehensive ability of the medical team and improve the core competitiveness of the hospital, which needs the joint efforts of all departments of the hospital (Wang, 2017). In order to establish a first-class discipline system, in recent years, with the discipline construction as the starting point, the hospital has actively pushed the development of the hospital to a new level and achieved good results. Subject construction is an important factor for the survival and development of a hospital, and directly reflects the overall level of the hospital, the academic status and the comprehensive competitiveness in the medical market.

The strong disciplines group, the perfect discipline system, the special subject direction form the foundation for hospital to improve the medical technology level, optimize the talents training environment, strengthen the medical scientific research ability and achieve sustainable development (Zhang, 2010). In order to improve the comprehensive strength and competitiveness, the subject construction and development

plays a fundamental role. The key subject is also an important powerhouse to attract, retain and train talents, which is directly related to the development direction and sustainable development of the whole hospital. But the subject construction is a long-term and arduous work, and also a systematic project. Therefore, it is necessary to formulate feasible strategies, establish a perfect discipline system, and concentrate on the construction of high quality and special superior disciplines.

Discipline construction is deeply rooted in talent cultivation, especially for Medical Science, which relies heavily on talent construction. How talents play their roles in discipline construction is based on the aforementioned construction of Post Competency (PC) (Holmboe et al., 2010). Competency-based Medical Education (CBME) requires a strong and multi-facet assessment system. Assessments and judgments from them are of great importance to the trainees, the program, and the public. When designing an assessment system for CBME, medical education leaders must focus on the various situations of clinical training.

Furthermore, CBME requires a sustainable and frequent assessment process, which is built upon standards, developmental and work-based as much as possible, applying assessment methods and tools up to the minimum requirement for quality and employs quantitative and qualitative measures and methods to assess trainees' progress. Like all the changes in medical education, CBME is an ongoing project. Since 2012, Peking University First Hospital has started its cooperation with the Royal College of Physicians and Surgeons of Canada. Among the first patch of pilot training programs for resident doctors, the training system for resident pediatricians in the Pediatric Department of Peking University First Hospital, has made beneficial explorations. In a PC-oriented teaching model, health issues to be solved are determined first, then competency in medical work is specified, and curriculum provision is adjusted to improve students' competency (Qi et al., 2015). In China, the standardization training process of resident doctors puts emphasis on the command of knowledge and skills, and lists no concrete requirements for other abilities while focusing more on the content of sub-specialties of internal medicine of pediatrics, including respiratory medicine, gastroenterology, cardiology, nephrology and neurology).

Comparing with the aims set in China, the Royal College of Physicians and Surgeons of Canada sets its goal in the same program at developing regular pediatricians with comprehensive abilities, which focuses on not only knowledge and skills to be medical experts), but also an integrative competency in communication, cooperation, management,

research, health advocacy, and professional spirit (Kavic, 2002). Meanwhile, Peking University First Hospital mentioned that the program is just an experiment, which needs more time for research. Li et al. (2015) raised the argument again in their thesis that human resource is a valuable asset for the sustainable development of hospitals. Clinicians, as an important group to realize hospital goals, are of the highest priority in human resource management.

Through evaluation and analysis, we get to know the overall distribution of competency among clinicians and departments, so as to draw up a plan for human resource, put forward a proposal for human resource development, provide short-term training and long-term development for individuals and groups, map out annual priorities for discipline construction, and break down annual key points of work. A mature and long-lasting human resource management mechanism, with the development of clinicians' competency at its core, should link various segments including human resource management, admittance management of medical qualification, resident doctors' training, and continuing education with each other so as to meet the original expectation of improving core competitiveness of the hospital.

For instance, Xu and Qian (2011) in their research found that competency-based recruitment is what helps organizations in employing people with core characteristics. It avoids the negative impact from selecting wrong people and reduces the cost for training. In particular, when it comes to selecting candidates for important and complicated positions, such as senior technical personnel or senior management, competency model plays a more important role than skills, intelligence or educational background and marks in predicting excellent performance, which introduces new ideas, perspectives and techniques to human resource management, including selection, appointment, assessment, training, and professional development. However, at present, the competency theory and techniques have limited access to employment and personnel selection in hospitals. Further exploration and development is needed to improve them in practice in order to solve the current problems in human resource management and enhance core competitiveness for hospitals.

In some theses on PC research in China, we found that Chinese medical management theory was new at PC with few researches.

Yan et al. (2016) did a research on the status analysis of PC in China's health care system by retrieving documents with Note Express in CNKI and Wanfang Data and

building an Excel 2013 database with user-defined export function. Through a metrology analysis of publishing years and regions, research objects and applications, they retrieved 579 theses. On theses they conducted an analysis of key words, excluding PC (already used), combining the similar occurrence, and analyzing the frequency of the new keywords, in which they found 915 key words, of which competency model had the highest frequency.

Classified by research objects, theses about the PC of nurses in medical institutions had the highest share of 34.9%, followed by those about medical students and management staff, while those about doctors ranked fourth with a share of 12.6%. Theses about general practitioners and health supervisors were rarely seen, and there were only two about the competency of medical staff in community centers for health services. These theses, with an annual growing number, were published in 144 periodicals in China, and their authors mostly working in colleges and universities and affiliated hospitals. Theses about nursing positions account for the largest proportion while those about competency of doctors and management positions in the health system shared a small proportion.

China is still at the early stage of understanding and studying PC theory, with most theses starting to interpret PC based on foreign researches and ignoring China's national conditions and characteristics, offering an incomplete picture of research objects. For example, Gu et al. (2017) from Nanjing Medical University Affiliated Children's Hospital mentioned the current development trend of hospitals in their thesis is that public hospitals are becoming large and integrative while those in the primary level general and integrative. They argued that fostering and making full use of clinicians is of essential importance to hospitals' development. Besides, they put forward the idea in light of some researches outside China on the PC of medical staff that clinicians' PC shows the following traits: PC is related to specific clinical positions and is influenced by job responsibilities, powers, environment, and incentive and constraint mechanisms. These traits, demonstrated by excellent clinicians, provide guidance, and present a full picture of the abilities and qualities associated with clinical work. They also mentioned a similar model to the iceberg competency model, and further advocated building a PC model for clinicians and applying competency researches to practice. Having summarized all the available theses, they found a biased choice of research objects, mostly heads of department, academic leaders and nursing staff. There are inadequate researches on the competency of clinicians, young clinicians in particular, and fewer researches on specialist doctors.

Researchers on clinicians from different positions and departments can study the competency range of clinicians from their departments, constructing a competency model with department characteristics. Meanwhile, there are some researches in China on how to build a PC model. For instance, Zhang et al. (2017) built a competency model for pediatricians by behavioral event interview. Then through literature review and behavioral event interview of 13 academic leaders from Beijing Children's Hospital, they built a PC model for clinicians upon the interview results, ability decomposition, and behavioral classification and refinement. On the grounds of the interview results and statistical analysis, they constructed the competency model for pediatricians consisting of six elements, namely, being good at learning, being proficient at majors, being effective at communication, being careful and responsible, and being active with high moral characters, and 21 core observable and evaluative indexes for abilities and behaviors. Their research yielded the latest fruit of indexes for constructing medical competency model but was limited to index research without validation. All colleges and universities are exploring indexes of PC based on their training objectives, and no consensus has been reached in terms of the indexes.

Therefore, there is no single index that bears strong public credibility in China. Compared to that, this research uses the universal competency index that has been validated and agreed in the international community. For example, CanMEDS framework proposed by Frank and Danoff (2009) from Canada includes medical experts, communicators, cooperators, managers, health promoters, scholars and specialists. Another index from ACGME came up with six core competencies, including medical knowledge, interpersonal communication ability, medical services, practice-based learning and improvement of professional quality, and large-system-based practice. There are several systems for assessing competency, but they are pretty much the same and can be classified to judge.

2.4.2 Post Competency- EPAs

The Employment of EPAs Theory to Medical Practice

According to Du et al. (2017), medical science is highly professional and practical, but it is not science, whose philosophy of endless exploration and pursuit cannot be applied to guide it because medical science is a practice-based discipline. Even the best theory is useless if it separates itself from clinical practice. And this is our focus in the research.

There is not even one medical PC theory that does not touch on how to assess whether a doctor has met the requirement or has shown competency traits. How do these traits present themselves? What kind(s) of behavior(s) can be seen as a measure to assess whether a doctor has the PC? In this area, there is barely research in China.

Therefore, medical behaviors are the key to assessing and training doctors that gives rise to the EPAs theory, which can be well linked to PC theory. Ten and Scheele (2007) in their thesis contended that the idea behind the competency framework should be associated with clinical working environment, and key professional activities in practice should be analyzed and linked to expected competency. Entrustable professional activities (EPAs) and statements of awarded responsibility (STARs) might narrow the gap between competency-based educational theory and clinical practice. EPAs show all the practices it takes to create a medical major. The right way to carry out these key EPAs lies in relevant competencies, which, as pointed out, should not be defined abstractly in the competency framework with too much focus.

Instead, we should pay attention to specific key clinical activities, and deduce the existence of various competencies from observations.

Ten and Scheele (2007) raised an example of ACGME-EPAs in Obstetrics and Gynecology (Table 2-4).

In working places, some clinicians are lost in competency-based complicated assessment model. They have what it takes to illustrate which professional activities need to be carried out fully, but they find it difficult to regard these activities as competencies.

There is no need to choose either competency or activity. Instead, admitting that both are relevant elements in the training process and represent different aspects of the same professional training goal can put competency and clinical practice in a harmonious state.

It presents the compromising situation of medical training for postgraduates in Obstetrics and Gynaecology (Ob-gyn). An employer, a colleague, or a patient is more interested in knowing whether a new Ob-gyn resident doctor has shown enough competencies to carry out the practices in the figure above, instead of whether he or she gets high scores in the vertically-arranged normal competency indexes.

Table 2-4 Bidimensional matrix EPA-general competencies

		EPAs						
		Care of uncomplicated pregnancies	Normal delivery	Uncomplicated puerperium and neonate	The high risk complicated delivery	Perioperative care	Surgery estimated as low risk	
ACGME competencies*	The ability to provide adequate patient care	●	●	●	●	●	●	The overall assessment of competencies is not actually done. In stead, their presence is inferred from the assessment of sufficient EPAs
	The possession and ability to apply medical kownledge	●	●	●	●	●	●	
	The ability to learn from clinical practice and to improve it				●	●		
	The possession and ability to apply interpersonal and communication skills		●		●	●		
	The ability and commitment to carry out professional responsibilities	●		●		●		
	The awareness of and ability to operate optimally within the context, system， and resources of health care				●		●	
	EPAs are focus of assessment, by observation，ratings or otherwise							

Source: Ten and Scheele (2007)

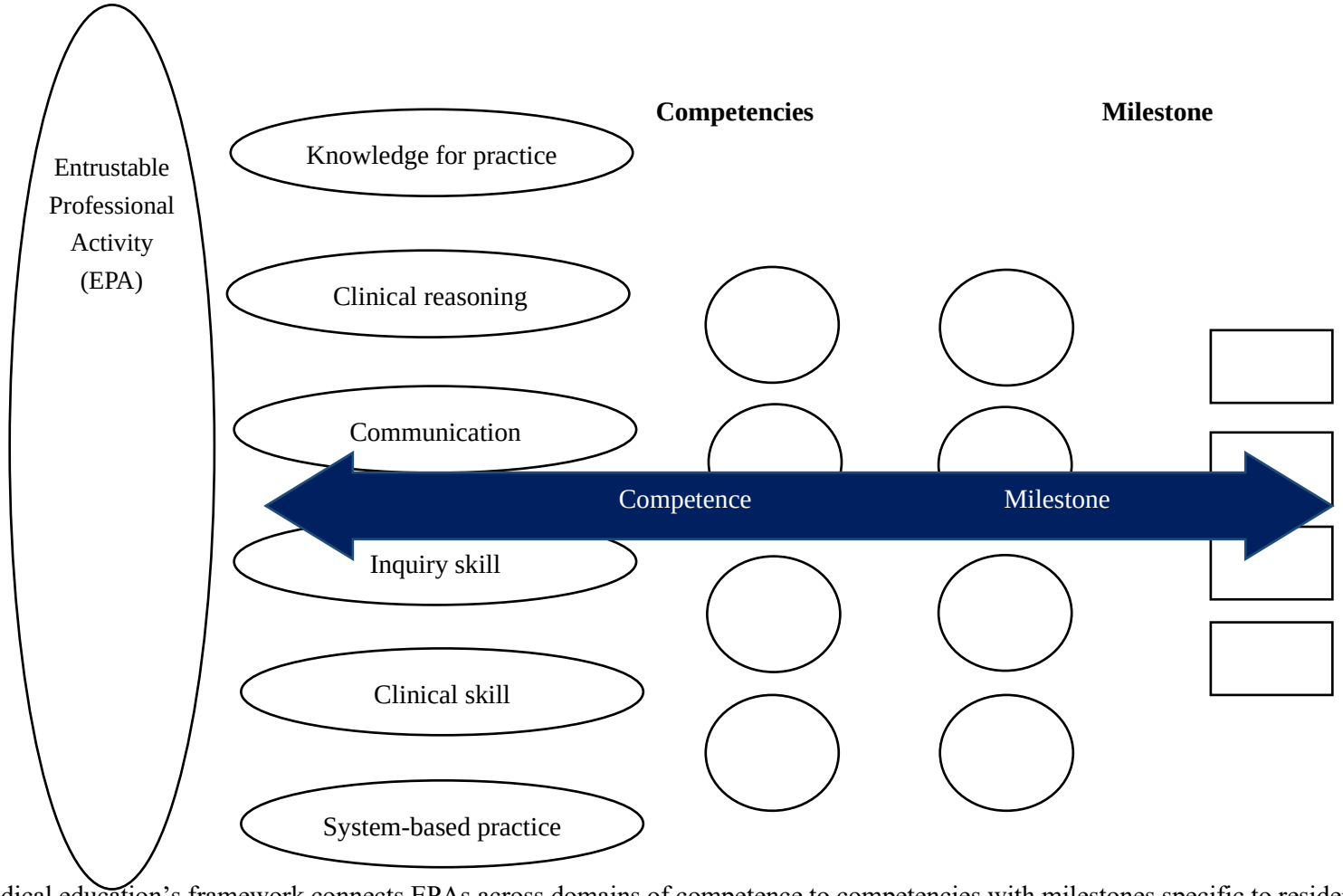

Figure 2-2 Medical education's framework connects EPAs across domains of competence to competencies with milestones specific to residency education

Source: Chesbro , Jensen, & Boissonnault. (2018)

EPA (or key professional activities in medical discipline) meets the requirements for assessing theories and practices. Therefore, work-based assessment should focus on EPA and normal abilities.

Chesbro, Jensen, and Boissonnault (2018) proposed that whether doctors have the ability to show self-consciousness, entrustable attitudes, values, or predictable behavioral habits. On this basis, the current medical education reform embraces EPA-based assessment framework.

Medical education framework links EPA ability with special abilities which are important for resident doctors' education. EPA is a unit of the professional practice, which can be entrusted to competent trainees or specialists, who need to have a proficient command of various abilities. This method highlights extensive and practice-based priorities for assessment, instead of considering individual (often isolated) ability. The assessment of EPA depends on entrusting strategies. The thesis mentioned that pharmacy major in the US is designing an EPA model to link pharmacy education with high-level practice experience, expecting that EPA can be used for performance assessment (see Figure 2-2).

This picture presents an EPA-based education method for training doctors. The following is a case from Chen et al. (2016), which confirms that EPAs is effective. Although early clinical experience is increasingly important, professors still face the challenge of bringing medical students of the early stage into medical practice.

EPAs provide a situation where competency framework is set up against the background of clinical workplaces, which can give medical students guidance on how to begin practice as soon as possible. The method adopted in the research process is to collect data from students from November 2012 to June 2014 with several steps to determine EPA content by means of student focus groups and interviewing professors. Then, each field is reflected on pre-service curriculum goal and graduate competency to make sure that everything is practical and relevant.

Seven EPA descriptions are made for each field, including specification/limits, expected knowledge, skills, attitudes, relevant competencies, and assessment information. Later on, they held workshops of local, national, and international levels to validate the appropriateness of content and supervising levels before investigating another group of experts and relevant staff. The result is that five EPAs, which are the primary requirements

for as a medical student. They are: information collection, information integration for identification, diagnosis and plan, health care group's communication, information sharing with patients, and resource identification. After that, they held a symposium to determine the content again according to the suggestions of experts, who all agreed that primary-level supervision is appropriate. These new EPAs can also be used by other professional institutions. This case proves that mature EPAs play a huge role in education. However, it takes a long time to discuss and validate before an EPA is put into use, which makes it difficult to spread the education method in a short time.

The following is a list of relevant EPAs from the American Academy of Pediatrics (AAP), which have already been validated and put into public use. Their description is quite detailed and allows for a clear understanding of its contents. Therefore, we will adopt this as the main benchmark of EPA for general pediatrics in this study. The full description can be found at https://www.abp.org/entrustable-professional-activities-epas. For clarity purposes we will identify and explain each one of these EPAs.

2.4.3 EPAs for Pediatrics

The full body of general pediatrics EPAs from the APP comprehends 17 individual items, as described below.

2.4.3.1 Provide consultation to other health care providers caring for children

The activity is described as "A key role for the pediatrician is to provide consultation to health care providers, specialists, sub-specialists, and health care agencies engaged in the care of children".

The specific functions which define this EPA include (Barone, Larrabee, & Burke, 2013): "1) Establishing and maintaining working relationships with the referring providers / agencies, marked by bidirectional communication. 2) Clarifying and focusing the clinical question to be addressed 3) Gathering essential information from referring physician, organization, or health agency, as well as the patient(s) and family. 4) Communicating findings and recommendations to the patient and family, and the source of the referral i.e., the requesting provider or health agency, 5) Demonstrating content expertise in one's area of pediatrics to provide consultation, and 6) Navigating the relationship with the patient/ family to be either supportive or directive (or some combination of the two) as needed over time".

2.4.3.2 Provide recommended pediatric health screening

The activity is described as serving "the purpose of early identification and treatment of populations of patients, is an important element of preventive health care. Foundational knowledge is critical, including knowledge of 1) available screening tests; 2) their status from a regulatory perspective (e.g. mandatory, recommended or voluntary); 3) their sensitivity, specificity, and positive and negative predictive values; 4) their cost/benefit ratio for patients and society; and 5) the risk/benefit ratio for the patient.".

The specific functions which define this EPA include (Barone, Larrabee, & Burke, 2013): "1) Applying knowledge in selection and interpretation of screening tools and tests (e.g. screens for growth and development, special senses, and medical conditions), 2) Engaging patients and families in shared decision-making for those screening tests that are not mandated by state law, and 3) Educating patients and families about the implications of the results to their overall health and care plan".

2.4.3.3 Care for the well newborn

The activity is described as caring "for the well newborn in the immediate perinatal period will occur predominantly in the newborn nursery. Scope of practice for this EPA includes well full-term and late pre-term infants. A pediatrician is also expected to manage the common problems that occur in these newborns".

The specific functions which define this EPA include (Carraccio, Barone, & Burke, 2013): "1) Performing a physical examination to look for normal variations, abnormal signs and congenital anomalies, 2) Identifying and applying key evidence based guidelines for care of the newborn, 3) Providing routine care, as well as addressing common problems that develop within the first 28 days of life, 4) Using judgment to know when common problems can be handled at home, and arrange for discharge and follow-up, 5) Assessing maternal/family readiness to care for the infant post discharge, 6) Transitioning care to the community practitioner, and 7) Demonstrating confidence that puts new parents at ease."

2.4.3.4 Manage patients with acute, common diagnoses in an ambulatory, emergency, or inpatient setting

The activity is described as "The ability to manage pediatric patients who present with common acute illnesses is a key activity of a pediatrician. The scope of practice includes well children and children with chronic underlying disease who present with an acute illness".

The specific functions which define this EPA include (Anderson et al., 2013): "1) Assessing the severity of illness and using judgment as to whether or not immediate or emergency actions, stabilization, or transfer to a higher acuity facility are necessary for treatment of urgent or life-threatening problems, 2) Gathering essential information through history, physical examination and initial laboratory evaluation, 3) Engaging in sound clinical reasoning that drives the development of an appropriate differential diagnosis to allow the indicated diagnostic tests to be performed, 4) Knowing or acquiring knowledge of the evidence related to the primary problem and applying the evidence to the patient's care in developing a diagnostic work-up and plans for management and follow-up, 5) Placing the patient at the center of all management decisions to provide patient and family centered care by engaging in bidirectional communication with patients and families, and 6) Communicating and documenting the therapeutic plan and clinical reasoning in a manner that is transparent to all members of the health care team".

2.4.3.5 Provide a medical home for well children of all ages (entrustment decisions for this EPA may require stratification by age group)

The activity is described as "The medical home is a partnership between patient, family and primary care practice, nested in the patient's community, that optimizes access to and coordination of care and resources. This activity requires the pediatrician to be a key facilitator and champion of patient and family centered care, working in collaboration with an interprofessional team. Provision of a medical home may emphasize different knowledge, skills, and/or attitudes for the different age groups, namely Neonate, Infant, Toddler, School-age child, Adolescent, and Transitional (to adulthood). As a result, provision of the medical home to each of these age groups can be seen as a "nested" EPA within the broader context".

The specific functions which define this EPA include (Larrabee, Trice, & Kuo, 2013): "1) Demonstrating knowledge of normal physiology, epidemiology, development, and standards of practice for the major age groups including neonates, infants, toddlers, school-age children, adolescents, and individuals transitioning to adult care, 2) Establishing a highly effective therapeutic relationship with patients and families, 3) Identifying specific patient and family needs by implementing a comprehensive assessment of patient and family, 4) Addressing specific patient and family needs by identifying appropriate resources and accessing and coordinating them to ensure optimal patient care, and 5) Optimizing the primary care of the patient by implementing quality standards

befitting a medical home.".

2.4.3.6 Provide a medical home for patients with complex, chronic, or special health care needs (entrustment decisions for this EPA may require stratification by age group)

The activity is described as requiring "the health care professional to be a key facilitator and champion of patient and family centered care, working in collaboration with an interprofessional team. Working knowledge of vulnerable populations is critical to this EPA. The activity often requires engagement with and coordination of multiple specialists and health care professionals. The activity also requires knowledge of and ability to access community resources. Entrustment to provide comprehensive care for medically complex children in a medical home may require different knowledge, skills, and attitudes for different age groups. As a result, entrustment decisions may require stratification by age group.".

The specific functions which define this EPA include (Burke, Anderson, & Kuo, 2013): "1) Demonstrating knowledge of key community services and agencies, to facilitate appropriate referral of patients with identified needs, and skill to diagnose, refer as needed, counsel and provide health maintenance for medically complex patients, 2) Facilitating patient and family centered care in a medical home model in order to emphasize collaboration with an interprofessional team that insures optimal care and empowerment of the patient/family, and 3) Engaging in and orchestrating the care coordination of Children with Special Health Care needs (CSHCN) with appropriate specialists, subspecialists, and other healthcare professionals/agencies (physical therapists, occupational therapists, home health care, dieticians, social workers, psychologists, etc.).".

2.4.3.7 Recognize, provide initial management and refer patients presenting with surgical problems

The activity is described as "work collaboratively with surgical specialists in the care of children with conditions where surgery is or may be indicated.".

The specific functions which define this EPA include (Calaman, Poynter, & Larrabee, 2013): "1) Recognizing conditions where surgery is primarily indicated or is needed in conjunction with medical management 2) Providing initial management and/or stabilization, 3) Making a referral and communicating directly to the pediatric or subspecialty surgeon, 4) Assisting with pre- and post-operative medical care of the child

(such as nutritional support, pain management, and medication dosing for the pediatric patient), and 5) Providing continuity of care that insures mutual understanding of the diagnosis, management and follow up needed.".

2.4.3.8 Facilitate the transition from pediatric to adult health care

The activity is described as "All children must have an organized transition to adult healthcare. This is particularly true of children with complex or chronic medical conditions. This necessitates an accountability to these patients on the part of a pediatrician to insure a seamless transition process to adult medicine counterparts".

The specific functions which define this EPA include (Larrabee, Kuo, & Burke, 2013): "1) Developing a therapeutic relationship with patient and family which foundationally supports recognition and timing of transition to adult care, 2) Assessing for transition readiness, 3) Transition planning that includes establishing a care team with an adult primary care provider and medical home, adult subspecialists, as needed and community based resources, and 4) Transferring care to adult health care providers, and coordinating assistance and ongoing support as needed".

2.4.3.9 Assess and manage patients with common behavior/mental health problems

The activity is described as "Mental health and behavioral issues are central to pediatric practice. Care of patients with behavioral and mental health problems requires that the pediatrician engage with the family".

The specific functions which define this EPA include (Trice, Kuo, & Burke, 2013): "1) Identifying and managing common behavioral and mental health issues, (e.g., low mood, inattention and impulsivity, disruptive behavior and aggression, anxiety, learning difficulty, substance use, and social-emotional issues in young children), including the initiation and monitoring of treatment effects for psychosocial interventions and when indicated for certain disorders (ADHD, depression, anxiety), pharmacotherapy, 2) Referring and co-managing patients with the appropriate specialist(s) when indicated to match the patient's needs, including pharmacotherapy (e.g., cognitive behavior therapist (CBT) for depression, specialist in trauma focused CBT for post-traumatic stress disorder, child psychiatrist for assistance in medication management), 3) Knowing the mental health resources available to patients in one's community and utilizing the appropriate resources for each patient's needs, 4) Knowing the role of each member of the interprofessional team and coordinating and monitoring care provided outside one's practice (e.g., mental health

professionals, community social services, support groups, early intervention and school personnel) to optimize patient care, and 5) Providing care that is sensitive to the developmental stage of the patient and the cultural context of the patient and family around issues of mental health".

2.4.3.10 Resuscitate, initiate stabilization of the patient and then triage to align care with severity of illness (entrustment decisions for this EPA may require stratification by two age groups: neonate and non-neonate)

The activity is described as "Managing patients with acute and severe illness is a core activity of a pediatrician".

The specific functions which define this EPA include (Calaman et al., 2013): "1) Recognizing the severely ill patient requiring resuscitation, 2) Patient care skills reflecting the ability to prioritize and act in rapid sequence, including an assessment, targeted history and physical and initiation of emergency treatment, 3) Resuscitation of a patient with acute decompensation and potential impending systemic failure requires initiation of medical therapy as well as prescribing or performing invasive procedures. These activities will vary by settings, resources and the expertise of the practitioner/team., 4) Demonstrating effective communication skills in managing a severely ill patient, 5) Embracing the importance of and engaging in reflection after resuscitation, 6) Knowing when to seek help, and 7) Transitioning care to another provider after initial stabilization".

2.4.3.11 Manage information from a variety of sources for both learning and application to patient care

The activity is described as "developing expertise in accessing and managing information".

The specific functions which define this EPA include (Trice, Calaman, & Barone, 2013): "1) Evaluating the quality of the information retrieved for informing patient care practice or one's own professional development (e.g. EHR, social networks, the internet, journal articles), 2) Accessing relevant information in a timely manner to facilitate patient care in the clinical setting, 3) Performing queries or searches of appropriate data resources to facilitate timely retrieval of relevant information, 4) Filtering data gathered by importance based on parameters such as reliability of the source, validity of the data and immediate usefulness for decision-making, 5) Interpreting and applying information in the context of clinical practice or one's own professional development (e.g. the context of an

individual patient or population of patients for whom one is caring, or the context of one's own professional formation), 6) Storing and managing information in a manner that optimizes retrieval and ensures protection of patient information, 7) Maintaining accountability for advancing knowledge and remaining up to date with information pertinent to one's practice, 8) Recognizing and managing the ambiguity often inherent in data itself or its interpretation, and 9) Developing and maintaining proficiency with technology to facilitate patient care".

2.4.3.12 Refer patients who require consultation

The activity is described as "Referring patients for consultation for issues outside the scope of the pediatrician's knowledge and skills is critical to performance in practice".

The specific functions which define this EPA include: "1) Making appropriate decisions to refer based on knowledge of referral guidelines, 2) Making the referral and ensuring its completion, and 3) Appropriately providing post-referral patient care, coordination, and follow-up".

2.4.3.13 Contribute to the fiscally sound, equitable and collaborative management of a healthcare workplace.

The activity is described as "The ability to function as a contributing member of a pediatric workplace, whether generalist or subspecialist, is a core activity for today's pediatrician, and particularly critical due to the complexities of the US health care system".

The specific functions which define this EPA include (Stafford et al., 2013): "1) Utilizing a working knowledge of current healthcare payment systems and billing requirements relevant to practice, 2) Engaging and working with the interprofessional practice team to improve processes to deliver efficient and fiscally sound healthcare to children, and 3) Demonstrating an awareness of financial practices that affect the workplace".

2.4.3.14 Apply public health principles and quality improvement methods to improve population health.

The activity is described as "All physicians engaged in the clinical practice of pediatrics should promote wellness, optimal health behaviors, and injury prevention within populations. Populations can be defined by practice setting, socio-demographic characteristics, geographic region, and/or medical conditions or risk factors".

The specific functions which define this EPA include (Stafford et al., 2013b): "1) Recognizing one's professional responsibility to populations, communities, and society at large, 2) Demonstrating ability to identify populations at risk, 3) Applying knowledge of epidemiology and statistical analysis to interpret data, including risk benefit and cost benefit analyses, 4) Collaborating with others in the development and/or implementation of projects aimed at improving health or healthcare systems, and 5) Utilizing resources (e.g.: EHR, patient registries, databases) to advance quality improvement and population health".

2.4.3.15 Lead an interprofessional health care team

The activity is described as to "collaborate as a member of an interprofessional team because practicing pediatricians must often serve in the role of leader of an interprofessional health care team caring for individuals or populations of patients".

The specific functions which define this EPA include (Stafford et al., 2013c): "1) Establishing a shared vision, goals, expectations, and outcome measures, 2) Engaging other team members in a way that utilizes their specific roles and capabilities, eliciting and valuing the perspective and contributions of others, 3) Demonstrating situation awareness by: Monitoring individual team member's performance to enable oversight and management of current and evolving situations, Balancing autonomy and supervision of team members by assigning/delegating unsupervised work to team members that aligns with their knowledge, skills, and attitudes (KSA) and supervising work of team members that is designed to expand their KSA, 4) Monitoring team performance and providing feedback, 5) Recognizing and managing the social cues, emotional responses as well as the personal and professional needs of team members, 6) Role modeling as the team leader, and 7) Teaching to the needs of the team members, including patients and families."

2.4.3.16 Facilitate handovers to another healthcare provider either within or across settings

The activity is described as the capacity to both effectively receiving and handing over patients from hospital ER-to-floor, floor-to-ICU, home-to-hospital, and hospital-to-rehabilitation facility).

The specific functions which define this EPA include (Stafford et al., 2013d): "1) Engaging in bidirectional communication of plans and conveying family and patient preferences, 2) Preparing for a handover by reviewing the medical record and updating the written tool (if applicable) to avoid errors of omission, 3) Communicating situation

awareness, illness severity, patient summary, action planning, and contingency planning to other health care providers, using a standardized template to improve reliability of the information transfer, 4) Summarizing the information heard, asking questions when needed to clarify information and to fill any perceived gaps, 5) Asking questions when needed for clarifying information and to fill any perceived gaps, 6) Restating key action items to ensure understanding, and 7) Providing feedback to the individual initiating the handover on any problems/errors that occurred, including inaccurate information transmission".

2.4.3.17 Demonstrate competence in performing the common procedures of the general pediatrician

The activity is described as "to perform the common procedures of the specialty such as bag and mask ventilation, bladder catheterization, administering IM and SC injections such as immunizations, I & D of an abscess, lumbar puncture, neonatal endotracheal intubation, placement of intravenous, reduction of simple dislocations, repair of a simple laceration, simple removal of a foreign body, temporary splinting of a fracture, umbilical venous catheter placement. Depending on the clinical setting, individual expertise, and availability of resources, additional procedures such as circumcision or non-neonatal intubation may also be performed".

The specific functions which define this EPA include (Poynter et al., 2013): "1) Knowing and understanding the clinical indications for procedures, 2) Demonstrating the ability to perform the psychomotor skills necessary to safely and effectively perform the procedure, and 3) Engaging in post-procedure management".

The 17 EPAs above are for community and general pediatricians. They are taken from the official website of American Academy of Pediatrics.

The specialized Gastrointestinal EPAs (GI EPAs) were taken from the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN). https://www.naspghan.org/content/132/en/training/opportunities/entrustable-professional-activities.

They are five as follows (we will include the Chinese translation due to its critical nature in the ensuing research):

GI EPA1. Care of children and adolescents with Acute and Chronic Gastrointestinal Disorders

To manage children and adolescents with acute and chronic gastrointestinal disorders.

To recognize and diagnose children who may have gastrointestinal diseases in a variety of clinical presentations and apply evidence-based medicine to the care of patients. To manage these children and adolescents including the acute presentations, emergencies and the long-term management of complex chronical diseases. To provide health education to parents and children, including the causes, treatment and clinical course of diseases. To organize and coordinate care for children with GI diseases within the medical system and the community.

GI EPA2. Care of children and adolescents with Acute and Chronic Hepatology, Biliary, and Pancreatic Disorders

To treat children and adolescents with acute and chronic hepatobiliary disease as well as liver transplantation and pancreatic disorders. To recognize and diagnose children with suspected liver, biliary and pancreatic disorders in a variety of clinical presentations and apply evidence-based medicine to patients. To manage children and adolescents with liver, biliary, pancreatic disorders, and liver transplantation including the acute presentations and emergencies as well as long-term management of complex chronic diseases. Educating parents and children on liver, biliary and pancreatic diseases including cause, treatment, and clinical course. To organize and coordinate care for children with GI diseases within the medical system and the community.

GI EPA3. Diagnose and manage common outpatient gastro-intestinal disorders in children and adolescents

To diagnose and manage common gastrointestinal complaints (including vomiting, diarrhea, abdominal pain, constipation and failure to thrive), and diagnose and manage common liver/biliary/pancreatic outpatient complaints (elevated transaminases, neonatal cholestasis, etc). Be able to differentiate between organic disease and functional disorders. Must be familiar with signs and symptoms of organic diseases as well as the diagnosis and treatment of functional GI disorders. To educate patients, their families and care givers, and other health professionals about the disease process and management plan.

GI EPA4. Perform comprehensive nutritional assessments, provide counseling/ education, and manage nutritional support for a variety of conditions

Be able to perform comprehensive nutritional assessments and provide counseling for families and primary care providers for patients with a variety of conditions leading to nutritional deficiencies/imbalances (Milestones).

GI EPA5. Perform quality upper and lower endoscopic evaluation of the luminal gastrointestinal tract for screening, diagnosis, and intervention

Be familiar with the operation of endoscopy and be able to determine which patients are appropriate to undergo an endoscopic procedure. Be able to perform a quality examination safely, and integrate the clinical presentation with the endoscopic findings in order to plan further management.

As stated, the five EPAs above are released by North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) for pediatric digestion specialists. They are formulated by the leaders of NASPGHAN.

Conclusion

Based on China's pediatricians and the development features of medical reform and pediatric medical system in China, combined with post competency and EPAs theories outside China, we designed a training model for pediatric digestion specialists within Regional Medical Alliances (Figure 2-3).

This model, built on the combination of EPAs and PC theories, highlights the competency features of pediatric digestion specialists in top-grade general hospitals within Regional Medical Alliances, and shows there is a shortage of pediatric human resource in China. Pediatric digestion specialists need to finish their own practice while fulfilling some of general pediatricians' responsibilities. We must deepen the construction of specialized pediatrics and combine it with general pediatrics. Within Regional Medical Alliances, one pediatrician must accept the consultancy and transfer treatment from others in the region and fulfill the teaching task of the Department. The cultivation of all competencies should be guided by clinical needs and meanwhile the construction of abilities should also be conducted according to clinical needs in wards, outpatient department, emergency room and other medical working places. The pediatricians in general hospitals should have clinical thinking ability, communication skills, team work spirit, interdisciplinary cooperation ability, thinking transformation ability between preclinical medical and clinical medicine.

In order to become a qualified pediatrician in general hospital, what kinds of competencies a medical graduate should have? How to cultivate competencies? Based on a model of competence (Bartram & Roe, 2005), the competency model for pediatric digestive care specialists in general hospital is constructed in this study.

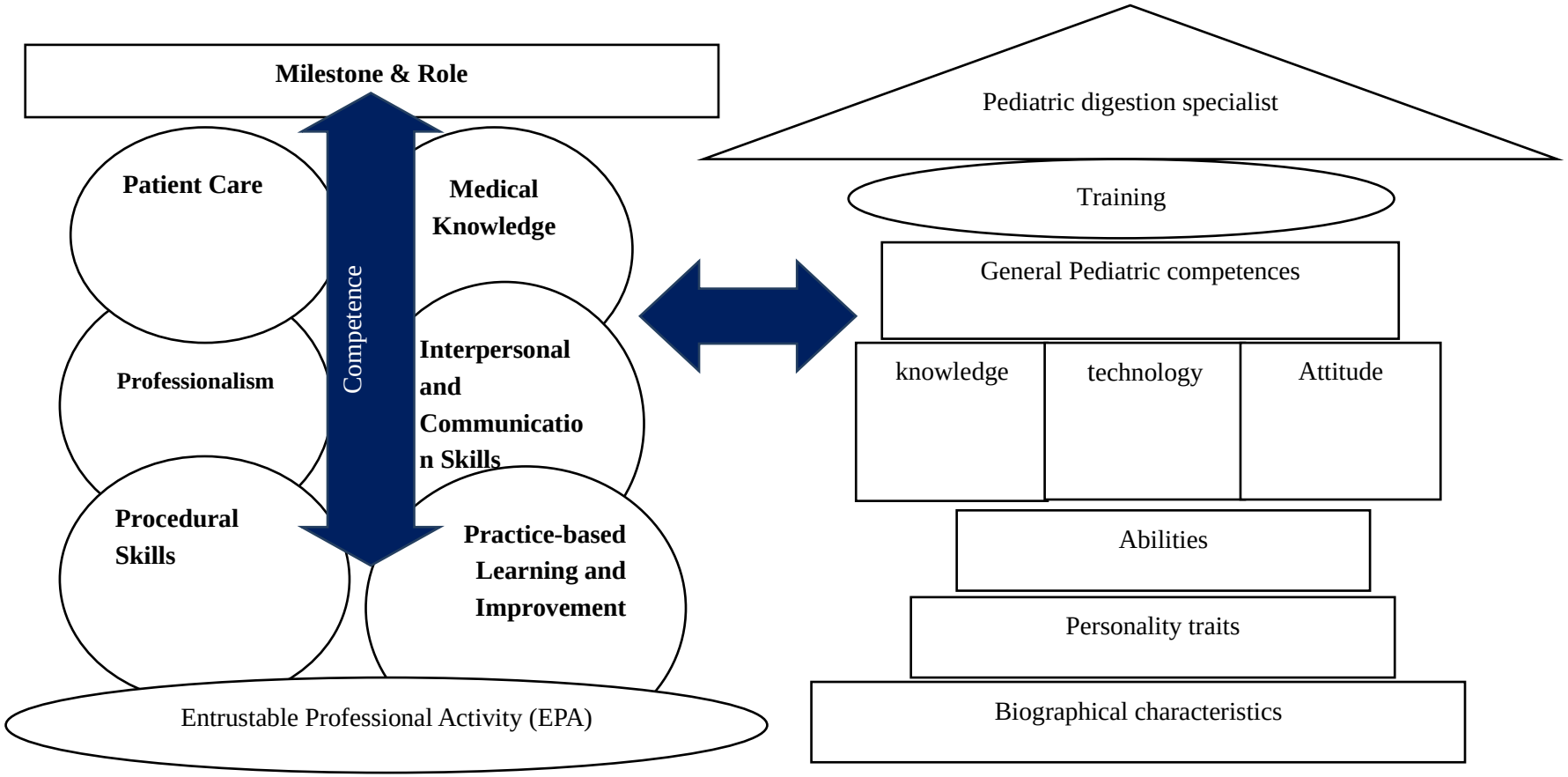

Figure 2-3 Proposed reference model for pediatric digestive specialists

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Chapter 3: Research Methods

This section will present all the methodological options made to clarify the research design. Because we opted for a mixed methods design, this section requires a separate description of the qualitative and the quantitative research. The qualitative research comprehended focus group and interviews conducted with two panel of experts in order to gain insight. The quantitative research started by collecting data about the applicability of international EPA pediatrics standard in the Chinese context as well as its rigorous description with a sample of 60 pediatricians attending a seminar. After revision, a questionnaire was designed with these EPAs, and also included competency domains and pediatrician deontology. This questionnaire was distributed within the professional networks via formal and informal channels which lead to a valid sample of 776 professionals linked to pediatrics.

3.1 Research design

As this research focuses on a systemic level issue, the multiplicity of variables that must be taken into consideration is suitably studied by means of a qualitative approach first, followed by a quantitative one. We opted for a mixed methods approach as it offers the possibility of joining the strengths of both qualitative and quantitative (Bryman, 2006). Qualitative is reputed to be suitable to describe complex phenomena, building on the meaning individuals bear while allowing for a situated understanding of phenomena, namely its context dependency. On the other hand, it may compromise external validity in the sense that findings may not extrapolate to general settings other than the context it came from and it is more likely that the personal biases of the researcher influence results (Johnson & Onwuegbuzie, 2004). Quantitative approach is more suitable to generalize research findings and test hypotheses with minimal interference of the researcher's expectations and biases while allowing for the quantitative predictions of phenomena controlling for confounding effects of other variables. It is however more probable that a priori hypotheses may not reflect the true latent representations of concepts or phenomena and thus it may fail to grasp the most important dimensions of a phenomenon in interdependence with its context (Johnson & Onwuegbuzie, 2004). It is also frequent that

papers report convenience sampling although dealing with findings as if random sampling was in place. That can promote an inflated sense of representativeness that is not truly observed.

Thus, mixed methods are particularly suitable to deal with complex domains of which health is a good example. This is probably a reason why research in health sciences has been keen on these methods (Creswell et al., 2011).

In designing this mixed methods study, we considered both explanatory and exploratory sequential designs (Creswell et al., 2003; Ivankova, Creswell, & Stick, 2006). As our major intention was exploratory in nature, i.e., we were motivated firstly to uncover freely generated interpretations of EPA in pediatrics in China, we deployed the exploratory sequential design from the perspective of an inductive approach. With the insight it provided from qualitative data analysis we are able to design a questionnaire that allows for a comprehensive data collection, thus integrating all variables into a single explanative model.

3.2 Qualitative research

To understand the macro-level variables of the study and the current situation of Chinese pediatricians and pediatrics as well as to explain the guidelines of China's medical reform, focus group and special person interviews are conducted with a semi structured interview technique. The focus group and special person interviews all follow the semi-guided method by adopting the same interview script which lays out the questions, but the questions can be changed into other ones that the interviewees are concerned about. All participants in the interview are stakeholders involved in the research topic. This study in total organized two focus group interviews and four expert interviews: all the participants in the first interview are pediatricians (specialists and ordinary pediatricians). The participants in the second interview are: nurses, medical technicians, scientific research personnel, management personnel, social experts and others.

Analysis of focus group discussion and interview with pediatricians: most of the focus group participants are front-line young pediatricians. During the whole interview and discussion, young pediatricians expressed their dissatisfaction of the working environment, saying that working in the front line was under much pressure. At the same time, they dared not complained to their relatives who do not work in the medical industry about their

grievance and there was no proper way to vent their grievances. They only shared their grievances with their colleagues.

In such circumstance, pressure will build up and intensify the tension between doctors and patients. The other problem was performance and compensation. As in general hospitals, pediatricians can compare themselves with other colleagues in adult departments, which will lead to a greater sense of disparity and thus lower their job satisfaction. Besides, they did not feel directly that the hospital attach importance to the pediatric medical staff. In addition, the hospital hardware (information software) was not convenient for daily medical activities and was not suitable for high-flow pediatric outpatient work.

During the process of teaching medical college students at ordinary times, the learning attitude expressed by clinical college students in the pediatric professional class has disappointed the pediatricians, from which we can conclude that the pediatricians are sensitive and fragile, especially in general hospitals. In terms of the age of children attending the clinic, everyone said that there were more newborns recently, which probably was because of the two-child policy and the local in-flowing area. However, they also expressed their concerns about the pediatric care in the community. Some communities now have no pediatricians at all and no general practitioners who can treat pediatric patients.

Meanwhile, they also heard that some communities had started training on general practitioners' pediatric skills, but on the whole pediatricians still were not very familiar with the community's treatment. At this stage, due to the lack of pediatric human resources, the number of pediatricians currently can hardly deal with situations beyond daily medical matters, such as assisting community pediatrics. When it comes to the future construction of pediatrics, everyone shared the same view. Medical pediatrics in communities basically treats common diseases and undertakes infant feeding. After the community pediatric system takes shape initially, the number of pediatric outpatient visits in tertiary general hospitals will drop, some complicated diseases will increase, and visits will be more orderly. It is also agreed that the community needs to strengthen the construction of pediatrics.

Analysis of interview with Wang Xin, Director of Medical Department of Ruijin Hospital North: the interviewee is the director in charge of the management of the medical service at the hospital. Throughout the interview, the development of pediatrics was viewed from the hospital perspective. During the interview, the interviewee pointed

out that the lack of human resources had resulted in the shortage of pediatrics, and the reasons for the shortage were various.

The reason could be the decrease in the number of patients caused by the change of the national population policy in the past 10 years, along with the strategic adjustment of hospitals. In recent years, due to the two-child policy and the loss of pediatric human resources in the past 10 years, the serious shortage of pediatric human resources had caused social repercussions, especially during the high incidence of children's diseases. Currently, hospitals attach more importance to pediatrics in terms of hospital construction, pediatric medical innovation and performance allocation. It's believed that to tackle the lack of human resources in pediatrics, the key is to strengthen the training of existing pediatricians and the re-training of pediatric skills of general practitioners.

The national government had also issued relevant documents in this regard. At the same time, it's believed to be necessary to further refine the pediatric specialties and consider the coordination of general practitioners, strengthen interaction with community medical disciplines and exchange with personnel relying on the national regional medical association.

Analysis of interview with Tao Yonglin, Head Nurse of Pediatric Department: the interviewee is the head nurse of pediatrics. Her daily work is to lead the pediatric nursing team to cooperate with pediatricians in their daily medical matters. She observed and participated in the daily activities of pediatricians from another perspective. In a nutshell, pediatricians gave clinical advice and nurses implement it and observe the medical effectiveness of patients and then register and provide feedback. During the interview, it was pointed out that the workload of pediatricians was heavy, the staff was in shortage and the work pressure was huge.

At the same time, it was indicated that medical workers had expected that they needed to balance work and family. In the process, however, frustration and negative emotions accompanied by the parents' incomprehension occurred to the pediatricians. Meanwhile, she said that the hospital leaders often communicated with her in terms of optimizing the outpatient procedures and so on, which left room for innovation and change at work and relieved the pressure of patient visits by making appointments at different time. The interviewee's evaluation of community pediatric construction was that the community pediatric treatment capacity was poor and required long-term training. It was hoped that the government would continue to strengthen support for pediatric medical personnel in the

future.

Analysis of interview with Pediatrician Yu Yi: the interviewee Yu Yi is a pediatrician in a typical Chinese general hospital and a grassroots practitioner of medical reform in China. It was obvious that the first reaction of Yu Yi at the beginning of the interview was that the workload of Chinese pediatricians was huge, not proportional to or even inversely proportional to their income, because they were inclined to compare the income of other colleagues in adult departments with theirs, and the psychological impact could be very huge, especially for pediatricians in general hospitals. Pediatricians bore great psychological pressure in daily work.

For one thing, doctor-patient relationship was tense. For another, it was difficult for them to balance work and family. At the same time, it was mentioned that according to the hospital's current performance plan, pediatrics contributed less to the hospital's economic development, so the overall income of pediatrics would be lower, which would increase the pressure of pediatricians from their families.

Meanwhile, as pediatric personnel were allocated according to workload, the human resources of pediatrics were quite scarce. At the same time, it was thought that the hospital was relatively narrow-minded in terms of rendering doctors the freedom to innovate, which was a matter for the management to reform, indicating that doctors were not involved in hospital management. As for expectations for the future of pediatrics, it was hoped that the capacity of primary pediatrics could be strengthened and the primary pediatric system could be improved, which would thus reduce the workload if every department could focus on fulfilling their own responsibility. Such expectation still reflected the lack of human resources, which led to the unsound pediatric system.

Analysis of interview with Professor Xu Chundi: the interviewee was Professor Xu, who is both a clinical doctor of pediatrics and a leader in pediatrics as well as a director and professor of pediatrics teaching and research section in the tertiary teaching hospital (clinical medical school), with high prestige and academic status in the industry, as well as rich clinical experience and teaching experience. Her generation witnessed and experienced the whole change of pediatrics since China's reform and opening up. Professor Xu explained the development of pediatrics through policy, economy, culture and technology changes.

In terms of policy, China abolished the department of pediatrics in the university due to the decrease in birth rate in the first 20 years and various related reasons. Because of the

reform and opening up, some pediatricians had chosen to change jobs and the whole industry underwent about 20 years of staff loss, resulting in the absence of the whole service system for pediatrics in China. In recent years, China had gained the advantage of demographic dividend in economy. At the same time the society was aging. The Chinese government started to uphold the two-child policy (each family can have two children) to enrich the population structure. A new upsurge of birth of the population, coupled with the lack of a pediatric service system, had led to disorder in the treatment of pediatric patients and overcrowding in pediatric institutions in every hospital. In daily medical work, especially in the tertiary teaching hospitals, doctors were encouraged to carry out scientific innovation and research in terms of policies. Yet due to the busy work at ordinary times, these research work could only be carried out after work, thus increasing the burden on pediatricians.

In terms of economic reasons, due to the low income of Chinese pediatricians in general, the original group of pediatricians gave up the profession of pediatricians and changed to work at foreign-funded medical companies. At that time, in the early days of China's reform and opening up, the salaries of foreign-funded enterprises were very high. At that time, many backbone pediatricians resigned. Until now, job transfer still could be found among pediatricians.

In terms of cultural environment, due to the poor medical and cultural environment in China, the doctor-patient relationship was highly tense, and it was difficult for doctors and patients to understand each other. Besides, China had implemented the one-child policy for a long period of time (only one child can be raised in each family), and thus parents highly cared for their children, leading to harsh demands on pediatricians in children's medical treatment. Aggressive behaviors such as rebuking at the sight of children crying would have a great impact on pediatrician's working environment and physical and mental health, creating invisible work pressure. At the same time, pediatricians in tertiary hospitals required doctors to carry out research work, and thus the working hours of pediatricians far exceeded the normal working hours. Certainly, they would not get paid for working overtime, directly posing a challenge for the pediatricians to balance work and family, although they had known from the moment when they chose this profession that they would have to sacrifice something.

In terms of medical technology in pediatrics, Professor Xu said that since the reform and opening up, the living standard of Chinese citizens had generally improved, the

diseases of children in China and the means to detect diseases were also gradually in line with international counterparts, and the scientific research for pediatricians' daily needs had also shifted from basic research to clinical research. Hospitals started to train the original pediatricians, and universities also launched a new pediatric faculty and started to recruit students, and at the same time began to train general practitioners' pediatric skills. Under these circumstances, pediatrics has further specialized.

Analysis of all interviewees and focus groups: due to various reasons, there is a lack of systematization in pediatrics currently. China is rebuilding the system step by step, which certainly will take some time. Many problems will arise in the process. Some problems have been found in this interview concerning the current stage. All the pediatricians said that they were under great pressure and the doctor-patient relationship was tense.

PEST - SWOT Analysis: in terms of policy, the government has started to reform the pediatric medical service, raise the income of pediatricians and improve the environment of pediatricians. As all the work has just begun, it has not yet been fully implemented, so pediatricians have not yet enjoyed the benefit. As for the platform that hospitals provide for young pediatricians to innovate, in the focus group interview, pediatricians said that the hospital would not provide room for doctors to innovate freely. The director of the medical department said that the hospital did provide room for every doctor to innovate. Professor Xu expressed that the hospital itself provided a platform for innovation, and two other young senior pediatricians also said that there was room for innovation, but there were limits. Different opinions might result from different understanding of innovation from different positions. Junior pediatricians just hoped that the existing workflow could be changed to make routine work easier.

There is little good communication and consensus between hospitals, departments and individuals. National policies have just been issued and have not yet been fully implemented. Economically: generally, the income of pediatricians in general hospitals is low, which easily dampens the enthusiasm of pediatric medical staff, especially in peak outpatient period, increasing the dissatisfaction of medical staff and leading to work fatigue. Economically: at present, hospitals have begun to reform the performance of pediatricians. However, due to the lack of the pediatric service system, the huge workload is not equal to the current salary. At each peak of children's visits, the society has realized the scarcity of pediatrician resources. Every peak of children's visits, there will be relevant news covering

the lack of pediatric resources to leading to the absence of pediatric services in many hospitals, and the social attention to pediatricians has increased.

In terms of management technology: in all interviews, everyone said that as for the medical visit disorder caused by the scarcity of pediatricians, first of all, the establishment of a preliminary service system for pediatrics depended on the construction of medical association and the training of community general practitioners in pediatrics skills, which could reduce the workload of diagnosing common diseases in pediatrics in tertiary hospitals and thus the pediatric patients who need emergency treatment in tertiary hospitals could be treated effectively. That is to say, division of labor and cooperation and a certain degree of diversion will occur after the establishment of the overall system, making the disordered medical situation orderly.

SWOT analysis of pediatrics of tertiary general hospital as an example. Strengths: Due to the national policy adjustment, the population policy has been revised and the two-child policy has been launched. At the same time, the public maternal and child service facilities, especially the medical environment, have been comprehensively upgraded. Relevant government departments are also further discussing the training of pediatricians. Weaknesses: the main problem with the lack of a pediatric service system is the long-term shortage of human resources, and the number of pediatricians cannot meet the needs of the peak birth rate.

After China begins to restore the pediatric major in the university, the training period will be very long. It can be said that it will take at least about 10 years before a new batch of pediatricians can start to work in hospitals and join the current pediatrician team, that is, the number of pediatricians will not increase too much within a certain period, while the existing pediatricians have to tackle problems arise along with the peak of the population's birth, which will be a great challenge the working environment, workload and mental and physical health of pediatricians. If the working environment deteriorates further, it may lead to the loss of pediatricians and further collapse of the pediatric service talent system, leading to irreparable loss.

For the Chinese pediatrics, this period will be a great challenge. Pediatrics in general hospitals is the backbone of China's pediatric service system, which faces a lot of pressure and contradictions. Opportunities: although the lack of human resources in pediatrics for a long time has led to the lack of a service system, it is now the greatest opportunity for its development. China's central government has adjusted its population strategy to meet the

needs of national development and launched the two-child policy. At the same time, the government started the comprehensive medical reform in China in 2009.

As the development of pediatric care serves the national development strategy and is also in line with the deepening medical reform in China. Both the development of pediatrics and the pediatrician group are directly or indirectly concerned. In this circumstance, the recommendations given by the pediatricians are easy for governments to accept. Threats: currently, the biggest threat to the development of pediatrics is whether it can relieve the existing work pressure of pediatricians to ensure that there will be no large-scale of pediatrician loss. At the same time, the pediatric training system needs to be improved and further refined to connect general practice and develop a scientific division of labor and cooperation. All service agencies in pediatrics need to make policy adjustments both internally and externally.

This also echoes with the heavy workload, high pressure and low job satisfaction of pediatricians put forward in the literature research Gao and Tao (2015). The reasons for the lack of pediatric medical services and pediatric human resources are basically like those of the literature research. At the same time, the construction mode of medical association is also a method to help improve pediatric medical services.

3.3 Quantitative research

Based on the literature research and qualitative research, it is found that the EPAs Theory can be well linked up with the post competency theory. According to the approach of literature research, it takes a long time to conduct practice on and prove the development of EPAs of an item, and that was generated after repeated verifications by experts in seminars. This time, we want to reversely use the EPAs items that have been widely certified and used to explain, verify and amend a model through the development of practice activities (sourced from EPAs) among Chinese pediatricians.

3.3.1 Examining whether the EPAs are consistent with Chinese pediatricians

As this research is based on pediatric specialists on digestion, the 17 items (Community Pediatricians) of EPAs Theory formulated by the American Academy of Pediatrics (AAP) and the 5 items (Practice Activities for Pediatric Digestion Specialty) drafted by the managerial level of North American Society for Pediatric Gastroenterology,

Hepatology and Nutrition (NASPGHAN) and AAP were chosen as the subject of the questionnaire for investigation and survey. The top priority is to examine where the EPAs formulated by AAP and NASPGHAN are consistent with the daily medical practice activities of Chinese pediatricians and pediatric specialists on digestion.

Based on previous information and direct experience in the field, the researcher promoted a seminar in the form of enlarged session during an executive meeting of Shanghai Central Pediatrician Medical Treatment Partnerships with over 60 participants, including authoritative experts at home and abroad, daily clinical teachers who are experienced in both teaching and clinical work and who hold intermediate professional titles or above. The author presided over the seminar and briefed on the research background and problems that need to be solved, giving a general introduction to the research progress of EPAs Theory and relevant theories. At the meeting, 22 EPAs (covering pediatric general practitioners plus pediatric specialists on digestion) were given out to the experts at the seminar to judge whether the items were in accord with daily practice activities (whether the degree of correlation is high or low).

In order to enable these experts to better understand the meaning of practice activities, the full name and specific functions of each practice activity would be listed. For the convenience of follow-up classification, the materials distributed to experts who hold a title of a senior professional post were color-printed while the materials to physicians holding a medium-grade or below professional title were printed in white and black. Each item of the materials issued at the seminar was attached with specific activity note and each topic was followed by three choices: 1. Consistent; 2. Inconsistent; and 3. Other explanation. This helped experts correctly understand all EPAs. After the seminar, supplement and correction would be made based on experts' feedback.

The opinions of experts holding a title of a senior professional post were mainly taken into consideration. Among the reviewed materials, a research on the suggestions of doctors holding a title of a senior professional post was conducted. After summarizing these materials, it was found that all 22 EPAs (pediatric general practitioners plus pediatric specialists on digestion), through expert review, were basically in line with the practice activities of Chinese pediatricians.

Only several experts added supplementary explanation on some problems in "Other explanation". The ninth EPA (practice activity of pediatricians) is an example.

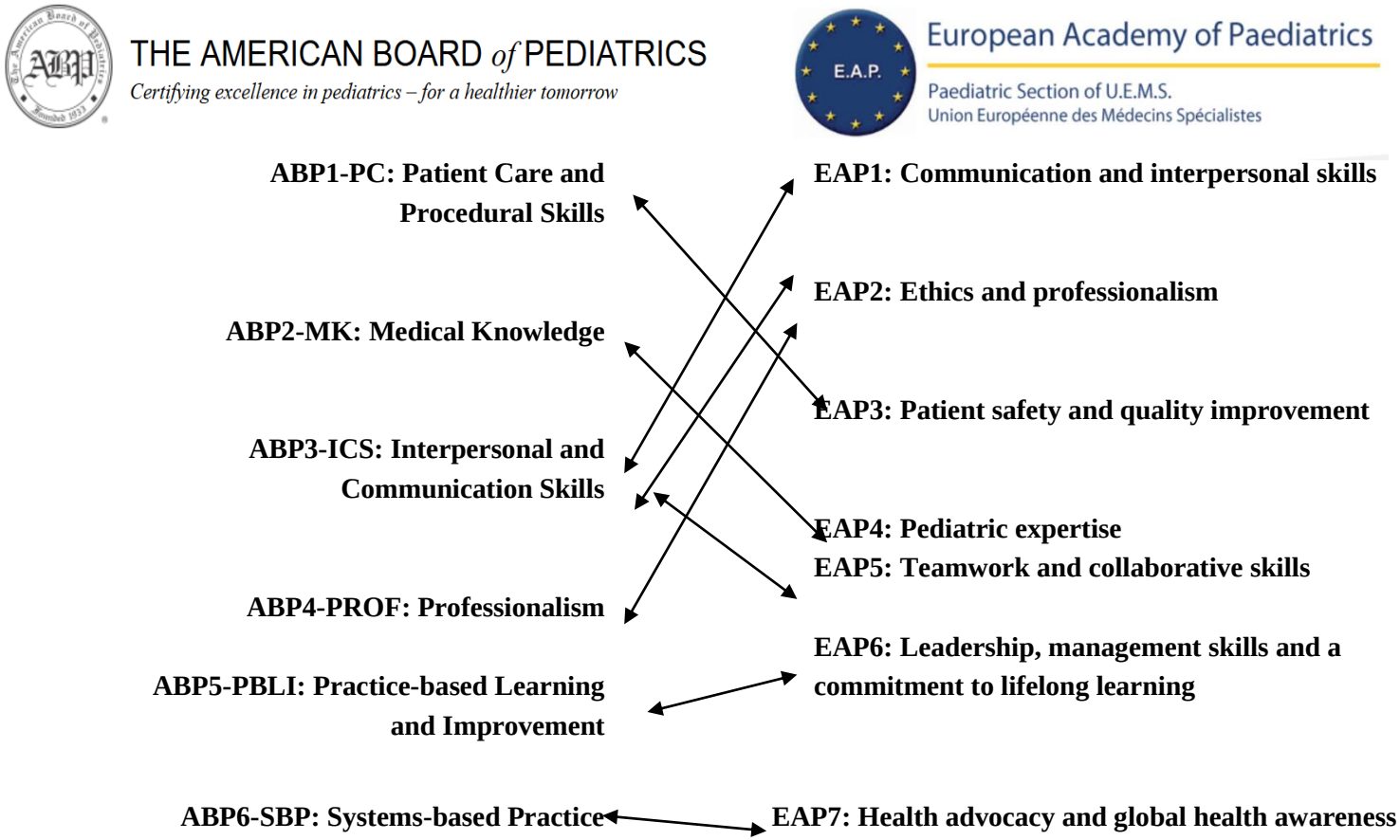


Figure 3-1 Match ABP-EAP

Source: Courseware in Medical Treatment Partnerships Meeting (Ramalho, 2018)

The explanation is: the full name of business activity is to evaluate and treat patients with common behavioral or psychological health problems; the specific functions of the business activity are to identify and cure common behavioral and psychological health problems (such as depression, distraction and impulsion, destructive and aggressive behaviors, anxiety, learning difficulties, and drug abuse), including launching social-psychic intervention treatment, monitoring treatment effect and diagnosing some diseases (Attention Deficit Hyperactivity Disorder, depression and anxiety neurosis) as well as conducting proper drug treatment.

Some experts added that, to complete this activity, it needed to discuss and diagnose together with psychiatrists or cooperate with the psychology department.

Another example is the 19th EPA (practice activity of pediatric specialists on digestion). The full name of the job activity is to nurse the infants, children and teenagers who suffer from acute and chronic liver diseases, cholangio / cholestatic disease, pancreatic disease and who need to conduct a liver transplantation. The specific functions of the activity include: nursing the children and teenagers who suffer from acute and chronic liver and gall diseases, pancreatic disease and who need to conduct a liver transplantation, and becoming familiar with present disease process and symptom knowledge. Some experts noted that this activity should not cover liver transplantation. In fact, they were mostly alike except for slight differences. On the whole, these 22 EPAs were consistent with the professional behaviors of Chinese pediatricians.

3.3.2 Questionnaire design

The questionnaire is composed of four parts:

- Relevant demographic information, educational background, occupational information, types of hospitals, and professional characteristics.
- Likert scale was used to generally describe specific practice activities of 22 EPAs (pediatricians plus pediatric specialists on digestion).
- Judgement research on the professional ethics that Chinese pediatricians should possess.
- Judgement research on the field of competency of general pediatricians and pediatric specialists on digestion.

In terms of the selection of post competency indicators, the post competency

indicators of pediatricians in the US and Europe are basically similar (Figure 3-1).

The integration of the two sets of indicator systems generates the following eight competency indicators:

- **Patient care** (gather information, make diagnosis and treatment decision, counseling patients, family)
- **Medical knowledge for practice** (knowing, critically evaluating and using current medical information and scientific evidence for patient care)
- **Practice-based learning and improvement** (Investigating and evaluating patient care practices; appraising and assimilating scientific evidence and using that evidence to improve patient management; demonstrating a willingness to learn from errors)
- **Professionalism** (Demonstrating a commitment to carrying out professional responsibilities, adhering to ethical principles and being sensitive to diversity)
- **Interpersonal and communication skills** (Demonstrating interpersonal and communication skills that result in effective exchange of information and collaboration with patients, their families and professional associates)
- **Systems-based practice** (Practicing quality, cost-effective health care and advocating for patients within the health care system).
- **Interprofessional collaboration** (Effectively interacting with other healthcare professionals into multidisciplinary teams)
- **Personal and professional development** (know own-limits in dealing with emotions, stress and balancing personal and professional life, adjusting to change, and behaving in a way that makes others trust and feel comfortable)

The above eight indicators were used in the post competency module in the questionnaire.

The questionnaire was named Building of Competency Training Model for Pediatricians in Grade 3 Comprehensive Hospitals based on EPAs Theories in Medical Treatment Partnerships—A Case of Pediatric Specialists on Digestion.

3.3.3 Measures

As stated, the first section of the questionnaire asked for sociodemographic and professional data. The section was designed to preserve participant anonymity.

Personal information pertained Gender (dummy coded as 1=Male and 2=Female), education (1=Junior college, 2=Regular college, 3=Master, and 4=Doctor), age (dummy coded for intervals 1="Below 30 years old", 2="30 to <40 years", 3="40 to <55 years", 4="55 or more years").

As regards professional status, current position was measured with a single choice question amongst the following options: Pediatrician (General), Pediatrician (subspecialist), Community General Practitioner, Pediatric Nursing, Doctor (other professional), and Manager. Other professional variables included: being or not a pediatric digestive specialist (1=Yes, 2=No), the job title (1="Senior professional title", 2="Medium-grade professional title", 3="Junior professional title"), performing managerial functions (1="Director", 2="Vice director", 3="Director assistant", 4="Head nurse", and "5=None"), professional tenure in pediatrics (1="Less than 5 years", 2="5 to 10 years", 3="10 to 15 years", "over 15 years").

Organizational data asked for the nature of the hospital where the participant works (1="Pediatric specialized hospital", 2="General hospital pediatrics", or 3="Community hospital"), and the grade of the hospital (1="Three-level", 2="Two-level", and 3="One-level"), if the hospital is a member of the medical treatment alliance (dummy coded as 1="Yes", 2="No" and 3="I don't know"). A final question was introduced concerning the extent the participant thinks how much he/she knows about pediatric digestive specialists (1="Do not know", 2="Very little", 3="Just a little", 4="General", and 5="Very well").

Besides the sociodemographic and professional data the questionnaire included three variables: EPAs for general pediatrics, EPAs for specialized gastroenterological pediatrics, domains of competency for general pediatrics and for specialized gastroenterological pediatrics, and pediatrics ethics.

EPAs for general pediatrics were measured by means of 17 EPAs as found from the qualitative and the first quantitative phase. Each EPA was named with a full description sentence (e.g. "Using the screening tools and conducting related interpretation - such as: to evaluate the growth and development, hearing screening and health - to attract patients and their families to participate in codetermination, making patients' families understand the status in order to making health plan."). Descriptions were lengthy as they pertain activities and not competencies. Participants were requested to answer on a 5 point Likert scale ranging from 1 (not important at all) to 5 (extremely important) in which extend they agree

the described EPA should be performed frequently by pediatric gastroenterologists in tertiary general hospitals.

EPAs for gastroenterological pediatricians were measure with five EPAs as found from the qualitative and the first quantitative phase. Applying the same principles of general EPAs, specialized EPAs were also fully described (e.g. “Perform routine diagnostic and treatment operations such as: mask ventilation, bladder catheterization, execute muscles (IM) and subcutaneous (SC) injection (such as immunization), endodermal (I & D) abscess, lumbar puncture, trachea cannula of the newborn, intravenous placement, repair simple laceration, simply remove foreign matter, temporary splint fractures, the placement of umbilical vein catheter.”). Participants were also requested to answer on a 5-point Likert scale ranging from 1 (not important at all) to 5 (extremely important) in which extend they agree the described specialized EPA should be performed frequently by pediatric gastroenterologists in tertiary general hospitals.

Pediatrics ethics was measured with a 6-item scale derived from code of conduct. Items used are: 1) safeguard the interests of children, 2) safeguard the interests of the patient’s family, 3) The ability to deal with inconsistencies between the interests of children and families, 4) The informed consent of the patient within the scope of adolescent medicine, 5) Coordinate the treatment of the malformation of the newborn and the parents demand inconsistent situation, and 6) Coordinate the conflict of interest between mother and child. These items reflect also international discussion about main dilemmas pediatricians face in daily work

3.3.4 Questionnaire distribution

The questionnaire was distributed with the help of Wenjuanxing (powered by www.wjx.cn), and a survey was made by using “e-questionnaire research based on WeChat and Wenjuanxing”. Wang (2018) noted that Wenjuanxing is a network platform integrating questionnaire, online test, online vote, registration, evaluation and test, user-friendly online questionnaire design, data collection, self-defined report and research results analysis.

Wang (2018) also expressed that WeChat is a free-of-charge application launched by Tencent on January 21, 2011 that provides intelligent terminals with instant messaging services. Users can use WeChat, through the network, to quickly send voice messages, videos, photos, texts and documents free of charge across different communication operators and operating system platforms. At the same time, they can also use the materials

that are shared on the streaming media. By February 2018, the number of monthly active WeChat users around the globe had exceeded one billion for the first time. According to the *Statistic Report on Internet Development in China*, WeChat has become the application with the fastest growth rate in the world.

The advantages and disadvantages of using "e-questionnaire research based on WeChat and Wenjuanxing" to conduct research are shown as follows:

On the one hand it is convenient, promote completion, controls for repeated answer, and preserves anonymity:

(1) Convenient: WeChat nowadays enjoys a large group of users, and many people in China use it as a contact tool in their daily work.

(2) High degree of involvement and completion: respondents can fill in a questionnaire off duty in a short time.

(3) On Wenjuanxing, users can set up a standard that one IP can only fill in one questionnaire, avoiding the interference of repeated filling in the questionnaire result.

(4) Relatively authentic conclusion and more written opinions collected: in face-to-face questionnaire distribution, which is in haste with the presence of others, respondents would fill in the questionnaire casually and hastily.

(5) Respondents will complete filling in the whole questionnaire before handing it in, ensuring the completeness of the questionnaire research.

However, is does has its disadvantages such as:

(1) As WeChat-version Wenjuanxing fails to impose restriction on respondents, WeChat users in non-research groups can also fill in the questionnaire if it is forwarded to them.

(2) Remote filling in of a questionnaire may also facilitate speedy and careless filling as well as monotonous answer which renders variables unsuited for analysis.

But these disadvantages will not have a great influence on the whole research because the target professionals are very specific, and the software allows to verify the filling time, and invariance cases can be removed in data processing phase.

Technically, the software is user friendly with a questionnaire design that starts by getting access to the official website of Wenjuanxing to register an account and log in, or log in by scanning the WeChat QR code. The questionnaire is created by clicking "Create

test paper/questionnaire/vote", and then name the title. According to researchers' planned research contents, several question types, including gap filling, single choice (only one option is correct), multiple choices (there may be two or more options are correct), and matrix questions, are available. Users can also import in bulk designed Word-version questionnaires. According to the questionnaire types and expected purposes, relevant settings can be made to the questionnaire.

After editing the questionnaires, users will receive a link and a QR code of the questionnaires by clicking "Distribute questionnaires". Respondents can fill in the questionnaires by clicking "Share the link" or scanning WeChat QR code. Click "Submit" after filling in the questionnaires.

The software also has a built-in function that allows for the previous analysis of data and download database ("Analyze & download") after which researchers can check the descriptive results of the questionnaires. It additionally allows for the export the report to a Word or Excel document for follow-up statistical analysis.

3.3.5 Survey instructions

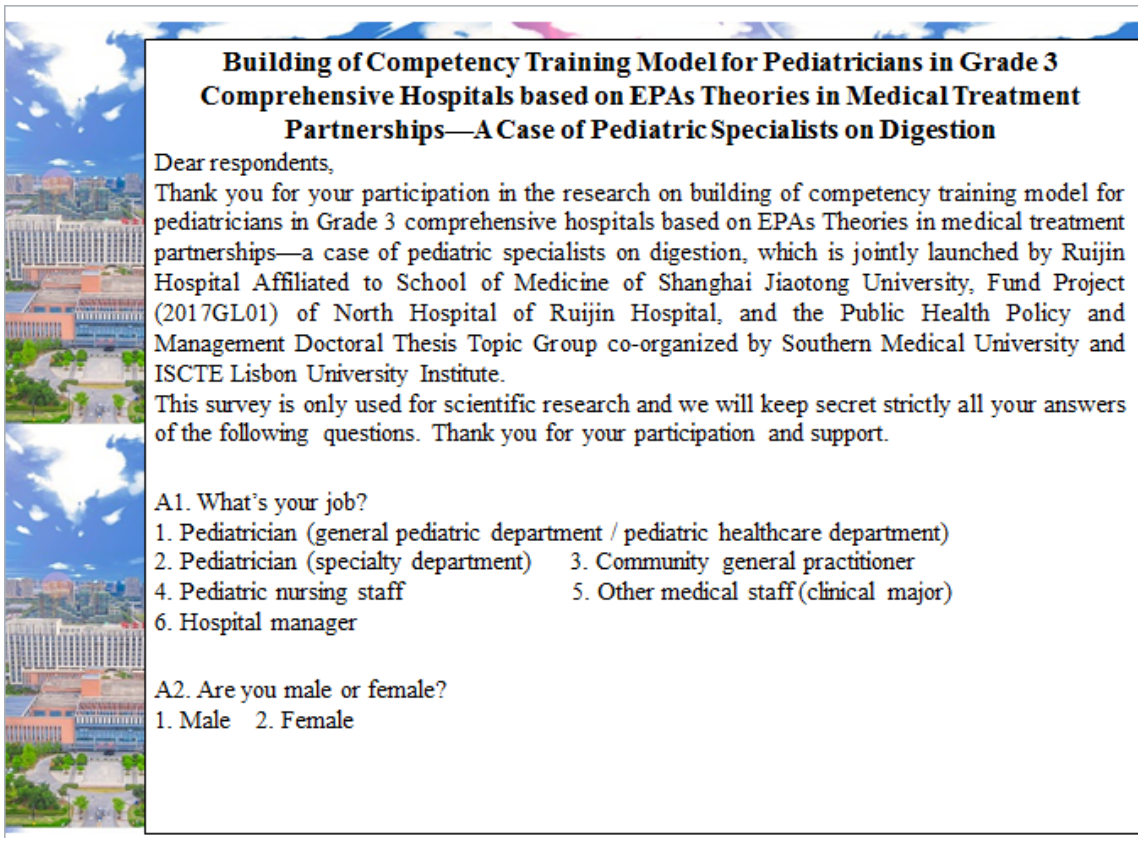
As stated, after design of the questionnaire a link or QR code were produced and spread across WeChat network. The specific link was https://www.wjx.cn/hj/cwnmfwkjl ucfr uudlqyhdq.aspx and the instructions to fill in are shown below in the original graphical and content form (see Figure 3-2, Figure 3-3, and Figure 3-4).

3.3.6 Coverage of questionnaire distribution

Considering the professionalism of the contents in the questionnaires, the eligible respondents should be pediatricians, pediatric specialists on digestion and other groups closely related to pediatrics. Therefore, the questionnaire was criteriously distributed to the groups in this industry by using special channels. In order to ensure the quality of samples collected, the questionnaires were distributed to members of China's pediatric academic organizations and participants in the academic meetings.

These academic organizations include: National Committee of Pediatric Society of Chinese Medical Association (CMA), Digestology Committee of CMA Chinese Pediatric Society, Pediatric Committee of CMA Chinese Society of Gastroenterology, Pediatric Committee of CMA Chinese Society of Digestive Endoscopology, Pediatric Digestology Minimally Invasive Committee of Maternal and Child Minimally Invasive Committee of

Maternal and Child Health Care of China Association, and Digestology Committee of Pediatric Society of Shanghai Medical Association (SMA). Why should we conduct the research through these professional organizations?



Building of Competency Training Model for Pediatricians in Grade 3 Comprehensive Hospitals based on EPAs Theories in Medical Treatment Partnerships—A Case of Pediatric Specialists on Digestion

Dear respondents,

Thank you for your participation in the research on building of competency training model for pediatricians in Grade 3 comprehensive hospitals based on EPAs Theories in medical treatment partnerships—a case of pediatric specialists on digestion, which is jointly launched by Ruijin Hospital Affiliated to School of Medicine of Shanghai Jiaotong University, Fund Project (2017GL01) of North Hospital of Ruijin Hospital, and the Public Health Policy and Management Doctoral Thesis Topic Group co-organized by Southern Medical University and ISCTE Lisbon University Institute.

This survey is only used for scientific research and we will keep secret strictly all your answers of the following questions. Thank you for your participation and support.

A1. What's your job?

1. Pediatrician (general pediatric department / pediatric healthcare department)
2. Pediatrician (specialty department) 3. Community general practitioner
4. Pediatric nursing staff 5. Other medical staff (clinical major)
6. Hospital manager

A2. Are you male or female?

1. Male 2. Female

Figure 3-2 Web interface

Figure 3-3 WeChat interface - WeChat QR code

First of all, these academies and societies are platforms and organizations gathering elites in this industry. According to Zhou, Jia, and Liu (2007), the CMA is an academic, non-profit social organization established and registered in accordance with laws by Chinese medical and scientific workers voluntarily in 1915.

Figure 3-4 WeChat interface on mobile phone

It is an important social force in the development of medical science and technology as well as healthcare undertakings. The CMA now has 677,000 members, 88 specialty societies, and 462 professional groups and has joined in 42 international and regional medical organizations, and maintains close cooperation with 47 local medical associations all around China. The CMA has published 183 printed and electronic medical journals and hosts and organizes nearly 200 international and domestic medical academic meetings each year,) the CMA Chinese Pediatric Society is the sovereign pediatric academic organization in China, and the Pediatric Committee of CMA Chinese Society of Gastroenterology and Pediatric Society of Chinese Medical Doctor Association are the administrative institutions in the industry of Chinese pediatricians.

Ning and Wu (2009) noted that the SMA is an academic group gathering medical and scientific workers in Shanghai as well as a bridge and bond linking the Communist Party of China and the central government with medical and scientific workers. Having

constructed a basic framework that fits modern scientific groups, the SMA has made remarkable achievements in academic communication, scientific popularization, talent training, science and technology awards, expert services, team building, undertaking of government function transferring, and carrying out social scientific services and other aspects, making positive contributions to promoting social harmony and the development of healthcare undertakings. Pediatric digestology societies are professional branches. Their members enjoy high academic reputation in the industry, and at the same time, they hold administrative post and teaching post in respective institutions. They have rich experience and are sensitive and forward-looking in academic focus and development in the industry.

Participants in academic meetings include: pediatric digestive doctors and pediatricians in related professions who attended the Academic Annual Meeting of Shanghai Central Pediatrician Medical Treatment Partnerships (Forum for Pediatric Digestive Disease), Annual Meeting of CMA Chinese Pediatric Society, Annual Meeting of CMA Chinese Society of Gastroenterology (Forum for Pediatrics), and Annual Meeting of CMA Chinese Society of Digestive Endoscopy (Forum for Pediatrics). This greatly guarantees the quantity, quality and accuracy of the respondents.

Lastly, having guaranteed validity and reliability we will show findings from hypotheses testing relating firstly: a) if the EPAs levels of complexity operate in parallel or in a hierarchical way, b) which EPAs levels predict each specialized EPA, c) which individual EPAs predict each specialized EPA, d) which competency domains (as designed from international standards) apply to China context, and e) which competency domains explain EPAs, so to uncover the competencies that leverage EPA. In this way we intend to understand if the competency model applies to pediatrics in China (both general and specialized GI) with a focus on EPAs. The final model will offer a structural view of pediatrics competency model in China.

3.4 Data description of all samples

3.4.1 Analysis of questionnaire-filling time

Questionnaire filling time is a sensitive matter as the design should allow for a reasonable time in order to prevent dropout. The description of EPAs is considerably complex in the sense that the title is insufficient *per se* but a long description would be counterproductive as participants will feel fatigue and time pressure to answer. Therefore,

we settle for a version that allows a questionnaire estimated filling between 6 to 8 minutes. Despite this caveat the medical professional is a very pressing one and we expect some participants to trust on their ability to overall understand the EPAs description without much reading. This, however, adds to measurement error and we must account for it.

Consequently, by analyzing the registered filling time, we detected cases where respondents most unlikely took enough time to read carefully. Such questionnaires may not offer the same data quality than others. After some pretesting, we set the lower limit at 240 seconds (4 minutes) and found out that many cases fell in this situation. By computing the standard deviation of the key variables under study (EPAs) and correlating it with the respective filling time we did find a positive significant association thus suggesting our perception about rushing into answers was founded.

Therefore, we excluded these cases as well as those where variance was null, effectively cutting down the sample to 776.

3.4.2 Sample description

The sample comprises 776 valid answers originated from almost all the Chinese provinces with about two thirds of the participants being from Hebei, Shanghai, Hubei, Jiangsu, Hainan, Hainan, Liaoning, and Guangdong (Table 3-1 and Figure 3-5).

As expected, the sample comprises mostly general and specialist pediatricians but also other clinical professionals linked to pediatrics (Appendix Figure Ap. 1-1).

The vast majority of the participants are female (75.3%) with a bachelor’s or master degree (87%), most scarcely with a doctorate (5.4%) as shown in Appendix Figure Ap. 1-2 and Appendix Figure Ap. 1-3.

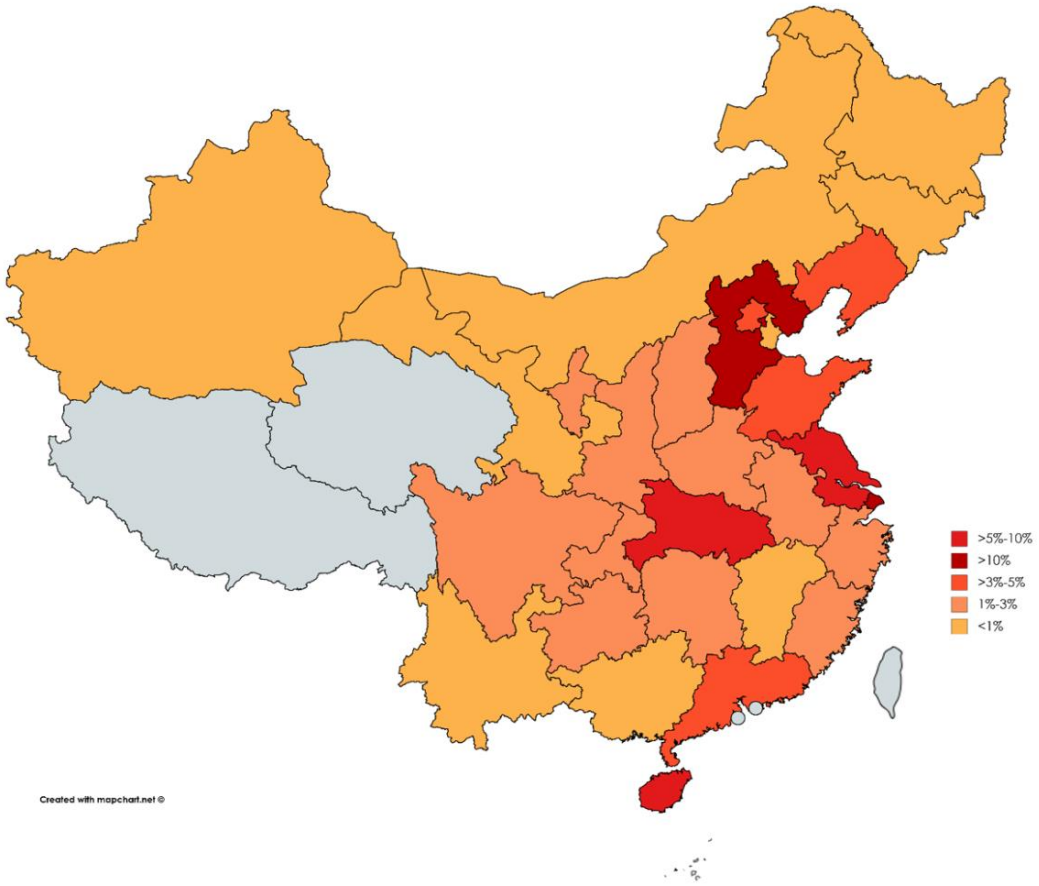


Figure 3-5 Sample geographic map

Table 3-1 Sample geographic origin

Province		*N*	*%*	*Province*		*N*	*%*
安徽	Anhui	17	2.2%	江苏	Jiangsu	43	5.5%
北京	Beijing	24	3.1%	江西	Jiangxi	7	0.9%
重庆	Chongqing	21	2.7%	吉林	Jilin	6	0.8%
福建	Fujian	9	1.2%	辽宁	Liaoning	37	4.8%
广东	Guangdong	28	3.6%	宁夏	Ningxia	13	1.7%
广西	Guangxi	3	0.4%	国外	Overseas	11	1.4%
甘肃	Gansu	1	0.1%	陕西	Shan´xi	9	1.2%
贵州	Guizhou	9	1.2%	山东	Shandong	29	3.7%
海南	Hainan	39	5.0%	上海	Shanghai	148	19.1%
河北	Hebei	157	20.3%	山西	Shanxi	11	1.4%
黑龙江	Heilongjiang	4	0.5%	四川	Sichuan	17	2.2%
河南	Henan	10	1.3%	天津	Tianjin	2	0.3%
湖北	Hubei	75	9.7%	新疆	Xinjiang	2	0.3%
湖南	Hunan	12	1.5%	云南	Yunnan	6	0.8%
内蒙古	Inner Mongolia	5	0.6%	浙江	Zhejiang	20	2.6%

The largest age group in the sample has between 30 and 40 years-old (41%) and the tendency is to have older than younger participants as expected in a profession that requires a lengthy education time (see Appendix Figure Ap. 1-4).

Correspondingly, the majority of participants hold a senior professional title (39%) followed by those that have a medium grade professional title (37%), as shown in Appendix Figure Ap. 1-5.

The title distribution showed the sample is mostly made of professionals that do not hold a chief function (about two thirds) but the other third (N=131) performs some sort of leading role such as chief physician, deputy chief physician, chief physician assistant or chief nurse, which adds the much valued opinion of both those with more operational responsibilities and also those who are in charge and have a deep understanding of the entire clinical activity from a leading position (Appendix Figure Ap. 1-6).

The participants have a stable experience as the largest group has over 15 years tenure in pediatrics. The remaining tenure group are evenly distributed from less than 5 years tenure (21%), 5 up to 10 years (21%) and 10 to 15 years (17%) as shown in Appendix Figure Ap. 1-7.

As a safeguard, the questionnaire included a check to ascertain to which extent participants think they have knowledge about gastroenterological pediatrics. From a scale ranging from 1 (do not know) to 5 (very good knowledge) only 2.7% answered “no knowledge” and they all fall in the group that has no leading functions.

The fact that their answer was negative to this question could justify their exclusion from the sample, however, after crossing data, almost all these participants are professionals that work within pediatrics settings and thus may have a subjective view of what they observe that enrich the results.

Likewise, their declaration of not being knowledgeable about a given matter may be biased due to a sense of humbleness. This is a cultural trait in Chinese culture (Jia, 1998) with deep expression in the Chinese medical ethics (Guo, 1995) and may help understanding why from the 268 GI specialists only 39% answered they had a very deep knowledge while 43% answered they had a general knowledge (see Appendix Figure Ap. 1-8).

More than half participants work in a general hospital's pediatrics and a considerable portion of the sample (41.2%) in a pediatric specialized hospital. The remainder of the sample participants (4.9%) work at a community hospital (Appendix Figure Ap. 1-9).

More than half sample (58.4%) is a member of China's Medical Consortium and the majority of participants work in a third-tier hospital (71%), followed by those who work in a second-tier hospital (26%) with a small portion of the sample (3%) working in a primary hospital (Appendix Figure Ap. 1-10).

Because tertiary hospitals can deal with rare and complicated diseases, are equipped with scientific research facilities as well as many specialists (specialist hospital and general hospital), it is expectable that the grade and nature of hospitals are associated. Indeed, more than 80% of specialized pediatrics work in hospitals of the third tier. Second tier hospitals also have specialized pediatrics but represent a minor proportion in the sample (17.2%). As expectable, both variables are associated (Cramer's V=.552, p<.001).

Table 3-2 Type of pediatrician per hospital grade

X\Y	Tertiary	Secondary	Primary	Subtotal
Pediatrician (General \Childcare)	162 (57.4%)	107 (37.9%)	13 (4.6%)	282
Pediatricians (Specialists)	294 (81.9%)	62 (17.3%)	3 (0.8 %)	359
General Physicians in Communities	1 (8.3%)	6 (50%)	5 (41.7%)	12

Table 3-3 Type of pediatrician per nature of hospital

X\Y	Special Hospitals	General Hospitals	Community Hospitals	Subtotal
Pediatrician (General \Childcare)	73 (25.9%)	195 (69.1%)	14 (5.0%)	282
Pediatricians (Specialists)	209 (58.2%)	148 (41.2%)	2 (0.6%)	359
General Physicians in Communities	2 (16.7%)	2 (16.7%)	8 (66.7%)	12

The type of pediatrician crossed by type or nature of hospital is depicted in the following tables (see Table 3-2 and Table 3-3). It is clear that specialists are mostly working in tertiary hospital and that the largest sample comes from such hospitals.

Table 3-4 commonalities of full 17 general EPAs factor analysis

EPAs	*Extraction*
B1 Establishing and maintaining working relationships*	.350
B2 Using the screening tools and conducting related interpretation	.546
B3 Carrying physical examination*	.476
B4 Handle common pediatric emergencies	.523
B5 Establishing a harmonious relationship with patients and their family members*	.433
B6 To have an understanding of basic community services*	.419
B7 Identifying patients who require surgery.	.530
B8 Transition between pediatricians and adult medical corresponding departments*	.417
B9 Identifying and treating common behavior and mental health problems*	.365
B10 Determine and prioritize treatment in order of importance and urgency.	.554
B11 Focus on learning purposes, in a timely manner to retrieve relevant information*	.482
B12 Use referral guidelines to make decisions.	.532
B13 provide patients with a cost-effective diagnosis and treatment plan.	.631
B14 Using data to identify high-risk populations, epidemiological principles.	.570
B15 Act as a management leader in medical care*	.488
B16 Transfer from clinic to inpatient and vice versa.	.566
B17 Have the ability to perform routine diagnostic and treatment operations*	.328

* signals cases of insufficient commonality

3.5 Reflective versus formative nature of EPAs

One of the goals of the research is to gauge to which extent are EPAs sufficiently represented in the mind of pediatricians in a meaningful semantic structure (as against a simple set of professional activities).

To test this goal, we conducted factorial analysis (exploratory). We reason that if factorial validity indicators fail or if commonalities suggest we should remove EPAs, then we can conclude that these are not yet interiorized in pediatricians' minds. So, instead of working with this construct as a reflective one, we must work with it as a formative one as it makes no sense to drop EPAs based on not being yet internally represented in a semantic structure.

Validity analysis is used to know if the items under study are reasonably and meaningfully treated as reflecting a latent construct (Nunnally & Bernstein, 1994). Validity

can be approached by means of a factor analysis where KMO value, communalities, explained variance, factor loading coefficients are considered to judge about the suitability of the analysis. KMO serves to identify if the data intercorrelation is high enough to allow the factor analysis. Communalities should attain at least the 0.5 threshold. When a given item fails to do so, it means it is not converging with the other items in the factorial analysis and should them be excluded (as not integrating a common reflective latent variable).

Table 3-5 Rotated matrix for general EPAs

	Factor	
	Systemic	Priorizing
B13 provide patients with a cost-effective diagnosis and treatment plan.	**.822**	.079
B14 Using data to identify high-risk populations, epidemiological principles.	**.770**	.175
B12 Use referral guidelines to make decisions.	**.721**	.255
B4 Handle common pediatric emergencies	.158	**.764**
B7 Identifying patients who require surgery	.142	**.751**
B10 Determine and prioritize treatment in order of importance and urgency.	.173	**.739**

Extraction: Principal components. Rotation: Varimax with Kaiser normalization.

a. Rotation converged in 3 iteractions.

Variance explanation rate value speaks for information extraction quality and it should be of at least 60. Lastly, factor loadings measure the magnitude in which a given item value reflects the corresponding latent construct.

The factor analysis validity indicators suggest there is enough high level of intercorrelations to allow it (KMO=.993). However, there are many cases of insufficient commonalities (Table 3-4) and the explained variance is below comfortable level (R^2=48.5%).

By sequentially removing items that showed lower commonality, we were able to reach a valid two-factor solution that has good KMO (.829) and all items have commonalities above .500, albeit only being able to explain 58.5% of total variance after rotation (Varimax). The remaining items correspond only to 7 EPAs but judging on the crossloading analysis, one of the EPAs (#16) should be removed. Therefore, the final factorial rotated matrix comprehends only 6 EPAs (KMO=.771, commonalities all

above .576, R^2=60.9%) that are already organized in pediatricians' minds as reflective constructs of two factors (see Table 3-5).

Table 3-6 commonalities of full 5 specialized GI EPAs factor analysis

Specialized GI EPAs	*Extraction*
B1 Establishing and maintaining working relationships*	.600
B2 Using the screening tools and conducting related interpretation	.628
B3 Carrying physical examination*	.597
B4 Handle common pediatric emergencies	.501
B5 Establishing a harmonious relationship with patients and their family members*	.477

This is relevant information, as it pertains how extensively professionals integrate EPAs into a set of cognitive categories, but it is not workable for the purposes of this research. These findings indicate that pediatricians have a common understanding about these 6 EPAs as organized around two major categories (data-based actions and intervention action) but its leaves out very important EPAs. Because this research does not put emphasis on cognitive representations but instead on performed activities, it is not a requirement that EPAs are organized around reflective constructs. Therefore, we conclude that the construct should be treated as a formative one. For such purposes we will treat these EPAs as leading to a formative construct.

A paralleled scenario occurred for specialized EPAs with the exploratory factor analysis showing high level of intercorrelations (KMO=.824) except for one case that has insufficient commonality (Table 3-6) and the explained variance is also below comfortable level (R^2=56.1%).

Following the same rationale, we conclude that the construct for specialized EPAs is in line with the previous choice for treating EPAs as formative. For such purposes we will treat both general and specialized EPAs as such.

3.6 Reliability and validity analyses for general and for specialized GI pediatrician

With validity based on the formative nature of the construct, we need to verify if the measures are reliable. Reliability concerns the extent to which a given questionnaire is measuring consistently the same construct.

It is commonly expressed by Cronbach's alpha which should attain the value of .70 (Nunnally & Bernstein, 1994). Findings are shown in Table 3-7.

Table 3-7 General and specialized EPA reliability

General EPAs	CITC	Item Deleted α Coefficient	Cronbach α Coefficient	Specialized EPAs	CITC	Item Deleted α Coefficient	Cronbach α Coefficient
B1	.399	.881	.883	**B18**	.612	.754	.801
B2	.469	.879		**B19**	.634	.747	
B3	.496	.877		**B20**	.616	.754	
B4	.511	.877		**B21**	.543	.775	
B5	.575	.874		**B22**	.525	.784	
B6	.548	.875					
B7	.543	.876					
B8	.535	.876					
B9	.521	.876					
B10	.482	.878					
B11	.540	.876					
B12	.563	.875					
B13	.501	.877					
B14	.578	.874					
B15	.492	.878					
B16	.615	.873					
B17	.479	.878					

CITC - Corrected Item Total Correlation

As we learn from the above table, the reliability coefficient is 0.883 and 0.801 thus indicating the research data for the general EPA and the specialized EPA scales are both reliable. Regarding the item deleted α coefficient, there is no obvious improvement in the reliability coefficient for both cases, meaning all items should be kept and the data are reliable. As regards CITC values, there are many cases where it falls below 0.60 suggesting issues. In conclusion, the overall scale is reliable but there are problems with specific items that may be partially explained by its formative nature.

Chapter 4: Results

4.1 Study#1 - Testing the hierarchical model of EPA

EPAs tend to be treated as a bundle of professional activities that comprehend all those required to become certified as a competent professional. They have been seen as being complementary and treated as being at the same level. However, from basic medical education, it is known that skills vary in difficulty and that skills may require previously acquired skills so to prevent learning impairment (Young et al., 2014; Sweller, Van Merriënboer, & Paas, 2019). Just by analyzing Bloom's taxonomy (Bloom, 1956; Krathwohl, 2002) of cognitive difficulty linked to specific verbs used to describe activities, it is evident that neither all activities nor competencies are at the same level of complexity. Therefore, it does not make much sense to treat EPAs as parallel processes that contribute to or are derived from competency.

It is our proposal that they must follow some sort of sequenced structure, from simple to complex, from earlier in education to later in education, from general to specialized.

In order to uncover a meaningful structure, we reason that clinical learning processes are made in phases from 1) the capacity to gather all required information to reach a good diagnosis, 2) to understand macro level dimensions that may impact on the accuracy of the diagnosis, 3) to be capable of bridging with other services, and finally 4) to actually deliver a best practice-based treatment while being able to lead clinically.

The first general pediatrics EPA level concerns "B2 Using the screening tools and conducting related interpretation", "B1 Establishing and maintaining working relationships", and "B5 Establishing a harmonious relationship with patients and their family members". When faced with any clinical situation, a pediatrician is required to correctly use screening tools to gather information. This information will be more accurate when the physician can establish a positive relationship with the patient's family as well as colleagues. A family that is trusting and willing to cooperate will disclose more information. Likewise, colleagues with whom one can have an open communication channel will also contribute to triangulate and clarify doubtful situations.

The second general pediatrics EPA level concerns “B4 Handle common pediatric emergencies”, “B6 To have an understanding of basic community services”, and “B14 Using data to identify high-risk populations, epidemiological principles”. When facing emergencies, a pediatrician must be capable of considering macro level information that relates with risk groups, epidemiology as well as knowing well the services that usually refer emergency cases to pediatricians, i.e. community centers.

The third general pediatrics EPA level concerns “B10 Determine and prioritize treatment in order of importance and urgency”, “B8 Transition between pediatricians and adult medical corresponding departments”, “B16 Transfer from clinic to inpatient and vice versa”, “B7 Identifying patients who require surgery”, and “B9 Identifying and treating common behavior and mental health problems”. Many cases will require the intervention of other medical area professionals. These cases require a sense of importance and know how to transfer to other services to provide for clinical needs that may fall outside the scope of pediatricians.

The fourth general pediatrics EPA level concerns “B12 Use referral guidelines to make decisions”, “B11 Focus on learning purposes, in a timely manner to retrieve relevant information”, “B13 Provide patients with a cost-effective diagnosis and treatment plan”, “B15 Act as a management leader in medical care” and “B17 Have the ability to perform routine diagnostic and treatment operations”. Delivering best practice service implies knowing and observing referral guidelines while keeping a focus not only on treatment but on the need to lead oneself into learning more while leading others. This level is the most complex as it comprehends practices that are usually allocated only to pediatricians in tertiary hospitals.

Because such logics might not resonate in all pediatricians, we have subjected this proposal to the validation of expert pediatricians. We elected three senior level experts and three more experts but with medium position.

Both are complementary as the first are expected to put special focus on the more complex levels while the medium-positioned are expected to focus mostly on the less complex (but not being novice means that they understand the most complex). The validation request was accompanied by a simple table proposing the aforementioned 4-level structure with a simple explanation of the rationale for each level as well as an option of stating if “agree” or “disagree”. The following results were found (Table 4-1).

Table 4-1 Interrater consensus

Level	*EPAs*	*Rationale*	*Y/N*
1	B2 Using the screening tools and conducting related interpretation B3 Carrying physical examination B1 Establishing and maintaining working relationships B5 Establishing a harmonious relationship with patients and their family members	Establishing a harmonious relationship with patients and their family members". When faced with any clinical situation, a pediatrician is required to correctly use screening tools to gather information. This information will be more accurate when the physician is capable of establishing a positive relationship with the patient's family as well as colleagues. A family that is trusting and willing to cooperate will disclose more information. Likewise, colleagues with whom one can have an open communication channel will also contribute to triangulate and clarify doubtful situations.	
2	B4 Handle common pediatric emergencies B6 To understand basic community services B14 Using data to identify high-risk populations, epidemiological principles	When facing emergencies, a pediatrician must be capable of considering macro level information that relates with risk groups, epidemiology as well as knowing well the services that usually refer emergency cases to pediatricians, i.e. community centers	
3	B10 Determine and prioritize treatment in order of importance and urgency B8 Transition between pediatricians and adult medical corresponding departments B16 Transfer from clinic to inpatient and vice versa B7 Identifying patients who require surgery B9 Identifying and treating common behavior and mental health problems	Many cases will require the intervention of other medical area professionals. These cases require a sense of importance and know how to transfer to other services to provide for clinical needs that may fall outside the scope of pediatricians.	

4	B12 Use referral guidelines to make decisions B11 Focus on learning purposes, in a timely manner to retrieve relevant information B13 Provide patients with a cost-effective diagnosis and treatment plan B15 Act as a management leader in medical care B17 Be able to perform routine diagnostic and treatment operations	Delivering best practice service implies knowing and observing referral guidelines while keeping a focus not only on treatment but on the need to lead oneself into learning more while leading others. This level is the most complex as it comprehends practices that are usually allocated only to pediatricians in tertiary hospitals

The interpretation allows the attribution of the following objectives linked to each EPA level:

1st level – establishing conditions to gather information for diagnosis

2nd level – first diagnosis and treatment (first emergencies, if pediatrician is able then he or she is able to tell who is high-risk and an emergency and high-risk population)

3rd level – bridging / referring to other services

4th level – observing best practice and leading

The four levels have all an expected contribution to the overall job performance of a pediatrician while simultaneously being linked in a sequence from the simplest to the more complex. This configures a sequential mediation model with three paths. The first path links level 1 with level 2, the second path links level 2 with level 3, and the third path links level 3 with level 4. We believe it is also reasonable to expect relations between these levels that bypass the sequential mediation making it partial. So, our hypothesis is set to "there is a partial mediation between level 1 and level 4 that occurs via sequential positive relationships of levels 2 and 3.

Based on this rationale we hypothesize that:

Hypothesis 1: EPA Level 2 mediates the positive relationship between EPA Level 1 and EPA Level 3.

Hypothesis 2: EPA Level 3 mediates the positive relationship between EPA Level 1 and EPA Level 4.

Hypothesis 3: There is a sequential mediation by EPA Level 2 and EPA Level 3 in the positive relationship between EPA Level 1 and EPA Level 4.

Concerning mediation testing with formative constructs there is an ongoing debate that is relevant for this research, namely to know if one should use covariance-based models (e.g. CB-SEM Structural Equations Modelling) or Partial Least Squares (e.g. PLS-SEM Structural Equations Modelling).

Arguments are compelling for both positionings. On the one hand, Adamantios Diamantopoulos, a credited scholar on formative constructs, contended that formative constructs can be measured with CB models, thus avoiding issues related with PLS (Diamantopoulos, Riefler, & Roth, 2008). PLS has been dismissed by many scholars, reviewers and publishing outlets for creating endogeneity problems (common method

variance) or other related with the very small samples it claims to be able to work with, as well as inflated indicator loadings (Sarstedt et al., 2016). However, PLS has also been consistently defended by another leading scholar, Joe F. Hair (e.g. Hair, Ringle, & Sarstedt, 2011; Hair et al., 2019). In his most recent review of the technique, it is clearly sustained that formative construct should be tested with PLS-SEM only and that PLS-SEM offers more reliable results than bootstrapping Covariance based algorithms like those use on Process Macro (Hayes, 2018). Lowry and Gaskin (2014) elaborated on PLS vs CB-SEM and overall did not discard any of these approaches as being globally or clearly superior to each other.

From reading through the ongoing discussion, we conclude that argumentation is far from reaching a consensus between contending parts. Its fundamental methodological basis precludes a clear decision and therefore, because we are using formative constructs and we are unwilling to let open a "what if?" question applied to adopting CB instead of PLS based data analysis techniques, we opted to conduct both. We assume that if results converge, their robustness is beyond doubt as regards the specific technique used. Hence, we tested the mediation model with PROCESS macro available in SPSS (Hayes, 2018) and then with a PLS-SEM software (Warp-PLS) (Kock, 2018).

Hierarchical EPA structure with CB models

The macro runs algorithms that build corrected bias confidence interval bounds, for lower and upper based on bootstrapping linked to direct and indirect effects. The direct effect, as the name indicates, concerns the direct relation between two variables without interference from any other. The indirect effect corresponds to the variance explained by means of sequential paths, where its product adds to direct effect specific variance (or can even show the direct effect is only an expression of the true mediation, and thus, it no longer is observable when the mediator is included into the equation).

By adding the direct and indirect effects we find the total effect. Likewise, when there is a significant direct effect but not an indirect one, there is no observed mediation. When the indirect effect is significant but the direct is not, there is a total mediation, and when both the direct and indirect effects are significant there is a partial mediation.

Both the direct and indirect effects are statistically significant if the value zero is not included in the range between the lower and upper CI95 bounds. Following recommendations by Hayes (2018) we set the number of repetitions to 5000 and the interval confidence at 95%.

The specific model we intend to test is depicted in Figure 4-1, where X is Level 1 EPAs, Y is Level 4 EPAs and M1 and M2 are Level 2 and Level 3 EPAs respectively.

Judging on the full model depiction it is possible to find six direct effects and three indirect effects between X and Y operating simultaneously.

The results follow a progressive analysis where the software starts by showing the model summary, and then shows statistics for direct effects of Level 1 on Level 2, and then of both Levels 1 and 2 on Level 3, and finally of Levels 1, 2, and 3 on Level 4. Then it ends by showing all the possible indirect effects statistics.

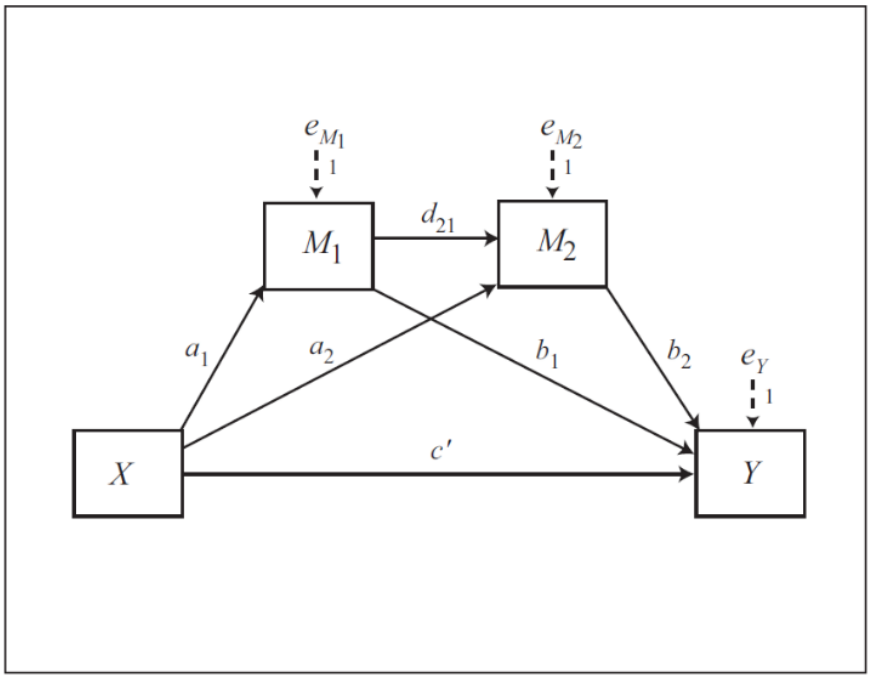


Figure 4-1 Statistical model of sequential mediation

The model for the relation between Level 1 and Level 2 is of considerably power as the explained variance is 37.1% corresponding to a significant F (1, 774) value of 458.1993 ($p<.01$). The direct effect of Level 1 on Level 2 has a coefficient of .659 with a significant CI95 [0.5988; 0.7198].

The model for the joint relations of Level 1 and Level 2 on Level 3 is also of considerably power as the explained variance is 49.4% corresponding to a significant F (2, 773) value of 377.6766 ($p<.01$). The direct effects of Level 1 and Level 2 are also significant with a magnitude of .301 and .423 respectively. The lower and upper CI95 are, respectively [0.2400; 0.3635] and [0.3667; 0.4809].

The model for the join relations of all preceding levels on Level 4 is slightly stronger than the previous with an explained variance of 50% corresponding to a significant F (3, 772) value of 258.2555 ($p<.01$). The direct effects of Level 1, Level 2 and Level 3 are all significant with a magnitude of .102, .180 and .342 respectively. The lower and upper CI95 are, respectively [0.0500; 0.1550], [0.1284; 0.2320], and [0.2860; 0.3995].

Table 4-2 Direct and indirect effects in CB models

IV	Med1	Med2	DV	Direct effect	Indirect effect (unstandardized)	CI95 LB	CI95 UB
Lev1	Lev2			.6593		[.5988;	.7198]
Lev1		Lev3		.3017		[.2400;	.3635]
	Lev2	Lev3		.4238		[.3667;	.4809]
Lev1			Lev4	.1025		[.0500;	.1550]
	Lev2		Lev4	.1802		[.1284;	.2320]
		Lev3	Lev4	.3427		[.2860;	.3995]
Lev1	Lev2	Lev3			.1188	[.0796;	.1621]
Lev1		Lev3	Lev4		.1034	[.0746;	.1340]
Lev1	Lev2	Lev3	Lev4		.0958	[.0742;	.1193]

The totally standardized indirect effect of Level 1 on Level 4 through Level 2 is significant with a magnitude of 0.1508 and a CI95 [0.1018; 0.2041]. This supports Hypothesis 1.

The totally standardized indirect effect of Level 1 on Level 4 through Level 3 is significant with a magnitude of 0.1312 and a CI95 [0.0946; 0.1692]. This supports Hypothesis 2.

The totally standardized indirect effect of Level 1 on Level 4 through both Level 2 and Level 3 is significant with a magnitude of 0.1215 and a CI95 [0.0949; 0.1493]. This supports Hypothesis 3.

The Table 4-2 summarizes the findings from mediation testing and its respective classification.

The overall depiction of results pertaining mediation is shown in Figure 4-2

From a PLS-SEM perspective, the full model is tested simultaneously. Warp-PLS 6.0 is suitable to conduct this analysis while providing validity and quality tests for the model (Kock, 2018). Kock and Lynn (2012) provide the technical guidelines to test model fit.

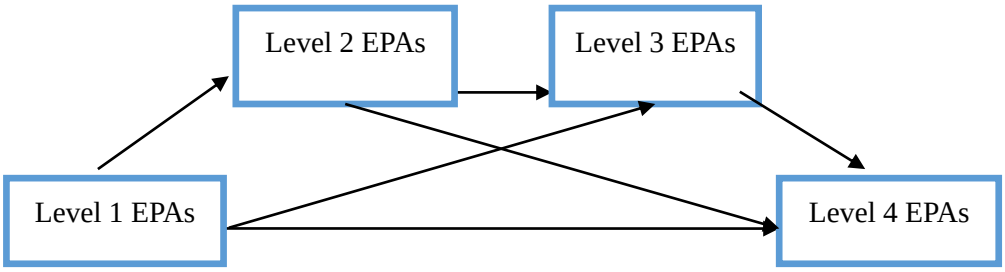


Figure 4-2 Hierarchical EPA model

Hierarchical EPA structure with PLS models

Among these, one finds the Average path coefficient (APC), that should be statistically significant ($p<.05$) and expresses the average association coefficients for direct effects established between latent variables. Its counterpart, the Average R-squared (ARS) as well as the Average adjusted R-squared (AARS), should also present a statistically significant value and should not differ more than 5% among them. Other set of indices pertains multicollinearity. The software offers calculations on the Average block VIF (AVIF) and Average full collinearity VIF (AFVIF) that ideally should fall below 3.3 (values up to 5 are also within acceptance range). These indicators are particularly important as they are able to show if common method bias occurred (Kock, 2015). Another important indicator is the Tenenhaus GoF (GoF) that is expressed as being small ($.01\leq GOF<.25$), medium ($.25\leq GOF<.36$) or large (GOF over .36) and measures the explanatory power of the model. Other issues that may hamper the quality of a PLS-SEM model concern specific patterns of association between values of two variables in such a way that false negative may emerge. Sympson's paradox ratio (SPR) is useful to detect these. It should not fall below .70.

Additionally, the R-Squared Contribution Ratio (RSCR) indicates if the model has any case of negative R-squared contribution which would indicate the direction of dependence of the hypotheses is wrongly designed. Values over 0.9 indicate no problem with this issue. Also, statistical suppression is also a problem that may occur when the absolute beta value is higher than the correlation between two latent variables (Tanur, 2015) and the software incorporates an index (SSR) that indicates the extent to which this might have occurred. Values of .70 or above indicate statistical suppression did not occur. Finally, nonlinear bivariate causality direction ratio (NLBCDR) indicates how much beta coefficients between two latent variables may change when using non-linear algorithms

and inverting also the direction of causality. Perfect situations are indicated by a value of NLBCDR of 1, but the acceptable threshold is set to .70.

In the case of the present sequentially mediated model, all values rule out validity and quality problems that might be associated with the model. Magnitude of associations and explained variance is significant (APC=0.369, p<.001; ARS=0.465, p<0.001; AARS=0.464 (p<0.001). Likewise, no multicollinearity problems are apparent (AVIF=1.795, AFVIF=2.101) and the model has a large fit to data (GOF=0.480). The SPR equals 1 and is Sympson's paradox is thus not a matter of concern, which goes in line with SSR value of 1. As regards direction of influence, both RSCR and NLBCDR indicate (1 for both values) no improvement is observed from reversing direction.

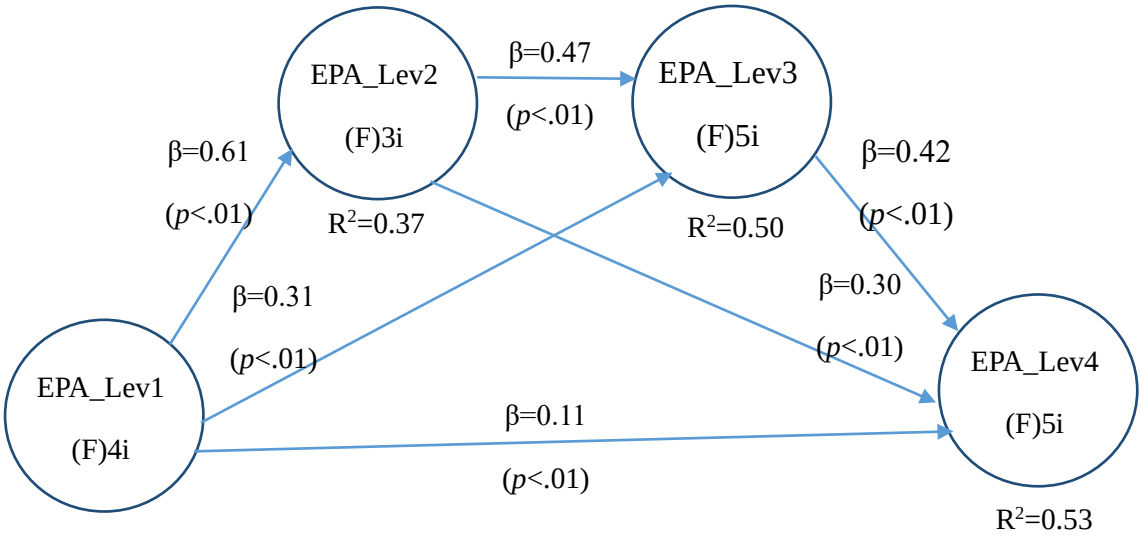


Figure 4-3 Full model path coefficients

Variables also have high reliability as Composite Reliability (CR) reach threshold of 0.70 for all EPA levels (CR_{Level1}=.792, CR_{Level2}=.782, CR_{Level3}=.819, CR_{Level4}=.814). For results to be trustworthy distributions must ensure unimodality and both Rohatgi-Szekely test and Klaassen-Mokveld-van ES tests indicate distributions are unimodal. Results can be interpreted as valid. Results show all direct paths are statistically significant (Figure 4-3).

Regarding indirect effects, all the two-path and the three-path indirect effects were significant. The mediation of the relationship between EPA Level 1 and EPA Level 3 via EPA Level 2 presents a significant value of .287 (p<.01). Likewise, the mediation of the relationship between EPA Level 1 and EPA Level 4 via EPA Level 3 presents also a significant value of .310 (p<.01). Lastly, the three-path mediation model through Level 2 and Level 3 presents also a significant value of 120 (p<.01) (see Table 4-3).

Table 4-3 Direct and Indirect effects in PLS-SEM

IV	Med1	Med2	DV	Direct effect	Indirect effect (unstandardized)
Lev1	Lev2			.610**	
Lev1		Lev3		.313**	
	Lev2	Lev3		.470**	
Lev1			Lev4	.107**	
	Lev2		Lev4	.295**	
		Lev3	Lev4	.417**	
Lev1	Lev2	Lev3			.287**
Lev1		Lev3	Lev4		.310**
Lev1	Lev2	Lev3	Lev4		.120**

** p <.01

These results also offer support to all three hypotheses. Comparatively, although the magnitude of path coefficients (and consequently of indirect effects) is substantially larger in the PLS-SEM model than the CB-Process, the statistical significance remains equivalent for all paths studied. This offers some guarantee the existing paths are not subjected to bias from data analysis technique options.

4.2 Study#2 - GI specialized EPA dependence on General EPAs

Another issue of relevance to uncover the structure of EPAs is how they relate with the specialized GI EPAs. One should be expecting a positive relationship to occur between them. Otherwise it would not be defensible as specialization learning goals cannot be achieved at the expense of previous acquired learnings and skills. So, we hypothesize that:

Hypothesis 4: All EPA levels are positively associated with each of the specialized GI EPAs.

As there are five specialized EPA, we shall derive five sub hypotheses, from H4a to H4f, one per each. Additionally, we also reason that, if indeed the proposed hierarchical structure is consistent, we would be expecting the magnitude of association between general EPAs and specialized GI EPAs to differ in the sense of being stronger in the more complex general EPAs.

So, we hypothesize that:

Hypothesis 5: There will be stronger associations between higher complexity EPA levels (e.g. 3 and 4) and specialized GI EPAs than those found between lower level (i.e. EPA Level 1 and 2) and specialized GI EPAs.

In this case, five sub hypotheses are also derived from H5a to H5f. For reasons related with previous analyses conducted both with CB-SEM and PLS-SEM, we will repeat that procedure for the new predictive models of specialized GI EPAs, using multiple OLS regression with SPSS 24 and WarpPLS-SEM 6.0.

Specialized EPA dependence on General EPA with CB models

From a CB approach results are shown separating each of the dependent regression analyses.

For GI EPA 1 the OLS multiple regression explains an adjusted variance of 36.9% where EPA Level 3 (Beta=.231, p<.001) and EPA Level 4 (Beta=.377, p<.001) were both significant predictors (Appendix Table Ap. 1-1). This supports both Hypothesis 4a and 5a.

For GI EPA 2 the OLS multiple regression explains an adjusted variance of 28.9% where EPA Level 3 (Beta=.216, p<.001) and EPA Level 4 (Beta=.338, p<.001) were both significant predictors (Appendix Table Ap. 1-2). This supports both Hypothesis 4b and 5b.

For GI EPA 3 the OLS multiple regression explains an adjusted variance 28.0% where EPA Level 3 (Beta=.232, p<.001) and EPA Level 4 (Beta=.336, p<.001) were both significant predictors (Appendix Table Ap. 1-3). This supports both Hypothesis 4c and 5c.

For GI EPA 4 the OLS multiple regression explains an adjusted variance of 25.9% where EPA Level 2 (Beta=.138, p<.001), EPA Level 3 (Beta=.184, p<.001) and EPA Level 4 (Beta=.188, p<.001) were all significant predictors (Appendix Table Ap. 1-4). This supports Hypothesis 4d but not Hypothesis 5d.

For GI EPA 5 the OLS multiple regression explains an adjusted variance of 17.7% where again EPA Level 3 (Beta=.132, p<.001) and EPA Level 4 (Beta=.299, p<.001) were both significant predictors (Appendix Table Ap. 1-5). This supports both Hypothesis 4e and 5e.

Overall, Hypothesis 4 is fully supported thus suggesting there is empirical evidence that specialized GI EPAs are built on top of general EPAs. Likewise, Hypothesis 5, that establishes a stronger association between higher general EPA levels (3 and 4) with specialized GI EPAs is globally supported to the exception of GI EPA 4. Also, there is no

indication of multicollinearity which means the variance accounted for has not been inflated due to interEPA correlations.

It is interesting noting that the dependence of specialized GI EPAs is stronger in the simplest GI EPAs thus indicating a possible mediating mechanism where general EPAs contribute both directly and indirectly through the lower level specialized GI EPAs.

Specialized EPA dependence on General EPA with PLS-SEM models

General EPA levels and Specialized GI EPA 1

The first model matches the requirements regarding validity and quality of the model. Namely, the Average path coefficient (APC)=0.290 (with a significant p value <0.001), the average R-squared (ARS)=0.443 (with a significant p value <0.001), and the average adjusted R-squared (AARS)=0.441 (p<0.001) (see Table 4-4).

Table 4-4 Association coefficients General EPAs-GI EPA 1 for PLS-SEM

	EPA_Level 1	*EPA_Level 2*	*EPA_Level 3*	*EPA_Level 4*
EPA_Level 1				
EPA_Level 2	.610*			
EPA_Level 3	.313*	.470*		
EPA_Level 4	.107	.295*	.417*	
EPA_GI 1	.011	.056	.242*	.374*

* p<.001

Multicollinearity was also ruled out (AVIF=1.926, AFVIF=2.064). The model has a large fit (Tenenhaus GoF=0.514) and no Sympson's paradox issues (SPR=1.000). Both SPR and SSR equal 1 and so here is no Sympson's paradox or issues due to data distortion. Also, both RSCR and NLBCDR equal 1 which indicates no improvement is observed from reversing direction.

For analysis purpose the most informative findings concern the existence or not of significant relationships between general EPA levels and the specialized GI EPA under focus. In the case of GI EPA 1 only two significant path coefficients were found, one with EPA Level 3 (Beta=.242, p<.001) and the other with EPA Level 4 (Beta=.374, p<.001). This supports both Hypothesis 4a and 5a (see Figure 4-4).

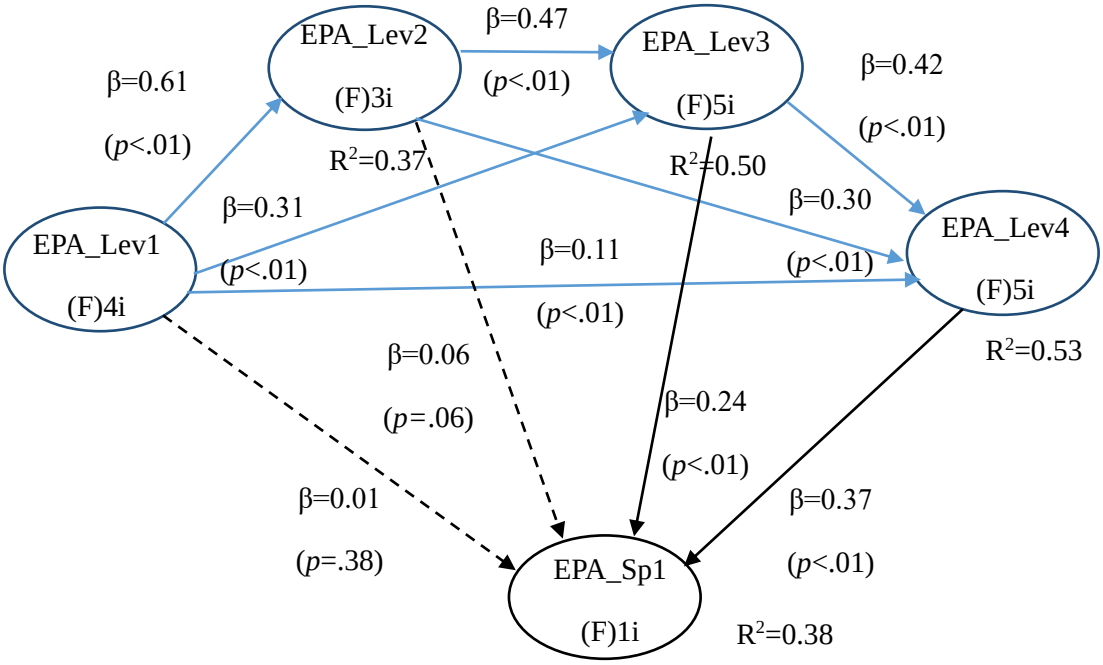


Figure 4-4 Full model for GI EPA 1

General EPA levels and Specialized GI EPA 2

The second model matches the requirements regarding validity and quality of the model. Namely, the Average path coefficient (APC)=0.283 (with a significant p value <0.001), the average R-squared (ARS)=0.425 (with a significant p value <0.001), and the average adjusted R-squared (AARS)=0.423 (p<0.001). Multicollinearity was also ruled out (AVIF=1.945, AFVIF=2.012). The model has a large fit (Tenenhaus GoF=0.503) and no Sympson's paradox issues (SPR=1.000) or data distortion (SSR=1). Also, both RSCR and NLBCDR equal 1 which indicates no improvement is observed from reversing direction.

Results shown that for GI EPA 2 there are also only two significant path coefficients. Again, one with EPA Level 3 (Beta=.215, p<.001) and the other with EPA Level 4 (Beta=.338, p<.001). This supports both Hypothesis 4b and 5b (see Figure 4-5 and Table 4-5).

General EPA levels and Specialized GI EPA 3

The third model also matches the requirements regarding validity and quality of the model. Namely, the Average path coefficient (APC)=0.279 (with a significant p value <0.001), the average R-squared (ARS)=0.415 (with a significant p value <0.001), and the average adjusted R-squared (AARS)=0.413 (p<0.001).

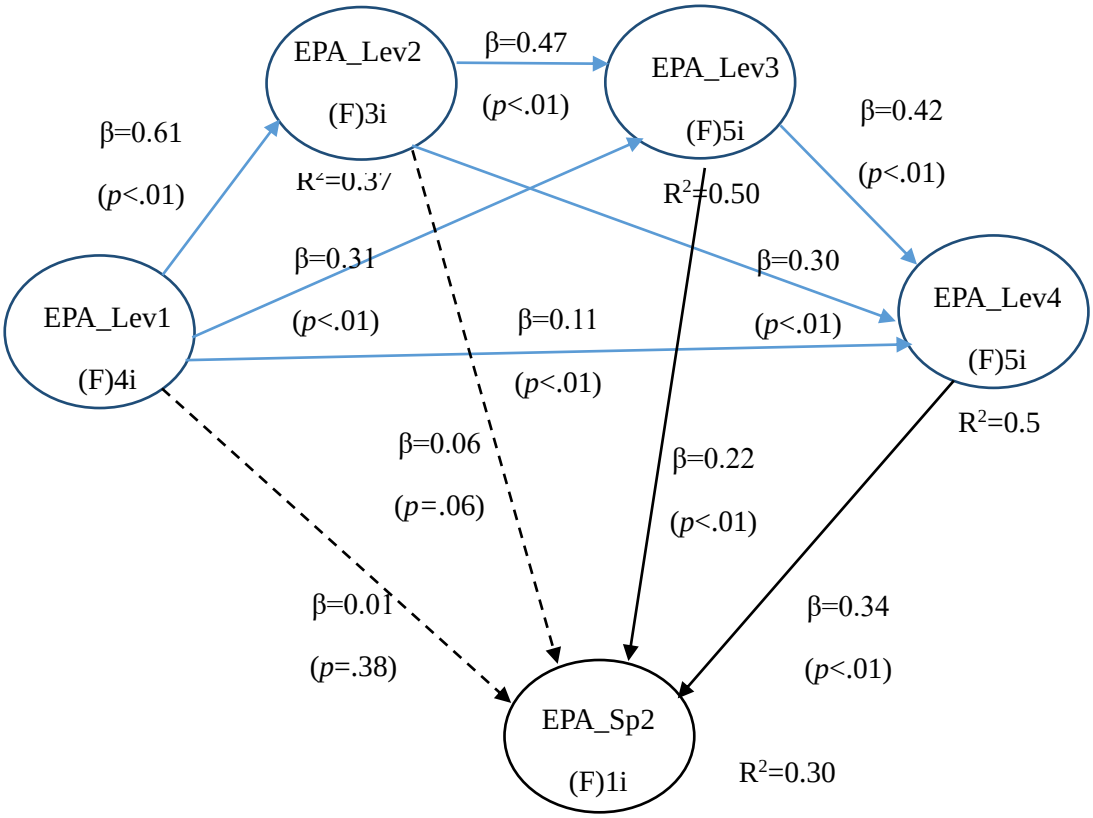


Figure 4-5 Full model for GI EPA 2

Table 4-5 Association coefficients General EPAs-GI EPA 2 for PLS-SEM

	EPA_Level 1	*EPA_Level 2*	*EPA_Level 3*	*EPA_Level 4*
EPA_Level 1				
EPA_Level 2	.610*			
EPA_Level 3	.313*	.470*		
EPA_Level 4	.107	.295*	.417*	
EPA_GI 2	.013	.057	.215*	.338*

* p<.001

Multicollinearity was also ruled out (AVIF=1.930, AFVIF=1.998). The model has a large fit (Tenenhaus GoF=0.497) and Sympson's paradox that is not ideal but still far beyond the threshold (SPR=0.900). Better value was found for SSR that equals 1. Lastly, causality direction is the most suited as seen by both RSCR (.998) and NLBCDR (1.0) (see Table 4-6).

GI EPA 3 results follow precisely the same pattern of the previous specialized EPAs with the variant that both betas are of similar magnitude.

So, with EPA Level 3 the Beta was .260 (p<.001) and the EPA Level 4 the Beta was .277 (p<.001). This supports both Hypothesis 4c and 5c (see Figure 4-6).

Table 4-6 Association coefficients General EPAs-GI EPA 3 for PLS-SEM

	EPA_Level 1	*EPA_Level 2*	*EPA_Level 3*	*EPA_Level 4*
EPA_Level 1				
EPA_Level 2	.610*			
EPA_Level 3	.313*	.470*		
EPA_Level 4	.107	.295*	.417*	
EPA_GI 3	.038	-.007	.260*	.277*

* p<.001

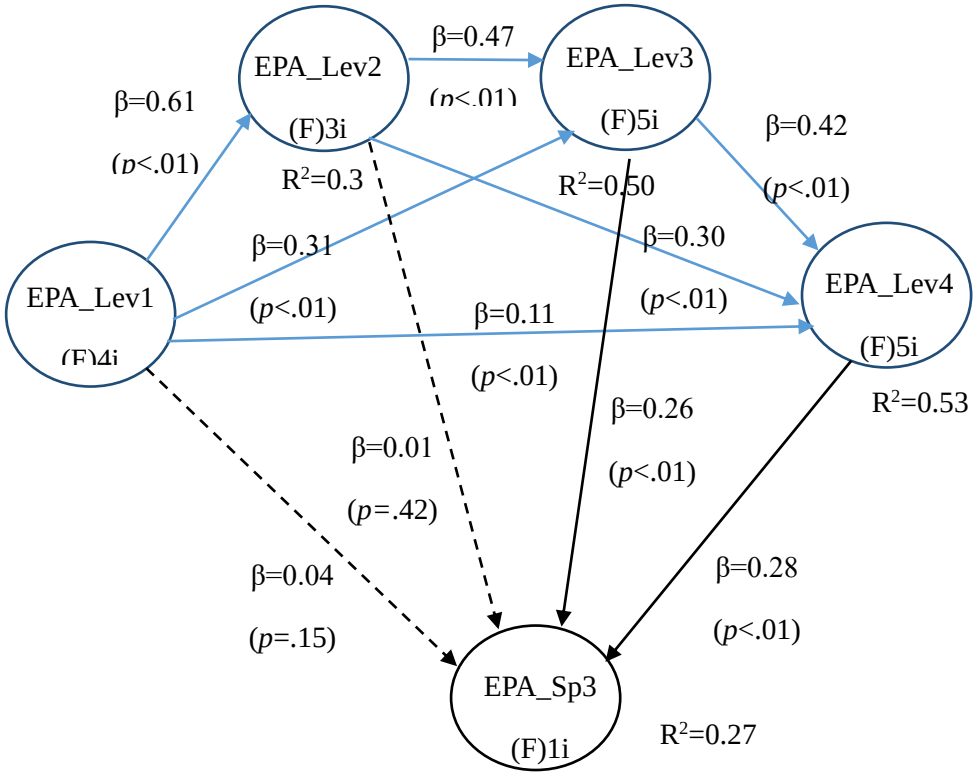


Figure 4-6 Full model for GI EPA 3

General EPA levels and Specialized GI EPA 4

The fourth model also matches the requirements regarding validity and quality of the model. Namely, the Average path coefficient (APC)=0.283 (with a significant p value <0.001), the average R-squared (ARS)=0.420 (with a significant p value <0.001), and the average adjusted R-squared (AARS)=0.418 (p<0.001). Multicollinearity was also ruled out (AVIF=1.955, AFVIF=1.982). The model has a large fit (Tenenhaus GoF=0.500) and neither Sympson's paradox issues (SPR=1.000) nor data distortion (SSR=1). The designed causality direction is also the most suited (RSCR=1.000 and NLBCDR=1.000) (see Table 4-7).

Table 4-7 Association coefficients General EPAs-GI EPA 4 for PLS-SEM

	EPA_Level 1	*EPA_Level 2*	*EPA_Level 3*	*EPA_Level 4*
EPA_Level 1				
EPA_Level 2	.610*			
EPA_Level 3	.313*	.470*		
EPA_Level 4	.107	.295*	.417*	
EPA_GI 4	.100	.121*	.186*	.214*

* p<.001

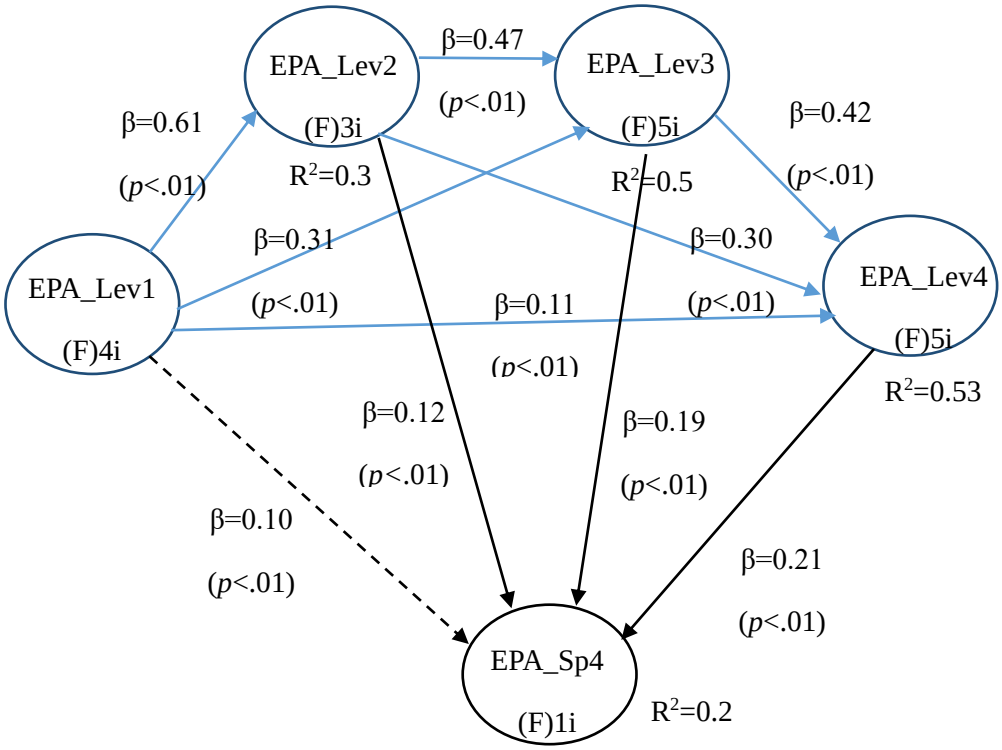


Figure 4-7 Full model for GI EPA 4

Table 4-8 Association coefficients General EPAs-GI EPA 5 for PLS-SEM

	EPA_Level 1	*EPA_Level 2*	*EPA_Level 3*	*EPA_Level 4*
EPA_Level 1				
EPA_Level 2	.610*			
EPA_Level 3	.313*	.470*		
EPA_Level 4	.107	.295*	.417*	
EPA_GI 5	.068	.007	.133*	.282*

* p<.001

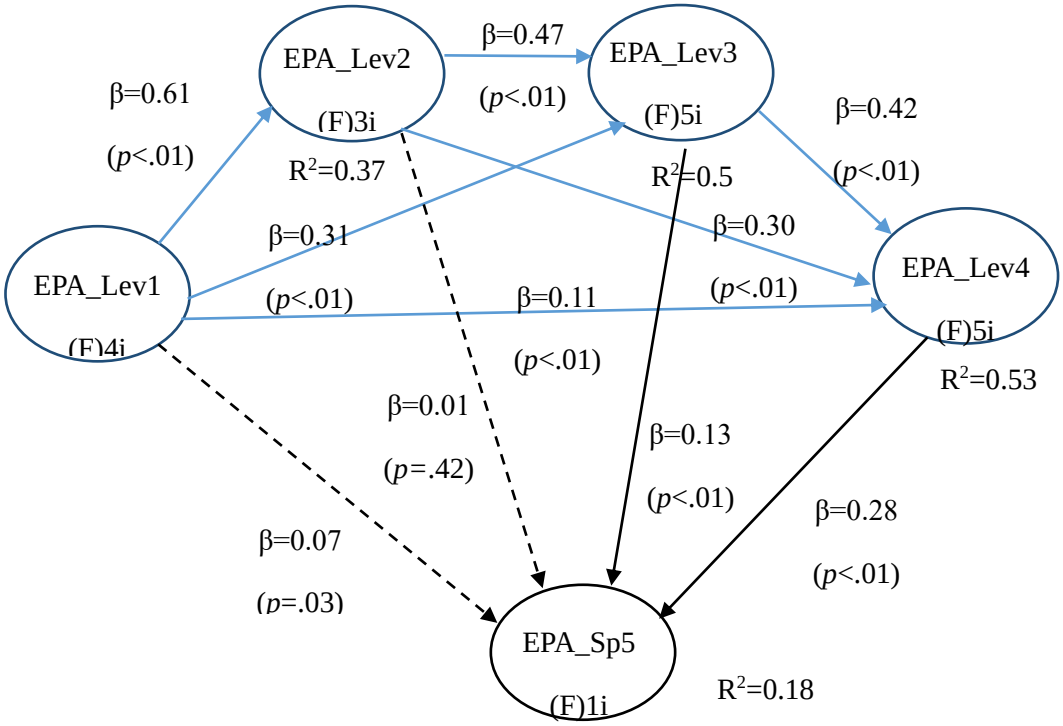


Figure 4-8 Full model for GI EPA 5

For GI EPA 4 there are three statistically significant path coefficients of modest magnitude. Namely with EPA Level 2 (Beta=.121, p<.001), with EPA Level 3 (Beta=.186, p<.001) and with EPA Level 4 (Beta=.214, p<.001). This supports Hypothesis 4d although it does not support Hypothesis 5d (see Figure 4-7).

General EPA levels and Specialized GI EPA 5

The last model matches the requirements regarding validity and quality of the model. Namely, the Average path coefficient (APC)=0.270 (with a significant p value <0.001), the average R-squared (ARS)=0.395 (with a significant p value <0.001), and the average adjusted R-squared (AARS)=0.393 (p<0.001). Multicollinearity was also ruled out (AVIF=1.897, AFVIF=1.947). The model has a large fit (Tenenhaus GoF=0.485) and neither Sympson's paradox issues (SPR=1.000) or data distortion (1.0). The causality direction designed is also the most suited as indicated by both RSCR and NLBCDR achieving a value of 1.0 (see Table 4-8).

In the case of GI EPA 5 the predominant pattern is observed with the two more complex general EPA levels showing statistically significant path coefficients, namely, with EPA Level 3 (Beta=.133, p<.001) and with EPA Level 4 (Beta=.282, p<.001). This supports both Hypothesis 4f and 5f (see Figure 4-8).

Overall, results from testing the predictive model between general and specialized GI EPAs gives support to hypotheses. As expected, all statistically significant associations found were positive, thus suggesting specialized EPAs are built on top of general ones. Likewise, such significant associations were found mostly for the upper two levels, EPAs Level 3 and 4. This suggests that EPAs levels 1 and 2 are mostly required to set the ground for Levels 3 and 4, and these higher-level ones remain the most informative to conduct specialized GI EPAs.

Taken into consideration that general EPA levels are designed by consensus as a formative construct, we think it is worthwhile to explore each general EPA separately as to ascertain in which measure the findings express a homogeneous behavior within each level.

4.2.1 Predictors of GI specialist EPA＃1

With B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B14, B15, B16, B17 as independent variables and B18 as dependent variable (see Appendix Table Ap. 1-6), the linear regression analysis shows a model that explains 56.0% variance and the model passes F test ($F=109.365$, $p<0.05$), showing at least one item is a significant predictor, with the formula of the model being B18=0.047*B1 + 0.055*B4 + 0.080*B7 + 0.062*B9 + 0.116*B11 + 0.055*B12 + 0.082*B13 + 0.126*B15 + 0.191*B16 + 0.181*B17.

In addition, the multicollinearity test of the model shows that all VIF values are below 5, indicating no multicollinearity existed. The D-W Value is close to 2, demonstrating that there is no autocorrelation of the model, which indicates a sound model. The analysis indicates that B1, B4, B7, B9, B11, B12, B13, B15, B16, B17 play a significant positive role in B18.

4.2.2 Predictors of GI specialist EPA＃2

Taking B19 as the dependent variable, the linear regression analysis shows a model that explains 49.1% variance of B19 (Appendix Table 4-15) and the model passes F test ($F=82.876$，$p<0.05$), showing at least one item is a significant predictor, with the formula of the model being B19= 0.051*B1 + 0.073*B9 + 0.161*B11 + 0.090*B13 + 0.126*B16 + 0.219*B17. In addition, the multicollinearity test of the model shows that all VIF value are below 5, indicating no multicollinearity existed. The D-W Value is close to 2,

demonstrating that there is no autocorrelation of the model, which indicates a sound model. To sum up, B1, B9, B11, B13, B16, B17 play a significant positive role in B19.

4.2.3 Predictors of GI Specialist EPA＃3

Taking B20 as the dependent variable, the linear regression analysis shows a model that explains 51.3% variance of B20 (Appendix Table Ap. 1-8), and the model passes F test ($F=90.477$, $p<0.05$), showing at least one item is a significant predictor, with the formula of the model being B20 = 0.419 + 0.081*B4 + 0.214*B7 + 0.090*B10 + 0.110*B11 + 0.069*B12 + 0.093*B15 + 0.122*B16 + 0.170*B17. In addition, the multicollinearity test of the model shows that all VIF values are below 5, indicating no multicollinearity existed. The D-W Value is close to 2, demonstrating that there is no autocorrelation of the model, which indicates a sound model. To sum up, B4, B7, B10, B11, B12, B15, B16, B17 play a significant positive role in B20.

4.2.4 Predictors of GI Specialist EPA＃4

Taking B21 as the dependent variable, the linear regression analysis shows a model that explains 46.2% variance of B21 (Appendix Table Ap. 1-9 4-17), and the model passes F test ($F= F=73.659$, $p<0.05$), showing at least one item is a significant predictor, with the formula of the model being B21 = 0.508 - 0.053*B4 + 0.103*B8 + 0.126*B12 + 0.116*B14 + 0.208*B16 + 0.071*B17.

In addition, the multicollinearity test of the model shows that all VIF values are below 5, indicating no multicollinearity existed. The D-W Value is close to 2, demonstrating that there is no autocorrelation of the model, which indicates a sound model. To sum up, B8, B12, B14, B16, B17 play a significant positive role in B21 and B4 has significant negative influence over B21.

4.2.5 Predictors of GI Specialist EPA＃5

Taking B22 as the dependent variable, the linear regression analysis shows a model that explains 39.6% variance of B22 (Appendix Table Ap. 1-10), and the model passes F test ($F= 56.145$, $p<0.05$), showing at least one significant predictor, with the formula of the model being B22 = 0.426 + 0.074*B4 + 0.100*B7 + 0.129*B8 - 0.102*B10 + 0.110*B11 + 0.098*B12 + 0.188*B15 + 0.086*B16 + 0.159*B17. In addition, the multicollinearity test of the model shows that all the VIF values are below 5, indicating no multicollinearity

existed. The D-W Value is close to 2, demonstrating that there is no autocorrelation of the model, which indicates a sound model. To sum up, B4, B7, B8, B10, B11, B12, B15, B16, B17 play a significant positive role in B22. It is interesting to notice that B10 has significant negative association with B22.

Findings offer a more detailed understanding on the patterns of association between general EPAs and specialized GI EPAs. It is worth noting that not all EPAs are equally predictors or the specialized GI EPAs. Level 1 EPAs contained surprisingly weak predictors because only EPA1 was a significant predictor and only for two specialized GI EPAs. This can be due either to heterogeneity of the level or to a configuration effect where a single EPA might not be a predictor but, together with another EPA, it can be such a predictor. However, the overall idea is that taking individually, level 1 EPA are not good predictors of specialized GI EPAs.

Level 2 EPAs show more cases of significant predictors where EPA#4 stands out as almost universal predictor of specialized GI EPAs. Still, about 50% of possible cases of significant prediction were observed in this level 2. In the case of level 3 there is a stronger proportion of significant predictors (14 out of 25 possible cases, 56%) where EPA16 predicts all specialized GI EPAs. Lastly, level 4 is clearly the one that comprehends the highest proportion of significant predictors (18 out of 25 possible cases, 72%) with general EPA17 being the universal predictor and EPA11 and EPA12 almost universal.

As expected, not all individual EPAs are equal predictors of specialized GI EPAs and more complex level EPA are more frequently predictors. This globally suggests a closer relationship between more complex EPAs and specialized GI EPAs, which is in line with stated hypotheses.

4.3 Data analysis of competency domains

As stated, competencies can be gathered into domains. We have identified eight of such competency domains by crossing the ABP and EAP list of competency domains: 1) patient care (EPAs 16 & 17), 2) Medical knowledge for practice (GI1, GI2, GI3), 3) Practice-based learning and improvement (EPAs 3 to 7), 4) professionalism (GI3 to 5), 5) Interpersonal and communication skills (EPAs 4, 7, 10, and 15), 6) Systems-base practice (EPAs 1 to 3), 7) Interpersonal collaboration (EPA 8 and 9), and 8) Personal and professional development (EPA 11, 12, 16 and GI4).

To ascertain if there is a pattern of underlying competency domains that lead to EPA development, we conducted several OLS multiple regressions, one per each General EPA level and one per each GI specialized EPA.

Beforehand, we analyzed the eight competency domains targeting General Pediatrics and Specialized GI Pediatrics regarding its descriptive statistics (Table 4-9) and intercorrelations (Table 4-10). We proceeded similarly for the specialized GI EPAs.

After understanding the overall descriptive statistics, we proceeded to the regression analyzes.

The overall descriptive statistics show that all general pediatrician competency domains share a similar profile with slight variations regarding scale amplitude. Otherwise, all means fall within the 4.20-4.50 range, with very similar standard deviations (0.596-0.629) and slight distribution differences (.000<kurtosis<1.574 and -.325<skewness<-1.012). In the case of competency domains linked to specialized pediatrics we found a similar scenario. Thus, all specialized pediatrician competency domains also share a similar profile with variations regarding scale amplitude.

All means fall within the 4.30-4.50 range, with steady standard deviations (0.578-0.602) and slight distribution differences (-.486<kurtosis<1.094 and -.236<skewness<-.911).

The first characteristic that is visible in the correlation table is the overall high level of significant positive correlations ($p<.01$) ranging .406 to .734 that overall average .549. The high intercorrelation values may indicate respondents have a cognitive representation of competencies which can be tested via factor analysis.

Respondents have also differing representations on how much each competency domain is associated with General and Specialized GI EPAs as evidenced by the varying coefficients for the respective intercorrelation (e.g. D1 and E1, D2 and E2 etc).

Table 4-9 Descriptive statistics for General and Specialized pediatrician competency domains

Competency Domain	*N*	*Min-Max.*	*Mean Value (standard dev)*	*Q1*	*Median*	*Q3*	*Variance*	*Kurtosis*	*Skewness*
D1	776	1-5	4.48 (.609)	4	5	5	.371	1.574	-1.012
D2	776	1-5	4.43 (.614)	4	4	5	.377	1.063	-.818
D3	776	1-5	4.35 (.598)	4	4	5	.358	.609	-.492
D4	776	1-5	4.46 (.610)	4	5	5	.373	1.657	-.973
D5	776	2-5	4.40 (.588)	4	4	4	.345	.000	-.493
D6	776	1-5	4.20 (.629)	4	4	4	.395	1.201	-.488
D7	776	2-5	4.23 (.602)	4	4	4	.363	.361	-.325
D8	776	2-5	4.30 (.596)	4	4	4	.355	.578	-.442
E1	776	1-5	4.50 (.590)	4	5	5	.348	1.094	-.911
E2	776	1-5	4.46 (.602)	4	5	5	.362	.595	-.762
E3	776	2-5	4.40 (.592)	4	4	5	.350	-.234	-.470
E4	776	1-5	4.45 (.584)	4	4	5	.341	.886	-.715
E5	776	2-5	4.42 (.589)	4	4	5	.347	-.211	-.518
E6	776	2-5	4.30 (.581)	4	4	5	.337	-.154	-.236
E7	776	2-5	4.31 (.589)	4	4	5	.347	-.414	-.254
E8	776	2-5	4.38 (.578)	4	4	5	.334	-.486	-.323

Table 4-10 Bivariate correlations for domains of competence

	D1	D2	D3	D4	D5	D6	D7	D8	E1	E2	E3	E4	E5	E6	E7
D1. Patient care	1														
D2. Medical knowledge for practice	.671**	1													
D3. Practice-based learning and improvement	.612**	.681**	1												
D4. Professionalism	.569**	.592**	.688**	1											
D5. Interpersonal and communication skills	.452**	.482**	.465**	.541**	1										
D6. Systems-based practice	.471**	.524**	.571**	.521**	.568**	1									
D7. Interprofessional collaboration	.458**	.487**	.539**	.495**	.497**	.600**	1								
D8. Personal and professional development	.491**	.482**	.565**	.526**	.538**	.607**	.587**	1							
E1. Patient care	.673**	.595**	.554**	.552**	.489**	.462**	.482**	.509**	1						
E2. Medical knowledge for practice	.580**	.645**	.575**	.505**	.475**	.493**	.486**	.471**	.727**	1					
E3. Practice-based learning and improvement	.522**	.565**	.656**	.546**	.472**	.547**	.520**	.506**	.647**	.734**	1				
E4. Professionalism	.480**	.514**	.578**	.616**	.475**	.534**	.518**	.578**	.620**	.639**	.712**	1			
E5. Interpersonal and communication skills	.469**	.455**	.468**	.458**	.656**	.496**	.478**	.529**	.524**	.522**	.583**	.572**	1		
E6. Systems-based practice	.406**	.469**	.539**	.493**	.473**	.633**	.492**	.523**	.511**	.572**	.643**	.623**	.615**	1	
E7. Interprofessional collaboration	.458**	.461**	.526**	.455**	.455**	.540**	.636**	.552**	.540**	.543**	.627**	.612**	.609**	.684**	1
E8. Personal and professional development	.478**	.487**	.551**	.515**	.548**	.549**	.492**	.698**	.513**	.522**	.599**	.607**	.621**	.621**	.650**

** p<.01

Table 4-11 Factor loadings

	General pediatrics	*Specialized GI pediatrics*
D3/E3. Practice-based learning and improvement	.830	.859
D4/E4. Professionalism	.797	.833
D2/E2. Medical knowledge for practice	.795	.783
D6/E6. Systems-based practice	.782	.813
D8/E8. Personal and professional development	.771	.790
D1/E1. Patient care	.761	.783
D7/E7. Interprofessional collaboration	.747	.812
D5/E5. Interpersonal and communication skills	.725	.790
Extraction method: Principal component		

The factor analyzes for both sets of competency domains show valid factor solutions. When thinking about general pediatrics, the solution is valid (KMO=.913, Bartlett's $X^2(28)=3370.773$, $p<.001$, with all communalities above .559) and extracts a single factor explaining 60.3% of total variance. The factor loadings are all above .700 and the Cronbach alpha=.906 indicates high reliability (Table 4-11, first column).

Likewise, the factor analysis for competency domains taken into consideration when thinking about specialized GI pediatrics is also valid (KMO=.927, Bartlett's $X^2_{(28)}=4115.175$, $p<.001$, all communalities above .601) and extract a single factor explaining 65.6% of total variance. The factor loadings are all above .700 and the Cronbach alpha=.925 indicating high reliability (Table 4-11, second column). We thus treat this construct as a reflective one that already has solid semantic representation within the pediatrician sample surveyed.

4.4 Competency domains as predictors of EPAs

We conducted regression analyses to explore a model explaining which competency domains explain EPAs. Due to its matching, regression models will test the association between general pediatrics EPAs and specialized GI EPAs and the respective competency domains (as single factors, one for general EPAs and one for specialized GI EPAs). Firstly, we will test to which extent each of the four levels of general EPAs are explained by general competency domain factor, then we will test to which extent each of the five specialized GI EPAs is explained also by the specialized competency domain factor. To better understand

which competency domains do explain each general EPA and each specialized EPA we will run tests using as predictors all competency domains, treated separately.

Explaining EPA levels with the general competency domain factor: The model intended to explain EPA Level 1 for the overall competency domain factor showed a valid model explaining 17.6% of adjusted variance with a significant ANOVA [F(1, 774)=166.991, p<.001] and a β=.421 (p<.001). For EPA Level 2 the model has also a significant ANOVA [F(1, 774)=202.112, p<.001] and explains 20.6% adjusted variance with a β=.455 (p<.001).

For EPA Level 3 the model has also a significant ANOVA [F(1, 774)=269.600, p<.001] and explains 25.7% adjusted variance with a β=.508 (p<.001). Finally, for EPA Level 4 the model has also a significant ANOVA [F(1, 774)=316.953, p<.001] and explains 29% adjusted variance with a β=.539 (p<.001). It is evident that competency domains predictive power increases as the complexity of general EPAs also increases.

Explaining specialized GI EPAs with the specialized competency domain factor: For the specialized GI EPAs, the model also shows predicted power. For specialized GI EPA 1 (Care for children and adolescents that have complex and acute GI diseases) the model has a significant ANOVA [F(1, 774)=185.112, p<.001] and explains 19.4% adjusted variance with a β=.440 (p<.001). For specialized GI EPA 2 (Care for children and adolescents that have complex and acute Hepatobiliary diseases) the model has a significant ANOVA [F(1, 774)=146.986, p<.001] and explains 15.9% adjusted variance with a β=.399 (p<.001).

For specialized GI EPA 3 (Diagnose and manage common GI, hepato and Pancreatic diseases) the model has a significant ANOVA [F(1, 774)=211.814, p<.001] and explains 21.4% adjusted variance with a β=.464 (p<.001). For specialized GI EPA 4 (Conduct comprehensive nutrition assessment and counseling) the model has a significant ANOVA [F(1, 774)=199.499, p<.001] and explains 20.4% adjusted variance with a β=.453 (p<.001). For specialized GI EPA 5 (Being familiar to use endoscopy) the model has a significant ANOVA [F(1, 774)=117.592, p<.001] and explains 13.1% adjusted variance with a β=.363 (p<.001). All GI EPAs are explained by competency domains.

Using a factorialized competency domain may reduce predictive power due to loss of variance and not all competency domains may predict EPAs, therefore we have repeated the regression analyses but taken the whole set of competency domains per EPA. The results for general pediatrics are summarized in Tables [from Appendix Table Ap. 1-11 to Appendix

Table Ap. 1-14] as well as those for specialized GI EPAs (Appendix Table Ap. 1-15 to Appendix Table Ap. 1-19).

General EPA Level 1 is predicted only by Interpersonal and Communication Skills (β=.121, p<.01) and Personal and professional development (β=.118, p<.05) explaining 17.4% adjusted variance. EPA Level 2 has more predictors, namely Medical knowledge for practice (β=.124, p<.05), Systems-based practice (β=.176, p<.01), Interprofessional collaboration (β=.104, p<.05), and Personal and professional development (β=.109, p<.05) explaining 21.2% adjusted variance.

EPA Level 3 is predicted by Medical knowledge for practice (β=.134, p<.01), Interprofessional collaboration (β=.103, p<.05), and Personal and professional development (β=.151, p<.01) explaining 25.9% adjusted variance. EPA Level 4 is predicted by Professionalism (β=.091, p<.05), Interprofessional collaboration (β=.193, p<.01), and Personal and professional development (β=.145, p<.01) explaining 29.5% adjusted variance.

Overall, Personal and professional development is the only domain of competence that always predict all General EPA Levels. It is by this sole feature the most central domain of competence. Interprofessional collaboration is also central because it predicts three of EPA levels (2, 3, and 4). Medical knowledge for practice predicts two of the EPA levels (2 and 3).

And finally, professionalism and interpersonal and communication skills predict each one EPA Level. It is not without informative value that Patient care and Practice-based learning and improvement were not significant predictors of any EPA level. Also, the increasingly explained variance magnitude across EPA Levels may be worth mentioning as it goes steadily up from 17.4% to 29.5% and no variance inflation was suggested by VIF in any of the cases.

The predictors vary substantially depending on the specific GI EPA under analysis. Complex acute or chronic GI diseases (GI EPA 1) was predicted by Systems-based practice (β=.140, p<.01) and Interprofessional collaboration (β=.191, p<.01) explaining 20.6% adjusted variance. Complex acute or chronic hepato-biliary and pancreatic diseases (GI EPA 2) was predicted by Practice-based learning and improvement (β=.181, p<.01), Systems-based practice (β=.159, p<.01), and Personal and professional development (β=.097, p<.05) explaining 16.7% adjusted variance. Common GI diseases (GI EPA 3) was predicted by Patient care (β=.135, p<.01) and Personal and professional development (β=.136, p<.01) explaining 21.4% of adjusted variance. Nutrition assessment (GI EPA 4) was explained only

by Interpersonal and communication skills (β=.093, p<.05) accounting for 20% adjusted variance. Finally, endoscopy was predicted by Practice-based learning and improvement (β=.129, p<.05) and Personal and professional development (β=.115, p<.05) explaining 13.4% adjusted variance.

As found for General EPAs, Personal and professional development is the domain of competence that most constantly predicts specialized GI EPAs, namely all but GI EPA4. Practice-based learning and improvement is also an important domain of competence because it contributes to build both for GI EPA 2 and GI EPA 4, in the very same manner of systems-based practice. Lastly, interprofessional collaboration seems to be a competency domain that is helpful in building GI EPA 1, patient care contributes for EPA GI 3, and interpersonal and communication skills contributes for EPA GI 4.

The absence of professionalism and medical knowledge as domains of competency that predicts at least one EPA (be it general of specialized GI) is notorious, especially as it expected for them to be central in all cases. This might be due to their fundamental nature that somehow is contributive to the other domains of competency and thus, their variance is integrated by those in the regression analysis. To test for this possibility, we ran the same regression analyses only with these two domains of competency.

As suspected, the regressions showed significant (p<.05) coefficients (positive) for all cases of general EPAs levels and specific GI EPAs. This is suggestive that there is a suppression effect of their variance which indicates they might be the basis upon which the other competency domains are built.

Once again, we opted to use a flat structure of competency domains as it is structured in the respective international standards, but our findings raise the possibility that they operate hierarchically. Because of the aggregated nature of general EPA levels of complexity, we opted to redo the analyses with each one of the general EPAs as shown in the next section.

4.5 General analysis

4.5.1 The Mean Value and Standard deviation of general pediatricians and digestive pediatricians

We can see from the descriptive statistics of competence domain D1-E8 that the samples of the eight competence indexes are generally consistent (see Figure 4-9).

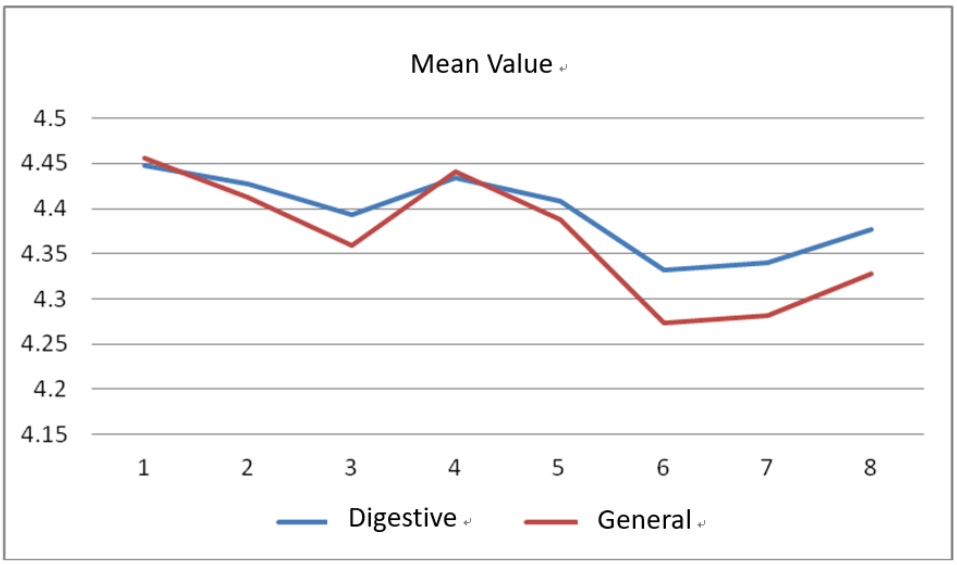


Figure 4-9 Mean value for competence domains per type of pediatrician

There is no big knowledge gap between general pediatrician competence domains and digestive pediatrician competence domains. Many reasons can explain this.

It is hard to specialize pediatricians to sufficient scale and therefore, digestive pediatricians often assume the role of general pediatricians, leading to the difficulty to differentiate digestive pediatricians' competence domains from those of the general pediatricians in terms of roles and responsibilities. As shown above, the comparison between medians found for EPAs for general and digestive pediatricians is tested (see Table 4-12).

To the common activities of general pediatrician department all activities but B7, B11, B12 and B15 are homogeneously consistent between digestive and general pediatricians. The strong differences are only seen after B17 with digestive pediatrician prominently greater than general pediatrician, which is in line with the activities of European and American digestive pediatricians, as what we have discussed in our meeting. Some complex general pediatricians' activities and those requiring surgeon cooperation are also closely related with that of the digestive pediatricians. Why is that?

Table 4-12 EPA comparison for general and specialized pediatricians

	T test analysis		*t*	*p*
	digestive pediatrician (N=268)	general pediatrician (N=508)		
B1	3.99±0.63	3.96±0.58	0.699	.485
B2	3.92±0.60	3.89±0.65	0.542	.588
B3	4.06±0.70	4.14±0.61	-1.688	.092
B4	4.41±0.57	4.37±0.62	0.915	.360
B5	4.12±0.66	4.15±0.58	-0.531	.595
B6	4.05±0.64	3.98±0.63	1.375	.170
B7	4.32±0.60	4.21±0.59	2.579	.010*
B8	4.05±0.66	4.02±0.64	0.624	.533
B9	4.09±0.60	4.06±0.66	0.468	.640
B10	4.52±0.55	4.46±0.61	1.465	.143
B11	4.30±0.56	4.09±0.60	4.693	.000**
B12	4.15±0.60	4.06±0.58	1.982	.048*
B13	3.98±0.70	3.95±0.67	0.556	.579
B14	3.99±0.72	3.97±0.64	0.401	.689
B15	4.40±0.59	4.31±0.58	2.096	.036*
B16	4.20±0.60	4.12±0.59	1.875	.061
B17	4.14±0.68	4.13±0.67	0.159	.874
B18	4.31±0.61	4.04±0.61	5.741	.000**
B19	4.21±0.61	4.01±0.66	4.101	.000**
B20	4.39±0.58	4.25±0.60	2.965	.003**
B21	4.10±0.62	3.99±0.64	2.340	.020*
B22	4.27±0.64	3.99±0.71	5.383	.000**

*** p<0.05 ** p<0.01**

We can tell from the previous mean value that digestive pediatrician's professional activities are more active than those of the general pediatrician. The first column of domains pertains digestive pediatrician domains and the second column the general pediatrician domains (see Table 4-13).

Table 4-13 Domains of competence means by types of pediatrician

	T test analysis		*t*	*p*
	digestive pediatrician (N=268)	general pediatrician (N=508)		
D1	4.52±0.56	4.46±0.63	1.219	.223
D2	4.45±0.56	4.42±0.63	0.614	.539
D3	4.39±0.57	4.32±0.61	1.445	.149
D4	4.50±0.59	4.44±0.61	1.449	.148
D5	4.41±0.55	4.39±0.60	0.337	.736
D6	4.25±0.61	4.17±0.63	1.624	.105
D7	4.27±0.60	4.21±0.60	1.446	.149
D8	4.30±0.60	4.30±0.59	0.023	.981
E1	4.59±0.53	4.45±0.61	3.042	.002**
E2*	4.53±0.55	4.42±0.62	2.315	.021*
E3*	4.47±0.55	4.36±0.60	2.557	.011*
E4	4.50±0.55	4.43±0.59	1.739	.082
E5	4.47±0.57	4.39±0.59	1.895	.059
E6	4.33±0.56	4.29±0.58	1.064	.288
E7**	4.41±0.59	4.26±0.58	3.317	.001**
E8	4.42±0.57	4.36±0.58	1.368	.172

*** p<0.05 ** p<0.01**

During the exploration of regression analysis, the R^2 values are often very low, not good for this linear regression, thus less meaningful. During the exploration of the inter-connection between EPAs, mutual promotion is found in all EPAs, suitable for factor analysis.

Communality value of all items are above 0.4, indicating strong correlation between the research item and corresponding factor and the efficient information extraction by the factors (see Appendix Table Ap. 1-20).

It ensures that after the factor extracts most information out of the research item, it can also be followed by the analysis of the correspondence between the factor and the research item (when the absolute value of factor loading coefficient is bigger than 0.4, the correspondence between the item and the factor is demonstrated). The overall indicators of validity are good (KMO=.972, .965<MSAs<.982, Bartlett t = 19924.029 (231) p<.001), accounting for 75.8% of total variance.

This solution was run with a confirmatory factor analysis that showed fit indices ($X^2_{(138)}$=323.252, CFI=.961, TLI=.946, RMSEA=.042, SRMR=.032) indicating good adjustment to data taking as reference Hair et al. (2014) recommended thresholds.

This finding offered great assurance about the robustness of this factor solution. The correspondence Table 4-14 is derived from the classification of EPAs and competence domains based on the interpretation of EPAs and relative panel discussions.

To further verify these factors, based on the above table, these EPAs were regressed to relative competence domains for value assignment and model prediction.

4.5.2 Linear regression based on factor analysis

Results of multiple linear regression analysis for each domain of competence covering patient care are shown in Appendix (see Table Ap. 1-21) as well as regarding personal and professional development (see Appendix Table Ap. 1-28).

The analysis shows that both EPA 16 and EPA 17 of general pediatricians have significant positive association with *Patient Care*. General pediatrician EPA1, EPA2, and EPA3 all have significant positive association with *Medical Knowledge for Practice* (see Appendix Table Ap. 1-22). General pediatrician EPA3, EPA6, EPA4, EPA5, and EPA7 all have significant positive association with *Practice-based Learning and Improvement* (see Appendix Table Ap. 1-23).

Specialized digestive pediatrician EPA3, EPA4, and EPA5 all have significant positive association with *Professionalism* (see Appendix Table Ap. 1-24). General pediatrician EPA4, EPA7, EPA10, and EPA15 all have significant positive association with *Interpersonal and Communication Skills* (see Appendix Table Ap. 1-25). General pediatrician EPA1, EPA2, and EPA3 all have significant positive association with *Systems-based Practice* (see Appendix Table Ap. 1-26). General pediatrician EPA8 and EPA9 all have significant positive association with *Interprofessional Collaboration* (see Appendix Table Ap. 1-27).

Table 4-14 Factor selection by combining EPAs contents and competence domains

Factor1	**Factor2**	**Factor3**	**Factor4**	**Factor5**	**Factor6**	**Factor7**	**Factor8**
B11	B3	B19	B4	B3	B20	B8	B16
B14	B6	B20	B7	B1	B21	B9	B17
B12	B4	B18	B15	B2	B22		
B16	B5		B10				
B13	B7						
B21							
Personal and professional development	Practice based learning and improvement	Medical knowledge for practice	Interpersonal and communication skills	Systems based practice	Professionalism	Interpersonal collaboration	Patient care

Table 4-15 Expert rating on EPA-domain of competence matching

Domains of competence	*EPAs*	*Rating*
1. Patient care		**4.363**
	16	4
	17	4
2. Medical knowledge for practice		**4.855**
	GI1	5
	GI2	5
	GI3	5
3. Practice-based learning and improvement		**4.445**
	3	4
	6	3
	4	5
	5	4
	7	5
4. Professionalism		**4.490**
	GI3	5
	GI4	3
	GI5	5
5. Interpersonal and communication skills		**4.788**
	4	5
	7	5
	15	5
	10	5
6. Systems-based practice		**3.941**
	1	3
	2	2
	3	4
7. Interprofessional collaboration		**4.064**
	8	3
	9	4
8. Personal and professional development		**4.145**
	11	5
	12	3
	16	4
	GI4	3

General pediatrician EPA11, EPA12, and EPA16 together with specialized digestive pediatrician EPA4 have significant positive association with *Personal and Professional Development*. However, general pediatrician EPA14 and EPA13 have no impact on E8 (see Appendix Table Ap. 1-28). We may remove the two EPAs regarding this domain for the subsequent model prediction. Overall, these analyses show that the EPA-base competence domains have a stable and robust structure.

4.5.3 The process of model value prediction

Value assignment and model prediction: Professor Xu, one of the leading figures of China's digestive pediatric discipline was invited to rate the model (see Table 4-15).

A graphic depiction of all ratings offers a comprehensive view (see Figure 4-10). The line chart indicates, in domains such as *Medical Knowledge for Practice, Practice-based Learning and Improvement, Interpersonal and Communication Skills, Systems-based Practice, Interprofessional Collaboration, Personal and Professional Development,* that general pediatricians have less need to mobilize domains of competence to execute EPAs than digestive pediatricians.

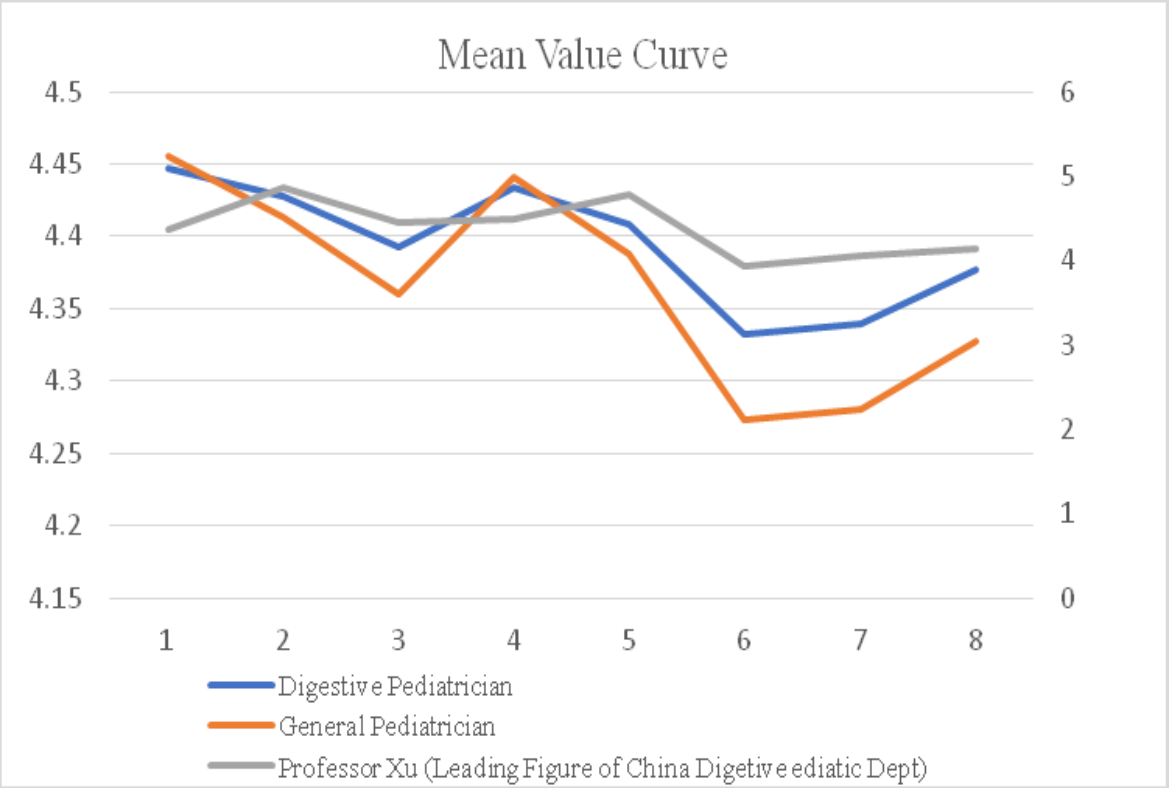


Figure 4-10 Overall rating on EPA-Domain of competence matching

General pediatricians can match up to digestive pediatricians in *Patient Care* and *Professionalism*. It indicates that *Patient Care* and *Professionalism* are the basic domains or the basic requirement as a pediatrician. Digestive pediatrician even shows weaker need to mobilize competence in primary *Patient Care*, while they have stronger needs to use domains of competence in *Interpersonal and Communication skills, Systems-based Practice, Interprofessional Collaboration, Personal and Professional Development,*

towards a more professional demanding activity. Practices in other domains have to be strengthened for further development.

Competence domains can be strengthened by targeting EPAs training. Roles and responsibilities of pediatricians can be differentiated and clarified by the training of competence domain.

4.6 Study#3 – The role of professional ethics in EPA profile

As stated, professional ethics play an important role in medical activity. Medical competence involves more than instrumental competence due to the many ethical dilemmas physicians face, especially in pediatrics where the patient is considered to be under the guard of a third person.

Ethics is unquestionably important in pediatrics education (Michaelson & Brunnquell, 2016). However, dowespite the universal acceptance of its importance, Hauer et al. (2013) found that amongst 30 internal medicine EPAS, informed consent was not included per se although it is one of the core EPAs (numbered 11). Informed consent in pediatrics is a good example of a critical ethical issue but Tait and Hutchinson (2018) contend it not sufficient mastered in residency either because it is insufficiently addressed or because physicians tend to assume that once parents sign an informed consent, one can take as granted that they fully understood it. Such assumption entails potential for litigation.

The complexity of bioethics needs not to be stressed as the array of issues that have a potential ethical implication is extensive. Such ethical issues can pertain specific dimensions of newborn phase (e.g. resuscitation) (Den Boer et al., 2018), infancy phase (e.g. overall study) (Verhagen, 2016) or adolescence (e.g. teenage confidentiality) (Yeragi et al., 2016). Children with disabilities are also a special case for ethics care (Silber & Batshaw, 2004). Ruiz et al. (2017) identified 40 such ethical dilemmas occurring in pediatrics.

With the diversification of population, many new issues have been brought into pediatrics ethics due to cultural background of patients (Hjern & Bouvier, 2004) and even pediatricians themselves (Mustafa et al., 2017). In this field of Medicine, technology has also made an impact where genomic sequencing of a child or underage patient may disclose life-long impact information without true consent as the guardians may not be

ethically able to make a decision that irreversibly releases permanent genetic information (Cornelis & Wouters, 2019).

In a one-year cohort study conducted with pediatrics interns, ethical behavior was found to be one of the best predictors of EPA4 as identified in the American Board of Pediatrics (Auble et al., 2018). This means, ethics has a foreseeable impact not only of its own dimension of professional practice as in the performance of activities themselves.

Following discussion on ethics in pediatrics recently, within the international context, by tested for a possible fundamental role ethics play in the link between EPAs. Based on findings of e added Ethics as a basic predictor of all EPA levels embedded in the sequential mediation found. Therefore, we reason that it is a required condition to enable maximum effectiveness in executing EPAs at all levels of complexity. Therefore, we tested for a sequential mediational 3-path model between Ethics and EPA Level 4, crossing EPA Levels 1, 2 and 3.

The corresponding hypotheses are those already tested in the hierarchical model of EPA with the addition of Ethics as a first path predictor. Therefore, we hypothesized ethics to have a positive relation with all EPA Levels, organized hierarchically from the simples to the most complex. The corresponding hypothesis is:

Hypothesis 6: Ethics has an indirect effect on EPA Level 4 through a sequential mediation via EPA Levels 1, e, and 3, in this order.

4.6.1 Pediatrician ethics profile

As stated, the ethics scale was built in order to reflect the code of conduct as well as extant discussion on dilemmas pediatricians face in current profession. Items that compose the scale have been showed in the Method chapter and the sample used to test the interaction effects is the same. Therefore, for parsimony sake we will not repeat such information concerning participants, their sociodemographic profile and the variables included in the model. We will show the required technical information pertaining testing psychometric quality of the measure of “ethics”, the hypotheses testing procedures and findings.

4.6.1.1 Psychometric quality of measure

In order to use the scale we tested for psychometric quality. As a construct that is built upon social judgment and shared values, professional ethics is deemed to be a reflective construct and therefore we will treat it as such.

This means the first requisite is to show its construct validity. With such purpose we conducted an exploratory factor analysis that showed a valid single factor solution (KMO=.856, .824<MSAs<.875, Bartlett X2 = 1349.783, 15, p<.001) that accounts for a modest magnitude of variance (52.4%) which is consistent with an insufficient commonality (.446) found for the first item (safeguard the interests of children). By removing this item, we found a similarly valid solution (KMO=.830, .802<MSAs<.857, Bartlett X2 = 1078.310, 10, p<.001) but with the same technical problem now concerning the second item (safeguard the interest the patient's family). By removing the second item additionally to the first one, the resulting factor solution is valid (KMO=.779, .779<MSAs<.815, Bartlett X2 = 820.096, 6, p<.001) and accounts for 60.4% total variance which reaches the minimum threshold for a sufficiently robust factor solution. This factor is also reliable (Cronbach alpha=.779, CR=.859) and has convergent validity (AVE=.604).

Being a more robust data analysis technique (as it controls for possible covariance between errors), we run a confirmatory factor analysis on both the full scale and the 4-item solution found in the exploratory factor analysis. The CFA for the full 6-item scale has suboptimal fit indices ($X^2_{(9)}$= 57.092, p<.001, CFI=.964, TLI=.940, RMSEA=.083, SRMR=.035), and indeed Lagrange Multipliers suggested the removal of the first couple items thus converging with the procedure done in the exploratory factor analysis.

The resulting CFA has acceptable fit indices (X^2(2)=6.789, p=.032, CFI=.994, TLI=.982, RMSEA=.056, SRMR=.015). We will use this single factor as the expression of the degree in which the proposed values are important within pediatric ethics. The fact that safeguarding the best interest of both children and children's family are excluded from the solution is understandable because of their evident nature. All other ethical items (deal with inconsistent interests, informed consent of patient in adolescence, malformation in newborn, conflict of interest between mother and child) are more prone to produce dilemmas, which is the stimulus for ethical judgment. The depiction of the model can be seen in Figure 4-11.

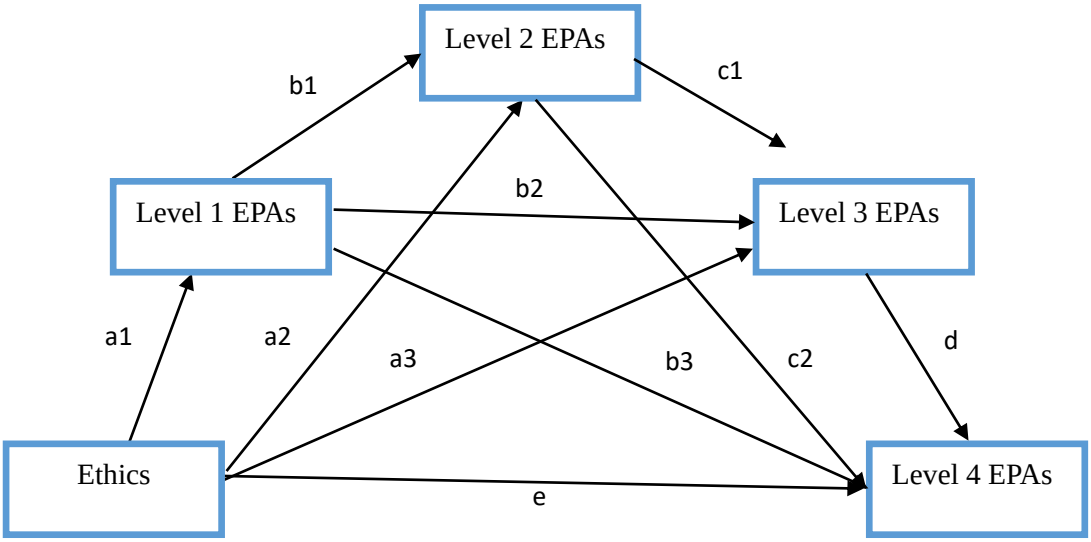


Figure 4-11 Sequential mediation model from Ethics throughout EPA levels

4.6.1.2 Model test

To test simultaneously all relations depicted in the model we use PROCESS Macro (Hayes, 2018) that runs simultaneous regression analyses, computes direct and indirect effects and shows indication on each effect statistical significance with bootstrapping technique (Efron & Tibshirani, 1986). Bootstrapping is a special technique where subsamples of the original database are randomly extracted, and the successive effects are computed and distributed in a range comprehended between a lower bond and an upper bond. The intervals are created with a confidence interval of 95% and the recommended number of sample extractions is 5000 or 10000. As a rule, if the interval comprehended between the lower and upper bounds does not comprehend the value "zero" we can trust the coefficient found is statistically significant, or more correctly, it is meaningful for that bootstrapped interval.

Because the PROCESS Macro is able to deal with a single independent and dependent variable each time, and this study operates with four EPA level variables we ran the model once specifying the exact design already built in the Macro, Model 6.

4.6.1.3 Results

Table 4-16 resumes all the effects found and the respective interpretation about its significance. For practicality sake, the paths are shown (e.g. "a1" "a2", "c1") and the indirect effects shown as sequential paths (e.g. "a1*a2", "a1*b1"). Due to the substantial number of sequential paths combinations and based on previous findings that support the

sequential 3-path mediation from EPA Level1 to EPA Level 4, we opted to show mediation paths that link Ethics to EPA Level4 through all possible options.

Table 4-16 Coefficients and bootstrapped intervals for 4-path model

Path	*Beta*	*SE*	*t*	*CI95 (lower)*	*CI95 (upper)*	*Total effect model*	*Full model with mediators*
a1	.365	.029	12.51***	.317	.426	R^2 = 19.9%	R^2 = 51.2%
a2	.189	.029	6.40***	.131	.247	F (1, 774) =	F (4, 771) =
a3	.159	.024	6.49***	.111	.207	193.43***	202.96***
b1	.572	.032	17.39***	.508	.637		
b2	.256	.031	8.17***	.195	.318		
b3	.086	.026	3.22**	.033	.138		
c1	.381	.029	13.10***	.324	.438		
c2	.168	.026	6.43***	.117	.220		
d	.313	.029	10.68***	.256	.371		
e	.316	.022	13.90***	.271	.361		
e’	.089	.020	4.35***	.049	.130		
a1*b3	.044	.016		.013	.078		
a2*c2	.045	.011		.025	.069		
a3*d	.070	.012		.047	.098		
a1*b1*c2	.050	.010		.031	.071		
a1*b2*d	.041	.007		.027	.058		
a2*c1*d	.032	.006		.019	.045		
a1*b1*c1*d	.035	.005		.025	.047		

*** p<.001 ** p<.01 * p<.05

Due to the high value of variance explained in the model, we conducted a regression with all variables entered simultaneously and found VIF ranging from 1.335 to 2.085 and a Durbin Watson statistic of 2.035 thus excluding variance inflation and showing there is no autocorrelation of residuals. Findings support Hypothesis 6.

4.6.2 Results

Findings go in line with previous results found in this research and show all variables contribute to level 4 EPAs directly as well as indirectly through the proposed path.

It is worth noticing that ethics (represented in all paths “a” contributes to all EPA Levels and is therefore a positive factor to reinforce the importance of all EPAs. Its

diminishing coefficient magnitude, as it goes up from Level 1 to Level 4 is explainable by the fact that the model controls for the variance that flows through the other variables. Therefore, the effects found are specific of each path. Cumulatively, the model accounts for more than half the variance of Level4 EPA, although variance inflation was ruled out, which is indicative of its suitability to explain and build strategies to increase EPA centrality in pediatrics.

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Chapter 5: Discussion and Conclusion

5.1 Discussion

China is making more efforts in medical education to cultivate more skilled physicians and therefore the standards of enrolling medical school have been improved, the medical disciplinary construction has been strengthened as well as the cultivation system for medical talents. Additionally, more clinical education bases are available in medical schools, faculty capacity construction has been enhanced, and the education quality assurance system in medical schools has been strengthened. Lastly, the continuing education system has also been improved to complement the lifetime education system and the medical post-graduate education and continuing education have been given more importance with a focus on deepening the coordination between medical education and practices and ensuring training quality. Overall, a large number of resources have been put into the research of medical human resources, with Shanghai being the bellwether of medical education reforms in China.

Despite all this investment, new societal perspectives in China forecast an urgency for both general and specialized pediatricians. This was put forward by a new way of pediatrician training. This new way of training pursues a training system for pediatricians who are competent, better at practicing medicine, and specialist pediatricians who are better at innovation and being able to instruct students. Generally, physician training includes three stages in all countries, education in medical schools, education after graduation, and continuing education. Although the U.S., U.K., and China may have different names for their medical training modes, they share the same education cycles. This research focuses mainly on postgraduation education and continuing education.

Through the training, pediatricians gradually adapt to their roles as general pediatricians or specialist ones.

According to Chinese categorization of medical disciplines, there are 19 secondary disciplines and 73 tertiary ones.

As the definition of specialist physicians goes, a specialist physician of internal medicine falls into the tertiary discipline as a sub-specialty of internal medicine, such as

respiratory specialist physicians and digestive specialist physicians. The pediatric department includes pediatric surgery department and pediatric internal medicine department, with the latter including digestive, respiratory and endocrine departments (see Table 5-1).

Table 5-1 Three stage of medical education

	Stage1: Medical School	*Stage2:Graduate education*		*Stage3: continue education*
USA	MD Programme	Residency traning	Fellowship training	Career-long
UK	MBBS Programme	Foundation Programme	Specialty	Career-long
China 5+3+X	Bachelor programme (5years)	standardised residency training (3year)	standardised subspecialty training (X years)	Career-long

Note: MD = Doctor of Medicine, MBBS = Bachelor of Medicine, Bachelor of surgery. * 16 medical schools in the UK offer graduate-entry medical programmes, similar to the USA model but leading to an MBBS degree.

The most effective training for pediatricians, especially specialist pediatricians, lies in the second and third stages, training after graduation and continuing education. Pediatricians evolve in their roles transition in terms of work content and job competency. This role transition is often accompanied with physician distribution into different levels of hospitals. In China, different levels and nature of hospitals entail specific requirement of physicians. The tertiary hospitals in China mainly deal with rare and complex diseases with rather detailed departments. Accordingly, physicians in tertiary hospitals have to be specialists in certain areas to provide complex medical services. The secondary hospitals in China mainly deal with common diseases, requiring less of specialist physicians.

General physicians are also seen in this kind of hospitals. While the primary hospitals, namely community medical services, are equipped with almost 100% general physicians, providing primary healthcare management services to the community and also giving guidance to patients for further medical treatment. The distribution mentioned above is also demonstrated by the questionnaire.

The concern the pediatrician distribution in three kinds of hospitals. We can see from the tables that most specialized pediatricians are seen in tertiary hospitals. We notice a mix of general pediatricians and specialist pediatricians in general hospitals. There are a few of pediatricians in community health centers. There are fewer general pediatricians in children hospitals.

Table 5-2 Frequency for China's medical consortium membership

Option	*Subtotal*	*Percentage*
Yes	453	58.4%
No	154	19.8%
No idea	169	21.8%
No. of Effective Samples for This Question	776	

Note: Whether or not a member of China's Medical Consortium

Table 5-3 Frequency by Nature of hospital (consortium only)

Option	*Subtotal*	*Percentage*
Specialized Hospital	189	41.7%
General Hospital	243	53.6%
Community Hospital	21	4.6%
No. of Effective Samples for This Question	453	

Note: The Nature of Your Hospital (among members of medical consortium)

Table 5-4 Frequency by grade of hospital

Option	*Subtotal*	*Percentage*
Tertiary	547	70.5%
Secondary	203	26.2%
Primary	26	3.4%
No. of Effective Samples for This Question	776	

This is in line with differentiated roles and functions of different kinds of hospitals. Results of the questionnaire acknowledge this distribution pattern.

Medical consortium is one of the most exemplary projects of China's medical reforms, which is proven by tables of quantitative data (see Table 5-2, Table 5-3, Table 5-4). There are 607 subjects having a clear idea about if their hospitals belong to a medical consortium, i.e. 8 out of 10 participants.

It indicates that as an important move of China's medical reforms, the concept of medical consortium is widely applied, and most medical staff are familiar with it. 776 interviewees work in tertiary, secondary or primary hospitals, some of which are specialized hospitals, some general hospitals and some others community hospitals.

This survey, together with literature review and recorded interviews, have verified the fact that medical consortiums are constituted by hospitals of different grades and natures.

One important finding for this research concerns the use of the American Academy of Pediatrics EPA description to analyze the work content of Chinese pediatricians. We can tell from sample data that American pediatricians share the similar vocational activities with Chinese pediatricians.

Therefore, we have shown there is a basic guideline for Chinese pediatricians training in terms of professional activities. The 17+5 EPAs cover all work processes and scenarios of post-graduation education and continuing education.

Another important finding that might deserve further attention concerns the hierarchical structure of EPAs. Traditionally, EPAs tend to be treated as a list of requisites to guarantee professional competency. This makes sense as they all are potentially involved in daily pediatrician work. However, EPAs differ in complexity and also seem to follow a nested structure where some simpler EPAs are required to be able to correctly perform more complex EPAs.

Thus, the hierarchical structure we tested and the was empirically supported makes sense especially because it corresponds to the serial sequence of learning goals in a pediatrics program.

Work scenarios for pediatrician EPAs and digestive pediatrician EPAs are mainly a set of medical activities in outpatient departments, emergency rooms, intravenous infusion rooms, functional rooms, and inpatient wards. A tailored training plan has to be made according to different scenarios (see Figure 5-1). The diagram (see Figure 5-2) reflects the work scenario of Chinese pediatricians. Different work conditions mean different responsibilities.

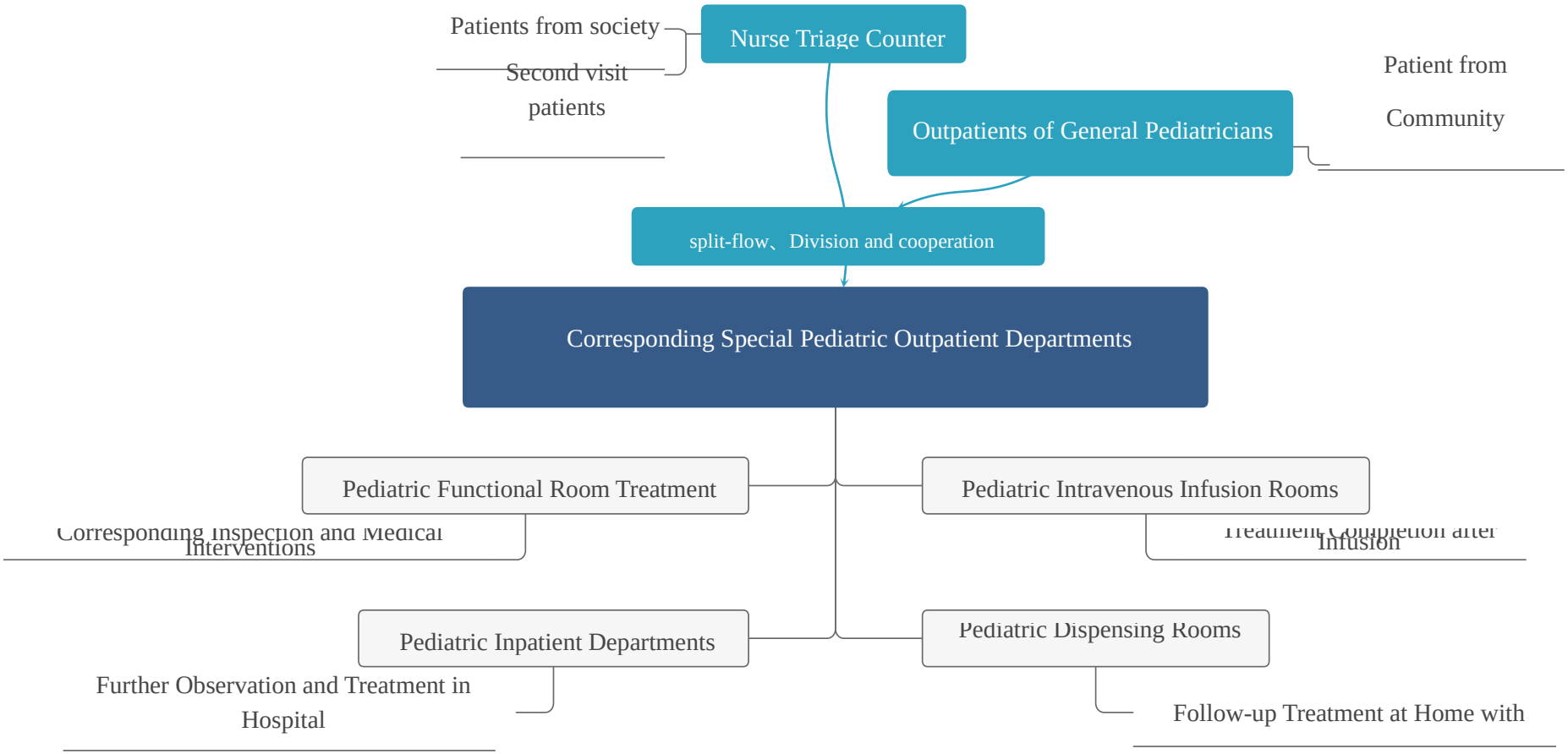

Figure 5-1 Diagram: medical service process of pediatrics in general hospitals

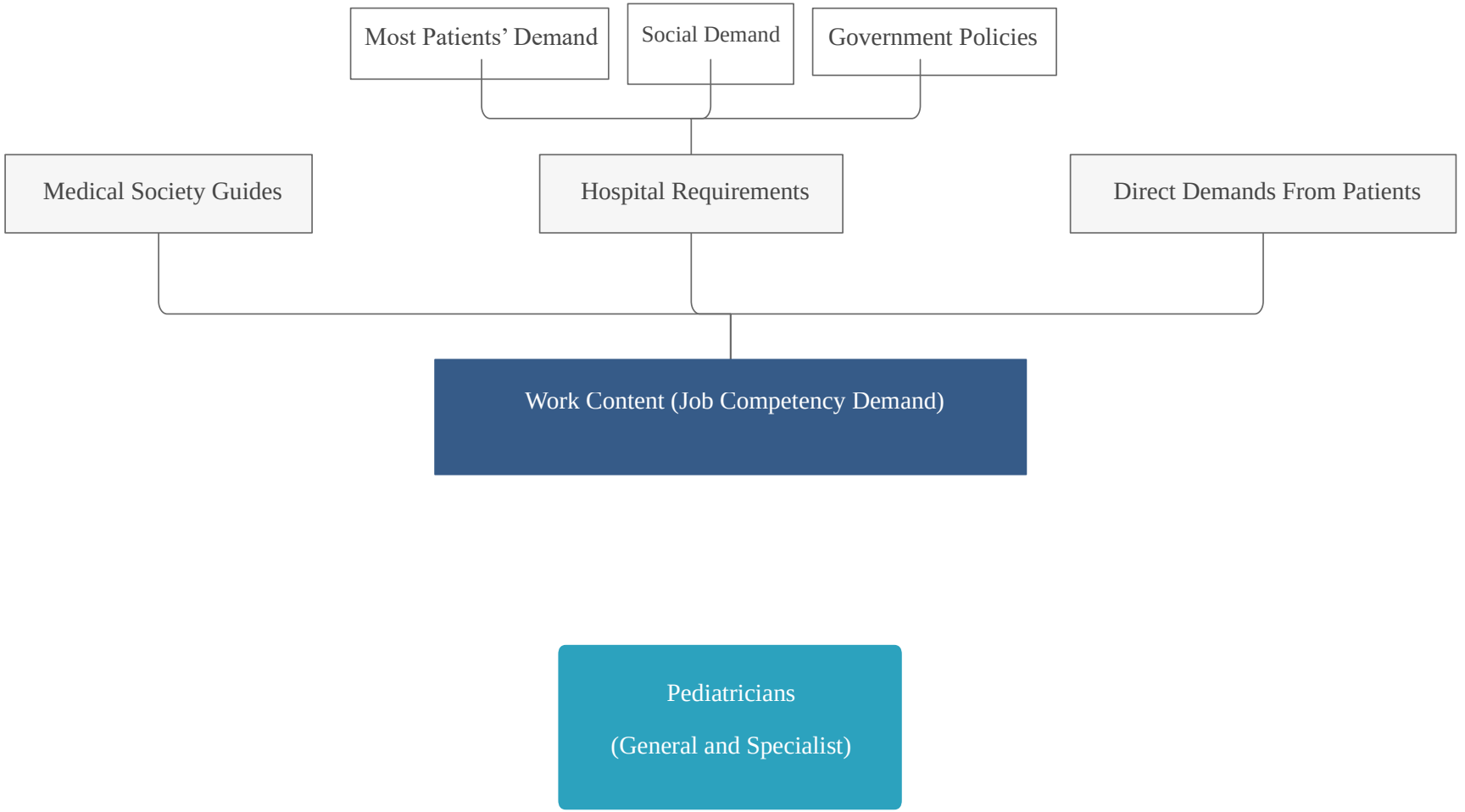
Most Patients' Demand
Social Demand
Government Policies
Medical Society Guides
Hospital Requirements
Direct Demands From Patients
Work Content (Job Competency Demand)
Pediatricians
(General and Specialist)

Figure 5-2 Contributors to Pediatrics job competency demands

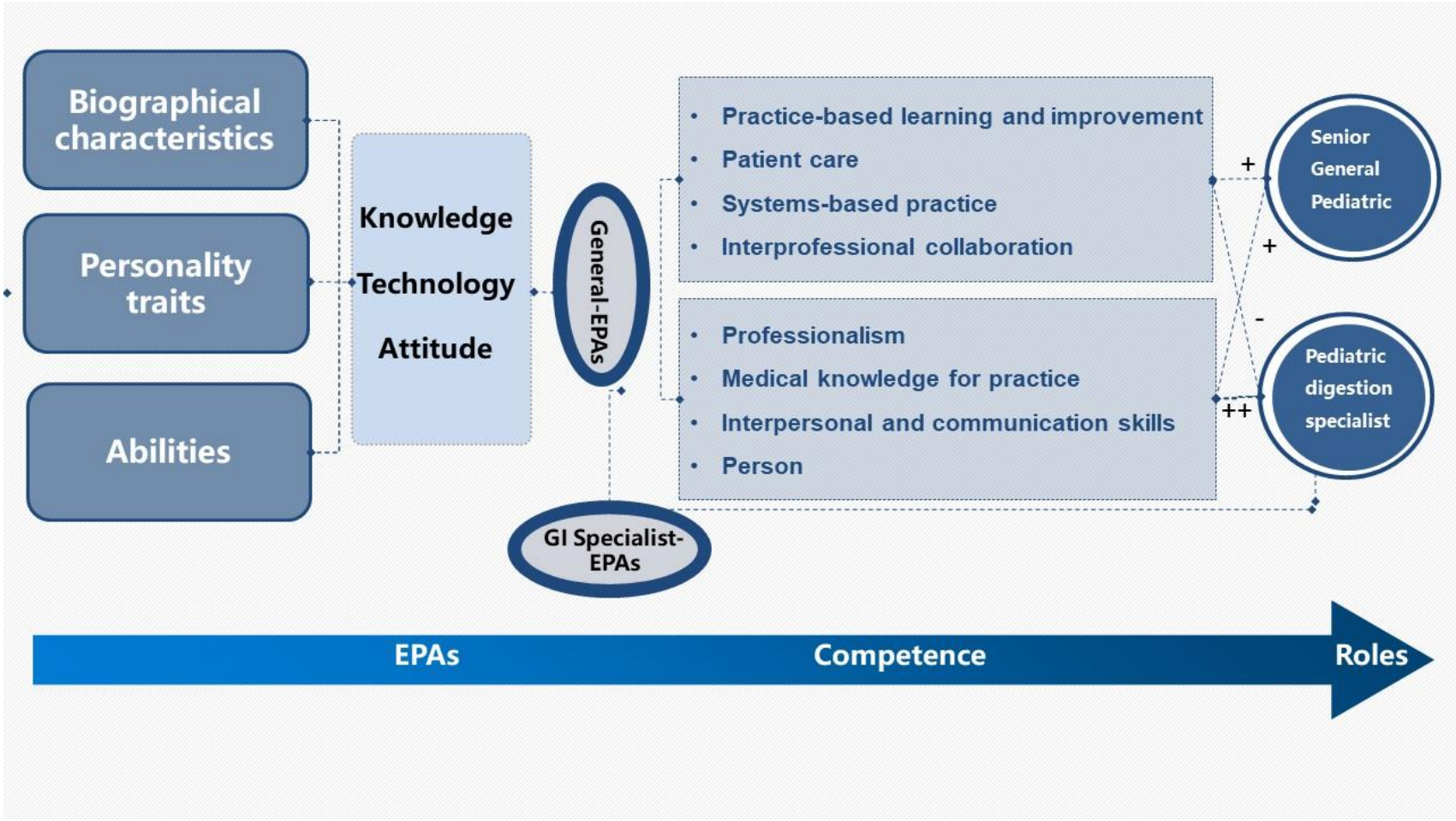

Figure 5-3 Competencies – EPAs – Roles schemata

There are various causes for certain competencies, arising from different work responsibilities. One kind of competency comes from multiple tasks and instant needs occurred during the process of patient treatment, such as communication. The second is derived from tasks for promoting the healthy and scientific development of social demography, such as science popularization and lectures on medicine and humanities.

The third comes from the government orders. The fourth is about competency of making treatment plans for new diseases based on the latest epidemic disease survey samples, which are constantly updated. All the above can be the causes of competencies required for pediatricians.

Based on the quantitative study, factor analysis of sampled data and Professor Xu's value assignment method, the model (see Figure 5-3) is built combining average value and work scenarios.

5.2 Limitations

Any research has limitations due to the choices made. As stated, mixed methods offer many advantages by bringing together inductive and deductive approaches. However, although we have qualitive and quantitative studies in this research, the samples are only pediatricians, not all physicians, thus it cannot reflect the characteristics of all Chinese medical workers.

Likewise, this research is exploratory. Considering the fact that the development of competency training model is a complex and systemic project, this research by itself cannot be thorough about everything.

Another limitation concerns the sample. As we only take pediatricians as samples, this research cannot verify if the competency training model, built on pediatricians, can be applied to other physicians.

As regards the interviews about competency models in China and abroad and the status quo of Chinese pediatricians, the research departed from a guideline of questions made in advance, which may have some subjective influence over the findings of this research. Also, during interviews, some interviewees got carried away from the topic, causing a certain level of weakness in interview content coding.

The range of factors influencing physicians' development is wide. Physicians' mental status, learning attitude, values, team spirit, education level, among other factors, will

impact their growth and self-identification. This research excludes these personal factors. This option was made for feasibility sake and also because the thesis is not developed within a psychological approach but rather an organizational behavioral approach which made us place the focus upon the concept of EPA. This is a brand-new concept and is extracted from applications in different work scenarios. The American Association of Pediatricians and American Association of Pediatric Gastro-enterology have already formulated related EPAs for pediatricians and therefore this seemed to be a suitable starting point for our approach. However, some EPAs items are not met with strong consensus with Chinese pediatricians. This is because China and the U.S. do not share the same pediatric working conditions. The severe shortage of Chinese pediatricians leads to an insufficient pediatric system. When China's pediatrician system is in full shape or fully developed, cognition among Chinese pediatricians may evolve and catch up with current American's cognition. This research uses American's established EPAs. Though a seminar for seeking consensus had been conveyed at the beginning, deviation may still occur when put into practices as the EPAs are not established by Chinese pediatricians.

5.3 Vision of the future

Further study of EPAs in physicians' education after graduation will be continued based on this research. EPAs used in the U.S. will be revised further to adapt to the training models of Chinese specialist physicians, apart from digestive physicians. The developed EPAs can be used as evaluation tools. An EPA represents a certain type of capability; therefore it can be used for evaluation. This is getting acknowledged by more people in competency training programs. One of the major advantages of entrustable professional activities is that they can be observed (therefore easier for evaluation). They are closely related with the daily work of medical workers (therefore highly relevant). Once a trainee can do these activities in an active, effective and safe manner without supervision, and able to integrate related capability domains, he/she can be deemed capable of carrying out corresponding entrustable professional activities. As a result, EPAs can be developed as evaluation tools.

EPAs for gastro-endoscopy specialist pediatricians in China can be made by using results of this research, from which we can further explore the experience and process of building EPAs. This will help the establishment of China national pediatric

gastro-endoscopy center. Current general pediatricians can join in the training program for gastro-endoscopy pediatricians.

As medical reforms sweep all over China, every tertiary general hospital has to take the responsibility to train general physicians. This research can be used for general pediatricians to learn general pediatric skills, so as to improve their capability to provide consistent and comprehensive medical services to individuals, families and communities.

5.4 Conclusion

This thesis is a prospective study of digestive pediatrician education system, an exploration of digestive endoscopy pediatrician panel of the National Health Commission of the People's Republic of China. It serves as a way toward the improvement and exploration of education system for pediatricians after graduation and for continuing education. Meanwhile it also helps laying the foundation for clinical pediatrician's career after graduation and for continuing education.

During the research, we found that the education in medical schools in China serves as formative years for a physician's lifetime medical education. Medical students are unclear about their careers. Their days in college are fulfilled by finishing mandatory curriculums and basic medical practices. They have not figured out about themselves, nor what hospitals mean to them. Generally speaking, college students are driven by the single goal of obtaining degrees. They have no clear plans about the future, whether desiring to be a doctor or what kind of doctors. Only after graduation, during the following up education, do they start the transition to be physicians. In building themselves into physicians, they rediscover what is medicine, the medical environment and hospital management. Unlike medical school students, who are affected by rather simple factors, they are now under multiple influences, such as policies, economy, culture and society, shaping themselves. They analyze the whole situation by considering their personal traits, advantages and disadvantages, personal interests, opportunities and risks. They revise expectations through medical practices and holistic analysis. They finally come up with career plans and define themselves. They choose the institution they are going to work with based on their specific career plans and ultimately, they become experts of certain medical sectors or specialists of certain medical departments or disciplines.

This research is focused on ways and methods of medical education after graduation and of continuing education. It studies physicians' growth pattern. The subjects in this thesis are pediatricians (and digestive pediatricians). In Chinese medical industry, this group, among other groups of physicians, are in great shortage and therefore are special samples. It is confirmed by many people in many literatures and interviews that, the number of pediatricians, due to multiple reasons, such as government policies, hospital management, department performances, salary and education patterns, are decreasing greatly. The latest government report of China highlights great support for pediatric development, with an emphasis on innovation. This research helps with China's medical reforms in relieving the pressure of pediatrician loss by way of this new and efficient training. A training model for tertiary general hospitals is built based on the new teaching concept (EPAs).

This research includes literature research, interview research and competency-based training of pediatricians. A training model with EPAs theory is also built. The concept of EPAs is also recently introduced into the western medical world. This research uses EPAs of American Association of Pediatricians and American Pediatric Gastro-enterology Association. The items in the above-mentioned EPAs have been tested if they meet the reality of Chinese pediatrics. A seminar was conveyed before the research, which demonstrated that these items reflect the reality of Chinese pediatrics. These EPAs break down into detailed activities according to different medical tasks neatly. The competency related theories can be used to evaluate and explain things. Through quantitative study, we found the positive correlation between pediatrician EPAs. They are complementary. EPAs of general pediatricians and digestive pediatricians are also complementary and positively corelated. They also enhance and reinforce job competency indicators.

During the whole training process of pediatricians, certain EPAs items are strengthened constantly to enhance activities of digestive pediatricians. While some other items of general pediatricians EPAs are weakened. Digestive pediatricians are formed as a result of the intentional focuses in activities training. For two competency domains, system-based practice and practice-based learning and improvement, digestive pediatricians perform better than general pediatricians. Before one becomes a specialist physician, he/she has to go through general physician's training to get the know-how of medicine. Then he/she can combine with clinical practices, personal development and other factors to decide whether or not to pursue a specialist career. If not, he/she can

become a senior general pediatrician. Right now in China, all tertiary general hospitals are part of the medical consortium projects. These hospitals take the roles of general physician trainers and health popularizers. These roles will become the mandatory requirements for physicians in these hospitals, which will soon evolve as part of physicians' routine. Physicians have to receive relative training after graduation and in continuing education to be competent for the new job requirements. Hospital requirements will in turn, become part of the competency model.

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Appendix 1: Interview Outline (Chinese Version)

第一部分剧本：

1.你认为中国儿科医生的现状如何？

2.儿科医生是否短缺，为什么?（可能背后的原因与医院管理的选择/工作条件以及医疗保健或医学院的合作程度有关）.

3.医院管理备选方案/工作条件”的可能类别是：时间表、工作量、薪金、教育/培训职业加上工作福利、健康的工作生活、工作-家庭平衡“，加上大学教育质量和临床领导能力”。

4.与保健/医学院合作”的可能类别是：吸引儿童进入保健专业的行动。

第二部分剧本：

1.是否有创新的机会和支持 （改进工作流程或建立新事物的自主性）

2. 对竞争力的重视程度 （强调成就，努力使别人与众不同，有竞争力）

3 选择工作的稳定程度 （工作安全、平静、宁静、低冲突）

第三部分剧本：

1.病人和他们的家人呢？

2.中国儿科的未来是什么？ （年轻的兴趣在以下医学研究 7 儿科）

3.需要做些什么来改善目前的情况？

4.社区儿科的建设呢？

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Appendix 2: Interview Outline (English Version)

Script:

Part one

1.What do you think about the present situation of pediatricians in China?

2. China is short of pediatricians. Why?

.(Maybe it is related to the options/ work conditions of hospital management and the degree of the collaboration of healthcare or medical schools).

3.The possible categories of "Hospital management options / work conditions" are: schedule, workload, salary, profession in education / training, workfare, healthy work and life, the balance between work and family and quality of college education, the ability of clinical leadership".

4.The possible categories of "Collaboration with healthcare / medical schools" are: attracting children get into the healthcare professions.

Part two

1.The opportunity and support to be innovative (the autonomy of improving work processes or building new things)

The attention is payed to competitiveness (emphasizing achievements, making effort to be different from others, being competitive…)

2.The stability (work security, calm/serene environment, low conflict rates)

Part three

1.And what about patients and their families?

2.What is the future of pediatrics in China? (the interest of the young is in following medical studies 7 pediatrics)

3.What should we do to improve the current situation?

4.What about the construction of pediatric community ?

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Appendix 3: Focus Group Visit Record (Chinese Version)

小组焦点访谈 1

（访谈对象包括：6 位医师（3 名初级职称、3 名中级职称、2 位初级职称医师）

我：第一是说认为儿童医生的现状如何？

女医师 1：现状要很大呢？你准备从哪个点呢？

我：从感觉来说。

女医师 2：因为收入低、压力大。

女医师 1：工作量太大。

女医师 2：关键是地位太低。

男医师 1：钱少事多。

女医师 1：社会地位低、而且投诉太多，就是在同行之内地位低，病人里也是比较不受尊重。

女医师 3：同行之内就无所谓了，随便同行怎么说。让我们工作顺利点就行。

我：第二个主题是儿科医生短缺。首先是背后的原因，先是从医院管理角度来说。

女医师 1：医院不受重视。

我：他等于是要从你对医院的管理工作的感觉。

女医师 1：没保障吧。出什么事也没人给我们出面。

我：感觉稍微再深一点。

女医师 2：深一点吗？

我：就是有没有更细节一点。

女医师 1：就是医院不受重视，觉得儿科是个小科室，没有什么发展前途，不赚钱呗。

女医师 2：可有可无的。

女医师 1：对呀。人家觉得你是个包袱，最好把你给丢了，把你给关了。还有一样不受重视。

女医师 2：不图你赚钱养家。

女医师 3：图你别出事。

女医师 2：对，就图你安安全全地别出事。

女医师 4：感觉不受重视

女医师 5：在出现家长争吵的时候没有安全感。

我：哪一个感觉问题更加突出呢，问题比较严重的。细化从工作条件有什么吐槽的。

女医师 3：工作条件？

我：硬件、软件等。

女医师 1：我感觉都没有什么硬件软件，医院里面不给你投入。

我：是哪方面投入？

女医师 1：比如说人才培养、仪器的引进这些方面，搞合作呀这些。

女医师 2：你想搞合作，人家还不想跟你合作呢。

我：那你是根据什么说的？

女医师 2：因为搞合作是要能将来扶持你的，你能给人家什么好处呢？

我：估计是医学的培养力度。然后就是时间表、排班表。

女医师 2：时间表、排班表？

我：应该是工作量上跟时间的关系。反正我觉得工作量和时间安排都超时了。

女医师 1：超时这是季节性的。

我：就是忙得忙死、累得累死。

女医师 6：我是觉得儿科忙是分季节的。你想我们基本上 11、12、1 月份，三个月忙，忙的时候真心是很忙，但是淡季的时候我们也挺闲的。所以就有点不均，不过这个也没办法。

女医师 5：这种矛盾没办法解决，不能派临时儿科医生呀。

女医师 4：你忙的时候做临时儿科医生，你闲的时候做什么？

女医师 2：闲的时候搞研究。

男医师 1：写标书。

我：国外呢?

女医师 2：人家的福利很多，不像我们这种。

女医师 1：国外儿科医师有休假什么的。

女医师 3：人家的福利很多，老外没办法理解我们这个。

女医师 4：他们有带薪假。

女医师 5：而且他们比如有时候还可以喝喝下午茶，喝喝咖啡之类的。

我：的确是有的，不能占有喝咖啡的时间。

女医师 4：他们的带薪假还是很长的。

女医师 5：他们有下午茶时间，我们是没有的。

我：关于现在儿科的薪酬的现状是什么？

女医师 2：就是少吧。就是差距太大了。

女医师 1：对，跟别的科室比差距太多了。

男医师 1：贫富差距不均。

女医师 5：其实国外儿科医生薪资也不高。

女医师 1：对，他们也不高，但是他们医生的整体层面都高。

女医师 4：因为儿科你本身也我没什么赚钱的。

女医师 2：儿科因为不赚钱，所以其实就不受重视。你想你要么就一点点，然后检查就更没有什么了，我们这里也就开个血常规你还有什么东西吗？

女医师 3：现在开这几项还不错。

女医师 2：你说肺炎支原体。

女医师 3：起码能加一点。

女医师 1：几项加起来有 150。

女医师 4：我今天看了好几个修片、加血常规、加肺支，然后就是 70、70、140。

我：福利还有吗？福利都没了吗？

女医师 1：我们有电影票。

女医师 2：也是这两年才有的，好吗？你以前有吗？

女医师 3：还福利呢。

女医师 2：其实那种几年一次的那种我们就很少。

我：旅游。

女医师 3：其实就是把那个给弄掉了，你以前不是有工会卡嘛，现在工会卡没了，其实是一样的。

女医师 2：其实我觉得那种还划算一点。

女医师 1：这是只是个人的，不像国外的话可以一家人去。

女医师 3：我觉得还是应该放松放松心情，一年去一次，才能更好的工作。

我：对于奖金还有没有那种更加残酷一点的词汇？

女医师 1：民工。

男医师 1：寒酸。

我：别人根本不知道民工是什么东西好吗？

女医师 2：就是技术熟练工，感觉跟操作工差不多。

女医师 3：但是像国外这种技术熟练工很高的呢。

我：人家搬砖出力钱多。

女医师 4：人家缺这种的。

男医师 2：澳大利亚不是收入排前三的嘛，第一名就是水管工，人家是按小时来收费的。下雨天还要多加一点，室外还要多收钱。

女医师 5：人家日本的那些电器搬家都不要的，因为那个人工会比电器还要贵。

女医师 1：其实我们已经慢慢开始往那个方向发展了。现在搬家有好多东西搬不走。

我：有什么健康的工作和生活？

女医师 1：运动运动。

女医师 2：现在需要发泄、需要减压。我们晚上回去就是吐槽大会，因为在我们宿舍有一个护士，然后大家下班第一件事就是说今天遇到什么奇葩了，然后宣泄完了，大家都上床了。

女医师 3：你回家可以去吐槽。

女医师 2：我们可以。

女医师 3：我回家跟我爸妈吐槽，我爸妈都不理解的，人家就觉得你应该换位思考，站在病人的方向考虑的话，你这些是不对的。所以我有的时候回去，我不愿意跟我爸妈去吐槽。

女医师 4：他们觉得你不就帮人家多看一个病人嘛。

女医师 3：他们就觉得你这些都是不对的。

女医师 2：所以说就像我们在宿舍里面我们都是这行的，我们之间可以吐槽一下。

女医师 3：所以我觉得我回去是不能吐槽的，我没办法吐槽。

男医师 1：跟家人吐槽还是不太好。

女医师 3：他们觉得把负面信息给你带回去的。

女医师 2：他们没办法理解。

女医师 1：负能量太多，每次回去都得吐槽半天，减压完了，然后就可以正常地吃饭了。

我：工作跟家庭之间的平衡，有没有完全冲击家庭？

女医师 1：当然冲击了。

女医师 3：当然有冲击了，我妈说我回去脾气特别差，老是发脾气。

女医师 2：管不了孩子。

女医师 1：春晓（音）不是也说了，她有一次回去，刚开始的时候她爸老是说她，要她对病人态度好一点，后来有一次就直接冲他大发火，以后她爸就再也不敢说她了。

女医师 2：我妈也是这样说的，说你脾气要好一点，态度要好一点，不能跟人家发火，不能跟人家吵架。现在我每次上班，我妈就会说你脾气好一点，不要吵架。

男医师 1：有的时候脾气太好，病人反而压不住。

女医师 4：双休日太少了。双休日基本上只能半天，有一天在已经不错了。

我：那我觉得这应该放在工作福利里面。

女医师 4：可以呀。

女医师 1：有两天休已经不错了。

女医师 3：是因为病人太多了，医生跟病人的比率实在是太低了，导致每个病人看医生的时间太短了，他真心觉得交流太少了。

女医师 5：一个交流少，另外病人的要求过高，病人对观念有点扭曲了，经常会出现他来的目的，就是你要满足他的要求，任何一方面满足不了，他就可能对你发飙。这个是太容易产生矛盾了。说是病人，中国人群总体素质问题。

女医师 3：中国人素质还是不高。

我：这个题目太大了。

女医师 5：老外说你们都这个样子？

女医师 1：这个他们肯定搞不懂。

女医师 3：但是有一点跟外国不一样，人家一个人上午看十个病人，我一天看十五个病人，他有足够的时间跟病人交流。

女医师 2：我们没有时间交流。我们后面你看外面那么多病人，我多给你说一分钟，外面的病人就要多等十分钟。

女医师 3：所以这不现实。第二个，人家的看病确实很贵，基本上都是保险公司负责的，挂号费很贵，我们这些都是自己出的，所以有矛盾很少的。我碰到过一次吵架，当时旁边人直接处理了，我碰到一例，他觉得护士不满意，立马就换一个护士。

男医师 1：咱们跟国外的收费标准不一样，就三级医院和二级医院不一样。

女医师 1：他们收费很高的。

男医师 1：越高级的医院，可能收费越高吧。

女医师 2：所以是因为我们这些病人他觉得是自己交了钱。

女医师 3：对，他们都是花得自己的钱。

男医师 2：直接从他口袋掏出来更加痛心一点，如果是他父母买保险，保险公司替他付的话，他就不会这样了。

我：无所谓？

男医师 2：也不能说无所谓，就是想的话还是有的，但是还是出自己的钱，保险公司也是你投保的。

女医师 1：但是你转一个弯人家会觉得好很多。

男医师 1：不一定都是那样。

我：平时有没有经常的继续教育和出去开会这样的一些机会？就是医院支持力度怎么样？

女医师 2：自己搞定。

女医师 1：好像出去开会，医院从来都不支持的。

女医师 3：我们其实也傻，其实是可以报销的。

女医师 4：你们可以报的，而且现在有弱势学科扶持，专门有一笔钱可以报销的。

女医师 3：应该是可以报的。

女医师 5：我们上次那个报了吗？

女医师 3：我们上次报的那个，他给我们的就是会议费。

男医师 1：拿到了吗？

女医师 3：我拿到了。我们每年儿科会议费有一万块，我们从来没报过。

女医师 2：没人跟我们说呀。

女医师 5：你们可以一起去投稿呀。关注每年儿科年会，专门去投稿，投稿你就解决了。

女医师 4：我们去参加？

女医师 5：对，大家排排队，分开去。

我：你那个钱已经拿到了？

女医师 3：我六千拿到了呀，然后她说她也过了，我叫她快点去弄完拿钱。

女医师 2：那我们俩就不用出了，对吧？

女医师 3：对。

女医师 1：什么呀？就是那个 pose？

女医师 1：你的呢？

男医师 1：我的还等着她给我。

女医师 3：我等着医院的钱到手了，我就给你钱。你就不要管了，你的我早给你付掉了。

女医师 2：谢谢。

男医师 1：我们还少报了一千。

女医师 3：对。但你没办法报了，你一千怎么报呀？对吧。

男医师 1：后面不是我们拿到的几百万的那个，那个不能去报吗？

女医师 3：可以报。

女医师 5：但是要记住，出去开会一定要有依据，你一定要投稿。

男医师 1：不是开会。是上次大华去那里学习。

女医师 5：可以。

男医师 1：我那里还有张三千块钱的发票。

女医师 3：你出去会议如果要报销，一个他要有邀请函，然后有行程表，这些都必须给提供的，你不提供他不给你报。

女医师 5：对。这是财务上规定的。当初去进修都可以报销的，短期进修都可以报销。

男医师 1：我现在有个三千块钱的发票，可以吗？

女医师 5：可以的。

男医师 1：那要怎么去弄呢？

女医师 2：他短期是多久？

男医师 1：上次打回来了。

女医师 3：你那个六百万是下来了？下来了你也可以试试看呀。

女医师 5：可以去报的。因为我这笔钱也是可以的，专门医生培训可以。

女医师 1：专门有一个急救培训里面有的。

男医师 2：好像没有那个重点学科，你只从医院的角度走，外面就是 60%。

女医师 2：到 60%？

男医师 2：对。

女医师 3：但是直接打回来的，我那时候报，他直接给我打回来。

女医师 5：那你上面要写什么项目。我们有两个项目，一个是门生改造这个项目，一个就是弱势学科，每年三四百。这我也感兴趣，最开始医生都打进去了，初期我也打进去了。这个弄上去，以后你只需要填什么项目支出，很明确的项目的话，他就会给你报的。然后叫主任签个字就可以了。

女医师 2：是弱势群体？

女医师 5：我们叫弱势教育学科。

男医师 1：因为我是 12 月份拿的发票。

女医师 5：可以可以。

男医师 1：培训费有三千块。

女医师 3：那到时候你看看能不能报吧。

女医师 2：什么培训费三千块？

女医师 3：就 pose。

女医师 2：你报的不是 pose 吗？

女医师 3：他报的是我们俩的。

女医师 4：他是管两年，我瞅了一下，他给我的时候已经半年过去了。然后相当于我俩只管一年半。

女医师 1：就是学习一下，我们那个早就报废了。我们那时候是 2013 年。

男医师 1：6000 多万，可以的话也可以去报一下。

女医师 1：我们都可以报？

女医师 3：可以呀。你后面有钱的话就可以去。

女医师 2：他有个培训项目我们每个人都可以去。

女医师 5：对。你们都可以。

女医师 1：我们那时候是那种配的才有的。

女医师 2：你那时候没有吗？新华医院没有？

女医师 1：新华没有，新华只有三年本科毕业的那个。虽然我们上课，但是没有证。

女医师 2：儿童医院也有一个，现在也开始搞 pose 培训了，儿童中心是最早的。

女医师 3：他搞得挺好的，一套的。

女医师 2：对，就一整套的系统，还弄的蛮好的。

女医师 1：你还有吗？

我：还有一点点。

女医师 1：继续。

我：后面吐槽就是在日常工作中，有没有什么让你自主觉得有关工作流程再造，或者需要改进的地方，就是有没有在工作中自己感觉有这样的意识？

女医师 1：有呀。当然有。你在工作流程里面，可能觉得有缺陷，我们自己也会说。

女医师 2：那个信息科也不知道改了我们那个没。

女医师 3：那人一打，就好大一堆，给我打出来了。

男医师 1：你就不要点打印，你点否就可以了。

女医师 1：你点取消没用了。它到后面还跳出来的。

女医师 2：你另外开一个药，它就要把前面的全都打出来。但是门诊系统做不到。

男医师 1：它可以选择第一处方打不打印。

女医师 1：没有的。

女医师 2：有的。你看你怎么开了，如果说第一张你开了一张处方，然后第二张你是在这张处方上开的，那肯定就要打印。

女医师 3：不是在这个处方上，都是单独另外的。

男医师 1：你那属于第二张处方了。

女医师 4：不是，它这个系统设置就是没有做好，你门诊都可以。早上给我搞了一下没有搞好，下午不知道来不来。

男医师 2：那个诊间的打印机还是那样。

女医师 1：那个打印机好烂。它会串页的，一打就出来，到最后就出来好长一段。

女医师 2：反正我就感觉上下两页变成一张。

女医师 1：我有的时候就上下两页，管他呢。

女医师 3：特别搞笑的事，药房里的人专门来我们处方的人看病，他说你们儿科的处方我们都习惯了，一会儿长、一会儿短、一会儿只有一点。然后我就问他，那这怎么弄呢？他说我们也只能叹气接受了。

女医师 4：问题是我昨天去人家成人科，他帮我处方打在我的病史上了，按照道理来说，应该是要再打印一张，你知道他怎么做的吗？他就直接把我病史上的直接划掉，然后直接在我另外一张处方上面把这个药直接写上去就搞定了。

男医师 1：就手写处方了？

女医师 4：就手写了。他干嘛还要再打一张，

女医师 2：我们也可以手写，但是要总结一堆就太多了。

男医师 1：字可以手写的，但是手写，有的时候字太多了。

女医师 3：那护士就让我手写，前面不是不让手写吗？

男医师 1：你说开个葡萄糖补液，挂个瓶子，四行要写的。

女医师 1：那 5S、GS 什么的。

女医师 2：那他那个急诊系统就是没有弄好呀。看他这次还弄得好吗。

女医师 3：偏离主题了。

我：没有没有。主题是在的。

女医师 1：讨论信息科的问题了。

我：实际上我们匹配度还没有从临床那边使用出发。

女医师 2：我觉得信息科有男的也挺惨的，直接打电话先把他叫来了，结果他又在相关的专业问人家。

女医师 4：现在我们中班去就诊间的那个，现在还要重新登录吗？我每次去都登不上。

男医师 2：肯定是护士维护的问题。

女医师 4：我每次去都登不上，他们说你打电话给信息科，我打了电话，他说我帮你把 IP 地址删掉就好了。那你就删一个地址而已，你帮我直接弄掉不就好了，我记得我每次都要去打一个电话。

女医师 3：没有。我上次就没有。

男医师 2：但是我看有些是护士维护的问题。

女医师 1：我就没打，直接登的。

女医师 4：我反正每次去就诊间我都要打电话，傻不拉唧的。

女医师 2：我就有一次没有弄好，后面好像都可以了。

女医师 5：我换过两次，都要打电话。

我：最后谈谈儿科的未来是怎么样的？。

女医师 1：未来应该挺美好的吧。

女医师 1：没有呀。

女医师 2：做好家庭医生什么的，分级诊疗。

女医师 1：你看二胎越来越多了。

女医师 3：我们职业多光荣呀。

女医师 4：祖国的花朵。

我：家庭医生这个项目到底现在算有起色吗？

女医师 1：社区好像有。

男医师 1：我后面问了一个社区里面，人家说你是社会儿科医生？我说社区就没有儿科医生。

女医师 2：但是好像现在开始了。

男医师 2：有的社区有。

女医师 3：现在他们社区是这样的，可能就一个医生，但是这个医生是全科医生，他这个全科医生到儿童医院去培训三个月，就像他们规培一样培训三个月，三个月回来以后，等于就可以看一下感冒这种简单的，就是如果挂水什么的，他们都是不挂的。

女医师 4：有的地方有挂。

女医师 3：但是你过去配配药什么的是可以的。

男医师 1：行为准则里面就是凡是发烧的都不看。

男医师 2：已经很好了，可以分你很多的精力。

女医师 1：至少他可以给你把血验一下，然后让你过来。

我：最后说我们不是医联体嘛，那假设我们要去负责帮助援助建设一个社区儿科，我们能做些什么？

女医师 1：投钱呀？

我：除了投钱。真正社区比我们有钱。

女医师 2：培训呀。

女医师 3：是我们医院援建一个，

女医师 4：诊疗规范一起做呀。

我：从哪方面培训呢？

女医师 5：人到医院里面，就像培训配置一样。

女医师 2：这个种类好像在做了吧。

男医师 1：就像我们那个全科医生什么的，全科学生从哪里来的？从中国。

女医师 1：刚刚一个潍坊医学院，一个健康医学院。

男医师 2：那实习的？

女医师 1：不是说实习的，我是说全科医生。

女医师 4：他那个全科是专门到社区去的。

女医师 1：他们全科是这样的，就是当初他们读大学的时候，就签合同的，就是全科

医生。

男医师 1：没有，不一样，他是规培的时候。

女医师 1：你以为我不知道呀。我跟你讲，我那个时候我在读大学，他们是有的，就是入学的时候，你签合同是全科医生，你出来就是全科医生。但是我知道他们那第一批跟第二批都是免学费的。

男医师 1：那可能带点定向感觉。

女医师 2：然后你后期到医院还给钱。

女医师 1：而且咱们后来回户口所在地，就是你户口在哪里，你就去哪里。

男医师 1：就有点定向的性质，他这可能是单位出钱的。

女医师 1：就是你回户口所在地做全科医生。就你回户口所在地的那个社区。

女医师 3：相当于以前的委托培训。

女医师 1：对。

女医师 4：那好像只有上海有。

女医师 1：反正我知道那个时候 他们是免学费、定向，就是出来肯定是有地方待的，所以就有很多人考。

我：带教形式呢？查房、开院。

女医师 4：讲课？

我：除了讲课。

女医师 2：不就这些嘛。

男医师 2：每年 11、12、1 月份开展带教活动。正好医生不够，过来带教。

女医师 3：我觉得现在实习的比我们那时候轻松多了。

女医师 1：我们加班，他们都不听的自己在那玩手机。然后收病人的时候，人家说我还要收病人呀？

女医师 4：他们现在实习的出来也找不到工作，他基本上都在考验。

女医师 5：而且都很明确的，不会做儿科的，他为什么在这里那么认真呢。

女医师 2：是全科医生，就是看儿科的。

女医师 3：她不熟。我们说的是那个实习医生。

女医师 4：就大学生。

男医师 2：潍坊那边是麻醉科的。

女医师 1：对呀，他们又不是看儿科的，他们为什么要很认真呢？说白了，跟他们没

什么关系的。

女医师 2：但是那个实习的要求要写一份大病例呀。

女医师 1：那个是健康医学院，潍坊不用。健康医学院要求的。

女医师 5：那总归要收个病人吧。

女医师 3：那也要看的。他们有的同学比较认真的会积极要求收病人，有的人就不管、不做的，他们到时候走的时候，你直接拿一份你的病例抄一下，直接打印一下。

女医师 1：你的问题结束了吗？

我：结束了。谢谢。

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Appendix 4: Focus Group Visit Record (English Version)

(Interviewees: six physicians, including three with junior professional title, three with medium-grade professional tile and two with senior professional title.)

Me: what do you think of the current status of physicians?

Female Physician 1: “Status” is a big word. Which specific perspective are you referring to?

Me: from your feelings.

Female Physician 2: low income, lots of stress.

Female Physician 1: huge workload.

Female Physician 2: mainly on low social status.

Male Physician 1: less money but more things to do.

Female Physician 1: low social status with a lot of complaints. I mean low status among peers and less respected by patients.

Female Physician 3: It doesn’t matter if it’s among peers, and no matter what they say. We just hope that everything goes well.

Me: The second theme is the shortage of pediatricians. First, the reasons behind it, first from the perspective of hospital management.

Female Physician 1: not taken seriously by the hospital.

Me: from your feelings about hospital management.

Female Physician 1: Less security. Nobody stands up for us when something happens.

Me: more deeper feelings.

Female Physician 2: deeper?

Me: more details.

Female Physician 1: Not taken seriously by the hospital. Pediatrics is regarded as a small department, no future, not making money.

Female Physician 2: unnecessary.

Female Physician 1: Right. They think it’s a burden. It’s better to lose it and shut it down. Besides, unimportant.

Female Physician 2: not expecting you to make money.

Female Physician 3: just don't have accidents.

Female Physician 2: yeah, just keep everything safe.

Female Physician 4: not being taken seriously.

Female Physician 5: not feeling safe when it comes to quarrels from patients' parents.

Me: Which problem is more prominent, more serious? From working conditions.

Female Physician 3: working conditions?

Me: hardware, software and so on.

Female Physician 1: I feel there is no hardware, software. The hospital doesn't invest.

Me: invest in what?

Female Physician 1: like training, introduction of instruments, engagement in cooperation projects.

Female Physician 2: we want to cooperate with others, but they don't want to cooperate with us.

Me: why do you say that?

Female Physician 2: because they cooperate in order to support themselves in the future, but what benefit can you give them?

Me: Maybe medical training efforts. Then, the timetable, the schedule.

Female Physician 2: the timetable, the schedule?

Me: I think it's workload and time, overtime working.

Female Physician 1: working overtime is seasonal.

Me: so busy, so tired during peak season.

Female Physician 6: For me, I think pediatric physicians are busy seasonally. We are basically busy in November, December and January, for three months. When we are busy, we are really busy, but in off-season, we are also very free. So, it's a little uneven, but there is nothing we can do.

Female Physician 5: There is no way to solve this problem. It's not possible to have temporary pediatricians.

Female Physician 4: you work as a temporary pediatrician over busy periods, then what do you do when not busy?

Female Physician 2: do research when not busy.

Male Physician 1: write proposals for medical research funds application.

Me: how about in foreign countries?

Female Physician 2: there are many benefits in foreign countries, they are not like us.

Female Physician 1: foreign pediatricians have vacations.

Female Physician 3: They have many benefits. Foreigners can't understand our situation.

Female Physician 4: they have paid vacations.

Female Physician 5: and they have afternoon tea and so on.

Me: Yes, they do. Their time for afternoon tea cannot be occupied.

Female Physician 4: their paid vacations are long.

Female Physician 5: they have afternoon teatime, but we have not.

Me: what is the current status of salary in pediatrics?

Female Physician 2: low salary, big gap.

Female Physician 1: yes, a big gap with other departments.

Male Physician 1: a gap between the rich and the poor.

Female Physician 5: actually, foreign pediatricians are not well paid.

Female Physician 1: yes, their salaries are not high, but the overall compensation is high.

Female Physician 4: because pediatrics does not make much money.

Female Physician 2: Pediatrics does not make money, so it's not taken seriously. It makes a little money, just depending on examinations, like blood routine examination. What else?

Female Physician 3: these examinations make some money.

Female Physician 2: you mean mycoplasma pneumoniae test?

Female Physician 3: at least make some money.

Female Physician 1: it's about 150RMB for such examinations.

Female Physician 4: I checked some CXR, blood routine, MPn, it's 70, 70, 140.

Me: any benefits? no benefits at all?

Female Physician 1: we have cinema tickets.

Female Physician 2: we've only had this for two years, ok? Did you have them before?

Female Physician 3: no.

Female Physician 2: actually, those that we can have once every few years are rare.

Me: travel.

Female Physician 3: Actually, it is travel that was gotten rid of. We have the labor union member cards before, but now it is abolished.

Female Physician 2: in fact, I think member cards are better.

Female Physician 1: this is for doctors only, unlike abroad, it's provided for the whole family.

Female Physician 3: I think we need to relax and travel once a year, which is better for work.

Me: any cruel words for bonus?

Female Physician 1: similar to migrant labors'.

Male Physician 1: shabby.

Me: people do not know what migrant labors are, ok?

Female Physician 2: I mean skilled workers, like operators.

Female Physician 3: but skilled workers make a lot of money in foreign countries.

Me: hard work laborers in foreign countries make a lot of money.

Female Physician 4: such people are rare in foreign countries.

Male Physician 2: Among the top three salary-makers in Australia, plumbers rank the first. They charge by hours, a little more for rainy days, and a little more for outdoors.

Female Physician 5: people leave their appliances behind when they move in Japan because the porter costs are higher than that of the appliances.

Female Physician 1: In fact, we are also seeing this in China. There are a lot of things left when moving.

Me: how about healthy work and life?

Female Physician 1: do exercises.

Female Physician 2: Now we need to let go of stress. When we go back at night, we often have a comedy roast show. There is a nurse in our dormitory who is very good at it. That's the first thing we do after work, to talk about weirdos we meet in work.

Female Physician 3: you can also do that at home.

Female Physician 2: yes, we can.

Female Physician 3: When I do this with my parents' presence at home, they don't understand me, and they think I should put myself in other people's shoes, be considerate for patients and then I'll find that I'm wrong to complain about work. So, sometimes when I go back home, I don't want to talk about work to my parents.

Female Physician 4: they think it's just one more patient.

Female Physician 3: they think I am wrong to think so.

Female Physician 2: In the dormitory we are all peers. We can vent to each other.

Female Physician 3: I cannot do this at home.

Male Physician 1: it's not good to vent to families.

Female Physician 3: they think you bring negative information home.

Female Physician 2: they don't understand.

Female Physician 1: too much negative energy. I can only eat after complaining and decompressing.

Me: the balance between work and family, does work impact your family?

Female Physician 1: of course.

Female Physician 3: right, my mother said that I was so bad tempered that I always lost my temper.

Female Physician 2: cannot take care of my children.

Female Physician 1: Chunxiao (Pinyin) said, once she went home, at first her father told her to be nice to her patients, but she got so mad at him, then he never said anything about her again.

Female Physician 2: That's also what my mom said. She told me to have a better temper, a better attitude, don't get angry with others, and don't quarrel with people. Now every time before I go to work, my mom will repeat it.

Male Physician 1: sometimes you cannot control the situation if you have a good temper.

Female Physician 4: We rarely have two days off in a week. We often have a half-day break at the weekend, and one-day off is pretty good.

Me: I think this should be one of job benefits.

Female Physician 4: I guess so.

Female Physician 1: two days off would be nice.

Female Physician 3: because there are too many patients and the ratio of physicians to patients is too low, the time for each patient is too short, and patients feel that there is too little communication.

Female Physician 5: One problem is poor communication. The other is that patients demand too much, and their perception is a little bit distorted. Sometimes, they just want us to give them what they want, and if you can't satisfy them in all respects, they might be mad at you. It's too easy to generate conflicts. It's not only patients. It's about the overall civility level of Chinese people.

Female Physician 3: which is still not high.

Me: this topic is too big.

Female Physician 5: foreigners have asked me, are you all like this?

Female Physician 1: they cannot understand.

Female Physician 3: But there is a thing different from foreign countries. In their countries, a physician treats ten patients in the morning, while I treat 15 patients

a day. They have enough time to communicate with their patients.

Female Physician 2: We don't have time to communicate. You see, there are so many patients waiting outside, and one more minute I talk with you means ten more minutes those outside will have to wait.

Female Physician 3: So, it's not practical. Second, it's really expensive for a foreigner to see a doctor. Basically, insurance companies are responsible for the registration fee, which is very expensive. While in China, patients pay the fee by themselves. So, there are less conflicts abroad. I have witnessed a quarrel abroad, and it was dealt with directly. The case is that the patient felt dissatisfied with a nurse, and then the nurse was changed immediately.

Male Physician 1: the charging standards are different between Chinese and foreign hospitals, such as in tertiary and secondary hospitals.

Female Physician 1: the charge is very high in their hospitals.

Male Physician 1: the higher grade the hospital is, the higher the charge may be.

Female Physician 2: so, it's because that our patients think they pay for it by themselves.

Female Physician 3: yes, they all pay by themselves.

Male Physician 2: It's more distressed for patients paying out of their own pockets. If their parents had bought insurance for them, and the insurance company reimbursed for them, they wouldn't have done this.

Me: do not care?

Male Physician 2: it's hard to say. In the end, you still spend your own money. You spend your own money on insurance.

Female Physician 1: but they feel better if there is a medium.

Male Physician 1: it's not always like that.

Me: Do you have regular opportunities for continuing education and attending meetings? How about hospital support?

Female Physician 2: depend on ourselves.

Female Physician 1: for attending meetings, our hospital never supports.

Female Physician 3: we are stupid, actually it can be reimbursed.

Female Physician 4: you can apply for, and now there is support for undeveloped disciplines, providing special reimbursement.

Female Physician 3: I suppose it can be reimbursed.

Female Physician 5: have our expenses been reimbursed?

Female Physician 3: our expenses were reimbursed as meeting expenses.

Male Physician 1: did you get it?

Female Physician 3: I got it. We have 10,000 yuan as meeting expenses for pediatrics meetings every year, but we have never applied for reimbursement.

Female Physician 2: nobody told us about that.

Female Physician 5: You can all contribute articles. Pay attention to the annual pediatric meeting, and you can contribute.

Female Physician 4: we contribute?

Female Physician 5: yes, you can go separately.

Me: did you get the money?

Female Physician 3: I got 6,000. She told me that she contributed successfully, then I told her to hurry up to apply for and get the reimbursement.

Female Physician 2: so, both of us don't have to contribute, don't we?

Female Physician 3: right.

Female Physician 1: What? That POSE?

Female Physician 1: how about yours?

Male Physician 1: I am waiting for her to give it to me.

Female Physician 3: I will give you the money once I get it from the hospital. Just leave it alone, I have paid for you.

Female Physician 2: thanks.

Male Physician 1: we missed 1,000 to reimburse.

Female Physician 3: Right. But you cannot apply for reimbursement. How can you apply reimburse 1,000?

Male Physician 1: Isn't there another one with millions later? Is that not reimbursable?

Female Physician 3: that is reimbursable.

Female Physician 5: But remember, you have to have receipts for meeting expenses, and you have to contribute.

Male Physician 1: Not meetings. I mean last time we studied at Dahua.

Female Physician 5: that is reimbursable.

Male Physician 1: I still have an invoice of 3,000 yuan.

Female Physician 3: If you need reimbursement for meeting expenses, you must have an invitation letter, and then a schedule, which must be provided, or your expenses will not be reimbursed.

Female Physician 5: Yes. That is a financial regulation. Further education is reimbursable,

as short-term study.

Male Physician 1: I have an invoice of 3,000 yuan, can I apply for reimbursement?

Female Physician 5: yes, you can.

Male Physician 1: how to do?

Female Physician 2: how long for short-term study?

Male Physician 1: that money has been reimbursed.

Female Physician 3: The 6 million? Then you can try.

Female Physician 5: It is reimbursable. Because my money can be reimbursed. Professional physician training is reimbursable.

Female Physician 1: there is a first aid training.

Male Physician 2: It seems that there is no key discipline. Only from the hospital perspective, it's 60% outside.

Female Physician 2: up to 60%?

Male Physician 2: yes.

Female Physician 3: But it was reimbursed directly. I applied for reimbursement at that time, and he reimbursed directly.

Female Physician 5: What project did you note in the application? There are two projects, improvement of students and undeveloped disciplines, 300-400 each year. I am also interested. At the beginning all physicians applied for it, including me. Then you just need to fill in the specific items of expenses later. They will reimburse your money if the items are specific and your application has been signed by your director.

Female Physician 2: vulnerable groups?

Female Physician 5: we call it undeveloped education disciplines.

Male Physician 1: because I got the invoice in December.

Female Physician 5: that's ok.

Male Physician 1: the training cost is 3,000 yuan.

Female Physician 3: then you can have a try.

Female Physician 2: 3,000 yuan for training?

Female Physician 3: POSE.

Female Physician 2: didn't you apply for POSE?

Female Physician 3: he reimbursed for both of us.

Female Physician 4: He reimbursed expenses within two years, and I found the invoice was dated half a year ago. It means he only reimburses our expenses

within one and a half years.

Female Physician 1: I just want to learn something, and ours were invalid long ago. That was in 2013.

Male Physician 1: more than 60 million, and you can apply for reimbursement if it's possible.

Female Physician 1: can we all apply for it?

Female Physician 3: Yes, you can. You can apply for reimbursement if you need later.

Female Physician 2: there is a training program, and all of us have a chance to participate in it.

Female Physician 5: Right. All of you can participate in it.

Female Physician 1: only those assigned have the chance at that time.

Female Physician 2: You didn't have it at that time? No in Xinhua hospital?

Female Physician 1: No in Xinhua. Only undergraduates of three-year system have the chance. Although we attended the class, we were not certified.

Female Physician 2: there was one in children's hospital, but now it also has POSE training, which was started from children's center.

Female Physician 3: they do very well, and it's systematic.

Female Physician 2: right, it's systematic and it's pretty good.

Female Physician 1: any more questions?

Me: a few more.

Female Physician 1: please continue.

Me: anything in your daily work that you feel like needing to be improved about the workflow, or what else needs to be improved, from your point of view?

Female Physician 1: Yes, of course. We report the defects in the workflow that we find.

Female Physician 2: I wonder if the information department have corrected the error yet or not.

Female Physician 3: that person printed a pile of papers.

Male Physician 1: don't click the print button, just click no.

Female Physician 1: clicking cancel is useless, as it will pop up later.

Female Physician 2: if you prescribe another medicine, it will print all previous prescriptions, but it didn't appear in the outpatient service system.

Male Physician 1: you can choose to print the first prescription or not.

Female Physician 1: I didn't see it.

Female Physician 2: I know it. It depends on your operations. If you give a second prescription based on the first one, they will be printed together.

Female Physician 3: no, I always give prescriptions separately.

Male Physician 1:that's the second prescription.

Female Physician 4: No, it is caused by the system setting, and there is no problem in the outpatient. They didn't solve it in the morning, and I don't know if they will solve it this afternoon.

Male Physician 2: the printer in the outpatient is still same as usual.

Female Physician 1: That printer is terrible. It always prints out incomplete pages.

Female Physician 2: always 2 pages linked.

Female Physician 1: sometimes 2 pages, whatever.

Female Physician 3: It's very funny. A person in the pharmacy came to me, and he said "we were used to your pediatric prescriptions already, some were long, some were short, and some were just a little bit long". Then I asked him how to deal with it? He said "we can do nothing but to accept it".

Female Physician 4: The problem is that I went to the department of adult medicine yesterday, and he printed the prescription on the medical history for me. Actually, he should print again. Do you know what he did? He just crossed medicine names out of the medical history and wrote them down on the other prescription.

Male Physician 1: wrote it?

Female Physician 4: wrote it, why would he print again.

Female Physician 2: we can also write it, but it's too much to sum up.

Male Physician 1: you can also write it by hand, but sometimes there are too many words.

Female Physician 3: the nurse told me to write it down by hand, wasn't it forbidden?

Male Physician 1: if you prescribe dextrose IV, you have to write words of four lines.

Female Physician 1: 5S, GS and so on.

Female Physician 2: the emergency system still doesn't work, and I am not sure if it can be repaired this time.

Female Physician 3: we are getting off the subject.

Me: no, no, it's still on the subject.

Female Physician 1: we are talking about the information department.

Me: actually, we didn't start from the clinical application.

Female Physician 2: I think the man in the information department is very miserable, we call him directly, but he has to ask somebody else in relevant specialty.

Female Physician 4: Should we log in again now if we use the one in the outpatient? I've never been able to log in before.

Male Physician 2: that's the problem of maintenance by nurses.

Female Physician 4: I've never been able to log in before, and they told me to call the information department. He said that he would help me to delete the IP address. Then you just do it, but I remember I have to call him every time.

Female Physician 3: no, I haven't had that problem.

Male Physician 2: but I think it may be the problem of maintenance by nurses.

Female Physician 1: I never call him, but log in directly.

Female Physician 4: anyway, I call him every time, it looks stupid.

Female Physician 2: I failed only once, but it's ok later.

Female Physician 5: I failed twice and I called him.

Me: finally let's talk about what is the future of pediatrics?

Female Physician 1: the future should be very good.

Female Physician 1: yeah.

Female Physician 2: like family doctors, tiered diagnosis and treatment.

Female Physician 1: You see there are more and more second children.

Female Physician 3: what a glorious career.

Female Physician 4: flowers of our country.

Me: Is the family doctor project on track now?

Female Physician 1: it seems that the community has it.

Male Physician 1: In a community, they asked me are you a community pediatrician? I said there were no pediatricians in the community.

Female Physician 2: but it seems that there are pediatricians in the community now.

Male Physician 2: in some communities.

Female Physician 3: It is true. There may be only one doctor in the community, but this doctor is a general practitioner, and he goes to the children's hospital for training for three months, just like the standard resident training, and then he can treat simple illness like cold, but not to give IV.

Female Physician 4: IV drip is possible in some communities.

Female Physician 3: dispensing medicines is possible.

Male Physician 1: the code of conduct requires that fever cannot be treated in the community.

Male Physician 2: it's good enough as they can share a lot of workload.

Female Physician 1: at least patients can have blood tests before coming to you.

Me: we are a medical treatment alliance, then what can we do if we go to help building a community pediatrics?

Female Physician 1: giving money?

Me: except for money, actually they are richer than us.

Female Physician 2: training.

Female Physician 3: our hospital can help building a pediatric department.

Female Physician 4: cooperate in standards of diagnosis and treatment.

Me: training from which aspect?

Female Physician 5: they come to our hospital, like equipment training.

Female Physician 2: it seems that this kind of training has started.

Male Physician 1: just like general practitioners, where are the general students from? China.

Female Physician 1: recently, one from Weifang Medical University, and one from the University of Medicine & Health Sciences.

Male Physician 2: interns?

Female Physician 1: not interns, I mean general practitioners.

Female Physician 4: he means those who go to the community.

Female Physician 1: general practitioners have signed contracts in universities, and all of them did that.

Male Physician 1: no, it's different, for him, it's standard training.

Female Physician 1: You think I don't know? Let me tell you this. When I was in college, there were contract students. After entering the university, they signed contracts to become general practitioners after graduation. And they did become general practitioners. But I know that the tuition of the first and second batches are free.

Male Physician 1: it seems like target training.

Female Physician 2: and you have salary later in the hospital.

Female Physician 1: we go back to the domicile place, it means that you have to go back to the place where the registered permanent residence is.

Male Physician 1: it seems like target training, and the expense may be paid by the hospital.

Female Physician 1: you go back to and become a general practitioner in the community in the place where the registered permanent residence is.

Female Physician 3: like the previous designated training before.

Female Physician 1: right.

Female Physician 4: seems that it only exists in Shanghai.

Female Physician 1: anyway, I know for them the tuition was free and the training was oriented, and they had assigned working places, so many people applied for this major.

Me: How about one to one teaching help? Like making rounds and open college.

Female Physician 4: teaching?

Me: except teaching.

Female Physician 2: I think so.

Male Physician 2: one to one teaching is carried out in November, December and January every year, which is applicable because doctors are urgently needed over that period.

Female Physician 3: I think it's easier for interns now than before.

Female Physician 1: When we worked overtime, they played with the mobile. Then when we received patients, they asked me why?

Female Physician 4: Now interns may not find a job. It's just formalities.

Female Physician 5: they know they are not going to be pediatricians, so why should they take it seriously.

Female Physician 2: general practitioners, not pediatricians.

Female Physician 3: She didn't know. We are referring to the intern.

Female Physician 4: the college student.

Male Physician 2: anesthesiology department in Weifang.

Female Physician 1: Right, they are not pediatricians, why should they take it seriously? To be frank, it has nothing to do with them.

Female Physician 2: but interns have to write the case report.

Female Physician 1: interns from the University of Medicine & Health Sciences have to write that, but not for those from Weifang.

Female Physician 5: well, they have to receive patients, right?

Female Physician 3: maybe, some students were serious and actively received patients,

while some were not but just copied or printed a case report.

Female Physician 1: any more questions?

Me: no, thank you.

Appendix 5: Director of Pediatric Visit Record Dr Xu (Chinese Version)

许春娣教授简介：主任医师、教授、博士生导师，现任上海交通大学医学院附属瑞金医院儿科主任、瑞金医院北院儿科主任、上海交通大学瑞金临床医学院儿科教研室主任，上海市巾帼建功标兵、国家临床重点专科—小儿消化项目负责人、国家卫生计生委儿科内镜专家组副组长、国家科学技术奖励评审专家、中华医学会消化内镜儿科组组长、中华医学会消化病学会儿科组组长、中国医师协会儿童健康专业委员会常务委员，上海市食品安全风险评估专家委员会委员，上海市儿科临床质量控制中心专家委员会委员、上海市医学会儿科分会消化学组名誉组长。临床儿科杂志、中国实用儿科杂志常务编委、中华儿科杂志、中国循证儿科杂志、《World Journal of Pediatrics》、发育医学电子杂志、中国儿童保健杂志编委。温州医学院儿童院客座教授。历任中华医学会儿科学会委员（13-15届）、中华医学会儿科学会消化学组副组长（13-15届）等。

采访人：您好许教授，很高兴您接受我们的采访，这次主要是对儿科主任医师岗位胜任力（音）的研究。第一个问题是您认为中国儿科医生的现状如何？

许教授：中国儿科医师的现状是病人基数很多，儿科医生很少，流失也比较多。就我知道，我们一个医生要针对2千-千人，我记不清了，我上次看的。总的感受是每个儿科的医生每天看门诊要看100号，至少要看到60到80号才能应对儿科病人数量，所以儿科医生非常紧缺。

采访人：具体紧缺的原因有哪些呢，与医院的管理、医学院的培养这些方面有关系吗？

许教授：其实是有的，之前中国国内是有儿科系的，我就是儿科系毕业的。儿科系后来到九七年的时候、出生量减少的时候，那时候觉得儿科医生多了，就把儿科系取消了。没想到现在二胎政策开放后人口出生数量增加，儿科就诊人数明显增加，就显得儿科医生明显不足。第二点，中国国内儿科医生待遇不是很好，不像其他内科、外科一样待遇比较好，所以有很多儿科医生都流失掉了，甚至去做其他工作了，比如说到医药公司或者转岗到其他行政部门，不

再作儿科医生了。再加上年龄大的退休走了一批，年纪轻的又没有跟上，这样就显得儿科医生非常紧缺。再加上二胎出生以后人口极具增加，所以我们儿科医生现在非常紧缺。

采访人：现在从工作量来说压力是很大的。

许教授：对，我们现在的工作压力很大，所以我们儿科医生上班的时候都非常紧张。像我们科里最多的医生一天要看到一百十几号。我上次到福建去会诊的时候，福建的一个儿科医生年龄跟我差不多，他一天看门诊也看到一百零几号。我说你那么大的年龄要看那么多，怎么看？他说没办法，我的病人太多，医生下不了班。科里医生就那么多，没有时间喝水也没有时间上厕所，吃饭也很困难，病人很多。加上家长对孩子的要求也很高，一个孩子来看病都是有2-4个家长，而家长的要求也很高，他们都希望一到医院马上就能看到医生，但事实上并不是这样。所以很多孩子到医院以后要排5个小时、6个小时甚至7个小时才能看到医生。

采访人：现在儿科医生受教育和职后教育的机会是不是很多？

许教授：现在国家是重视的，原来我是儿科医学系毕业的，后来大部分都是临床医疗系毕业的，经过调整以后，我们有临床医生规培，3年制规培。如果你作儿科医生，如果你要做专科医师的话，要进行专科培训。现在各家医院也有很多继续教育学习班来培养儿科医生，但这个主要是针对儿科医生业务方面，比如说消化、呼吸、心血管这几类的比较多。应该说我们对儿科医生的继续教育还是抓得比较紧的，就像我们医院一样，到年底的时候要对所有的住院医生进行考核，比如像心肺复苏考核、知识考核等等，而且要求每个医生每年都要参加学习班的学习。这个学习我们是要有证书的，规定每个医生每年要拿到10分的继续教育的证书。

采访人：你觉得现在儿科医生工作和家庭之间平衡的关系怎么样，是工作更重要还是家庭更重要，或者是平等、不平等的关系？

许教授：每个医生不完全一样，因为我们儿科医生非常忙，工作时间一般都是超过8小时，他们可能在照顾家庭方面不会有那么多的时间。我有几次下班7点、8点到病房里去，我就看到很多儿科医生在那里，他们除了看病人，尤其像我们三级医院是教学医院，要进行临床研究，要带教大学生，他们还在备课，所以他们很晚回家。这些年龄医生可能是没有孩子的，但是对于一个有孩子

的儿科医生，他们也不是很早回家，一般都是8小时以外才能赶回家里，然后再照顾孩子。他们不可能像其他职工那样，周末把时间都花在孩子身上，带孩子学习、课外学习，因为我们医生平时要上班，周末要值班。应该说，这一代年轻医生照顾家庭的时间有，但不像其他的工作岗位那样有很多时间可以花在家庭上，他们只有部分时间可以照顾家庭，不可能全身心用在家庭上，他们毕竟有很多病人要照顾。所以我们即使在家里的时候，也经常通过微信等其他交流工具上讨论病房的病人怎么样、要不要进行处理之类的，很忙的时候没法照顾孩子、照顾家庭。

采访人：你认为现在儿科医生在工作中有没有创新的机会，或者有没有能够满足他们创新的环境支持呢？比如说他自发地改变工作流程或者建立新的事务的自主性，这些会不会培养？

许教授：应该说我们儿科医生从心底都希望有创造性，希望改变环境，不要每天应付于繁忙的工作，单纯做临床。对我们的教学来说，医院对我们要求每个医生都要有创新，除了看病之外，要从看病之中总结经验、提出创造性思维，做临床研究或者带学生做基础研究，希望能一边工作又有创新。但是因为我们儿科工作太忙，所以他们在8小时之内是没有时间创新的，所以只能利用休息的时间做研究、做一些项目，或者利用在家的时间做一些创新的研究、发病机制的研究、临床治疗方面的研究等等。大家可能会看看文献，了解最近有哪些文献、报道，看这些对我们的工作有什么帮助、有什么改进。其实我们也定期进行业务学习，比如说我们每个星期一都要学习最新的知识，大家进行交流、谈自己的认识、看法，目的就是希望我们在工作中有所提高、有所创见，所有的一切都能提高中国儿科医学的水平。

采访人：在儿科医生的工作过程中，有没有强调成就或者使他们更具有竞争力这方面的教育？

许教授：其实我也关注了儿科医生能力培养、创新力培养、团队培养这些方面，因为儿科医生最大的特点、跟内科医生不一样的地方就是他们的工作量没有我们大，他们一天不需要看那么多病人，我们很多时间都在应付日常临床工作。但是儿科医生的团队非常团结，大家经常交流，希望通过交流提高能力，通过看好病人、治好看不好的病人、抢救好病人，大家都会觉得非常有成就感、非常愉悦。因为我们救活了一个病人就挽救了一个家庭，所以这是现实当中

最难做的。其实儿科医生最快乐的是什么？把孩子的病看好了。比如这个病人原来已经快不行了，觉得他没有多少天了，但是我们硬把他救活了，我们觉得这个很大的成就，是个很大的满足。这可能是儿科医生都比较长寿的原因吧，你对孩子好孩子也会对你笑。

采访人：儿科医生现在的稳定度如何，比如说他们感受到现在医闹不安全、发生冲突比较高，导致他的稳定度会不会减少？

许教授：是的。因为中国的家庭就1、2个孩子，孩子是家庭的宝贝，他们非常看重孩子的健康，一旦孩子生病了、到医院了，他们总希望花最少的钱、看最好的医生、得到最好的医疗照顾。但是中国的现状是病人特别多，只能排队很长时间才能就诊，所以这样病人会不满、会医闹、家长会对医生有看法、有想法，甚至会骂医生、打医生。但是还有一点，中国的儿科医生的整体收入是底下的，比成人的内科、外科要低，这也是中国儿科医生不稳定的原因。工作量大、工作报酬低、时间长、不被社会所理解，这些都是儿科医生不稳定的因素。现在中国政府对这方面已经开始重视了，他们开始提高儿科医生的待遇，让儿科医生有比较好的、比较稳定的状况，给他们创造比较好的工作环境、提高待遇，给他们创造出国进修、学习的机会，所以我们的队伍现在开始稳定下来，现在愿意报考儿科医生的队伍也在逐渐增加，这跟我们单位、领导、政府实施的措施是分不开的。

采访人：中国儿科的未来您认为是什么样子的，您认为是什么模式？

许教授：现在政府提倡多重医疗手段，有国营医疗、有民营的、有国外投资运营的。比如上海来说，现在上海除了有4大儿科专科医院、综合医院的儿科以外，还有很多外资的，最近有几家美国的还有其他国家的到我们医院建立了妇产、儿科医院，有各种不同性质的儿科医疗场所，互补了儿科医生的不够，缓解了儿科病人就医难的困难。高档的、平价的医疗资源都有，所以家长可以根据自身条件选择不同医院就诊。

采访人：我们现在需要做些什么来改善目前的状况呢？

许教授：我觉得虽然目前儿科医生待遇有所改善、大家有所尊重，但相比较外科医生、内科医生，儿科医生的队伍待遇还不是很高的。所以我希望全社会、政府能重视儿科，给儿科医生很好的待遇，在经济上尊重儿科医生的劳动，进一步提高儿科医生的待遇。我也知道在国内很多地方儿科医生的收入是非常低下

的，因为国家不补贴医院也不可能靠挂号费、就诊量来提高医生的收入。所以还是希望能增加儿科医生的收入、给儿科医生更多的学习、提高的机会，而且社会还要更加尊重儿科医生，同时不断提高儿科医生的工作能力、各方面的能力。

采访人：现在我们都在大力提倡恢复社区医疗服务，您觉得目前社区的儿科医疗服务是什么状况？

许教授：其实20年之前，儿科都是在社区看病的。很多的常见病，像感冒、咳嗽都是在社区医院看的，比较重的病、难看、难治的病再转到三级医院就诊。后来随着收入发展以后，家长对医生的要求高了，社区的儿科教授都退休了，新的儿科医生没有跟上，新的医生不敢看儿科患者，所以造成社区没有儿科病人，他们也不敢看。我觉得现在政府要求在社区开设儿科医院，让最基本的疾病在社区解决，像国外一样，严重、复杂的疾病由社区转移到三级医院，这样就能缓解所有的儿科看病难、就医难的问题，可以从根本上解决，但这条路要走还需要很长时间。第一社区没有那么多儿科医生，我们要进行培训；第二，家长目前还不认同社区儿科医生的能力，这是目前的现状，所以患者基本上还是集中在大医院。但是我们现在做的工作就是把三级医院、二级医院、社区医院挂靠在一起，三级医院派专家到社区医院坐诊，把一部分常见病患者引导到社区医院，把社区儿科医疗建立起来。

采访人：您认为现在的儿科医生应该具备哪些能力？医、教、研，从这三个方面给我们描述一下。

许教授：应该说对不同级别的儿科医生医院有不同的要求。像一级、二级医院就是临床医疗工作，而一级医院就是儿童保健工作。儿童保健工作就是儿童在生长过程中定期到社区医院进行检查，看儿童的健康、生长、发育、营养有没有异常。二级医院就是儿科常见病的诊疗。我们三级医院的任务就很重，我们除了承担大量的医疗工作以外还承担教学工作、科研工作。因为我们是教学医院，我们要带大学生、要教学生，所以很多临床医学生都在我们医院。我们的儿科医生要讲课，有大课、有小课，要带大学生在临床实习，带他们怎么在门诊看病、在病房怎么检查、怎么问病史，要教会他们怎么分析、怎么诊断、怎么治疗患者，还有教学方面，所以我们每个医生既是临床医生也是教师。还有一点，我们教学还有很大的作用——临床医疗研究工作。医院要

求有能力进行科研的医生要申请国家、地方的研究项目，做好临床研究。比如说我就是博士研究生导师，也是硕士研究生导师，我既带博士研究生也带硕士研究生，我也向国家申请了多项研究课题，专作小儿胃肠疾病的研究，也发表了很多文章，有英语的、有中文的。我有病房、有门诊、有儿科实验室，我们有研究队伍专门做研究，所以对我来说，既可以看临床，又可以上大课、带教大学生，同时又可以作研究，所以这就是三级医院对我们的要求。我对下面的研究生也是从三个方面进行培养，第一看病，第二教学，第三作研究。除了每星期要进行临床病例讨论、风险疑难病诊断，我们还进行定期研究活动，讨论我们的科研课题怎么做、实验怎么做、临床研究怎么做、目前国内有什么新进展、要突破哪些研究，这都是我们经常做的工作。所以对我们来说，白天可能我在临床看病，下班以后我们要看书、学习、作研究。其实不仅是我，我们医院很多主任都是这样，下班以后我们一边吃晚饭、一边讨论课题研究，9点钟才回家，很少能照顾家庭。三级医院对我们的要求是每个医生都要作科研、每个医生都要上大课、带学生，既是医生又是教授又是研究员。

采访人：您介绍一下我们瑞金医院儿科的发展历程，有没有里程碑的事件？

许教授：瑞金儿科建院已经110周年了，是上海市最早成立儿科的，所以我们国家的儿科学的老祖宗、奠基人是从我们医院出来的，所以最早的儿科医生都是我们医院的。最早的时候是我们医院成立了儿科系、成立了儿童医院分出去，所以我们应该是上海儿科的老祖宗。最早在50年代的时候，那时候儿科都是传染病、都是流行病，所以那时候我们的医生要应付的就是各种流行病、各种传染病。随着社会发展以后，疾病也发生了改变。目前我们的疾病已经向西方化靠近，传染病越来越少、营养不良越来越少，各种慢性病明显增多，比如我现在搞的是儿科胃肠营养奶粉过敏症状，在我当住院医师、作为学生的时候，这个病我知道中国人是没有的，是白种人、犹太人有的。但是2000年我从美国进修回来以后，我发现中国人这种疾病在增多，而且现在越来越多。如果你们有机会到我们的儿科病房，你可以看到有很多都是这种病。所以我跟美国的医生交流的时候他们说你们的病种跟我们美国的病种一样。的确，因为我们的生活提高了，疾病的发生改变了，我们现在的诊疗手段跟国际上是看齐的。我们现在的传染病越来越少、慢性病在增加、肿瘤在增加，

像我的病房有三分之一是白血病的病人，还有胃肠肿瘤疾病的，所以接下来我可能要搞实体肿瘤的放射治疗，我下一步要做这方面的工作。所以发烧、感冒这种病一般都在门诊，病人很少见到，所以疾病发生了很大的变化。今天我们的医学知识也在更新，我们要更新知识来应对目前的情况。当然每年也会有流行病，比如说像今年12月份的流感大流行，这个全世界都有，但是其他疾病也可能发生了变化。我记得在最初的时候，在中国建国初期还有很多血吸虫病、寄生虫病，我们学习很多老前辈做这方面的研究，治疗寄生虫病、治疗血吸虫病，用中医药，那时候我们采草药、煮中药、做中药来治疗慢性病。我们医院在80年代的时候做了很多创新，在儿童遗传内分泌代谢方面作了很多研究，也是国内最早开展矮小症生长障碍的诊疗单位，所以我们也获得了国家二级研究科学技术进步奖。现在全国都在跟我们学，我们在医学发展、医学进步方面一直是走在前面的。现在我们在搞遗传代谢方面的研究，作二代基因测序。我们作了很多免疫缺陷疾病，免疫缺陷病、白血病，各种疾病。内分泌代谢病人基因检测，我们也发表了一些文章，得到了国际上的认可，在国际上作了大量的交流、报道，他们都认为我们在基因检测上做了很多工作，应该说我们还是很成功的。

采访人：您再说一下现在儿科发展中遇到的问题主要有哪些？

许教授：我们最早是三甲综合医院的儿科，是全国排名前4名的医院。其实在解放初期，我们的儿科非常先进，我们有4个病区、有100多个儿科医生。后来我们组建了儿科室，把一半的儿科室分出去成立了新的儿科医院。后来病房减少了，从4个儿科病区变成3个儿科病区，后来因为医院发展需要，专科医院发展为综合医院，儿科又缩小了，变成了2个儿科病区，医生也减少了，很多儿科医生转岗了。那个时候一个家庭就一个孩子，所以病人明显减少，而且我们的医院又在市中心，市中心很多家庭都搬迁到近郊区，所以病人急剧减少，很多病人到专科医院去看病。而且我们又引进了成人心血管外科一支强大的队伍，开了3个病区，所以我们就变成1个病区了。我们儿科现在一个病区大概有14张床位，现在的儿科医生只有21名，包括我在内。我们的医生不够，所以我们请了退休了老医生来充实我们的队伍。我们这支队伍要看儿科门诊、要看儿科急诊、要管儿科病房、要做儿科实验研究、要代教大学生、给大学生上课、教学，所以我们非常紧张，我们现在要招收新的医生来充实

我们的队伍。医院现在给我们机会，要开始扩建儿科病房，但我们首先要做的工作是培养儿科医生、扩建我们的队伍。所以我现在最重要的工作是稳定现有的儿科队伍，再增加新的儿科医生，把我们的儿科队伍作强、作大。我们现在的水平是可以跟国际接轨的，我们可以做胃镜、肠镜，这些我们医院都是能做的，但我们的医生非常少，这就是我们工作量很大的原因，所以我们很多的医生没有更多的时间照顾家庭。

采访人：您认为我们现在的儿科医生还需要提高哪些能力是比较应急的？

许教授：急救的能力。我们医院在治疗疑难杂症方面、急救方面还比较差一点，所以要提高医生的急救能力、还有疑难疾病分析能力、还有临床科研能力，这些还是要增强的。我们在教学方面已经做得很好了，但是我还想要做得更好。其实我们以前的教学已经做得很好了，我的老前辈都是从美国、英国留学回来的，那时候查房的时候，我们老师不仅用中文查房，而且用英语查房、法文查房，所以水平是非常高的。我现在也有英文班、法文班，医学院要求我们用英文上课、用法文上课，我们要提升外语能力，（32：26），应该说这方面大家都在提高。这样除了能学习新的知识，也可以跟国外交流。我们经常请国外的学生到医院进修，我们也送年轻医生到美国、到英国、到欧洲进修，基本上我们每个年轻人都有机会，所有这些是为提高儿科医生的临床工作能力、科研能力、教学能力等等各方面的工作能力，是这样的。

采访人：谢谢。如果我们需要帮助社区儿科建设，需要从哪些方面入手？

许教授：社区方面第一他们缺少儿科医生，第二，内科医生不敢看儿科病人。所以我们准备作两个方面，第一培训社区医生，要对他们进行强化学习，给他们上课、教学，教他们怎么看儿科疾病，让他们会看儿童疾病，比如伤风、感冒、咳嗽，这些病都能处理，退烧都能处理。第二，我们也在不断培养新的全科医生，让他们到儿科来轮转。到儿科的各科轮转以后，通过3-6个月的轮转开始知道儿科疾病的特点是什么、儿科疾病怎么看，他就能懂得怎么处理儿科疾病，这是需要做的。其实我也经常下基层，给社区医生讲课，、小儿呼吸病怎么诊治，都在讲，为什么？提高他们临床常见病的治疗能力就可以分流一部分儿科患者，就能降低三级医院患儿就诊难的问题，这是市政府非常重视的、目前要做的。当然一开始我也派我的高年级学生下基层去看儿科门诊，代教社区医生、手帮手带，解决看病难的问题。我们也要社区给家长讲

解科普知识，让家长了解一些常见症状的处理、家长怎么护理，这些都是我们要做的。

采访人：您认为如果能带教社区全科医生的话，他达到什么程度才算是合格的？

许教授：我其实对他们的要求不是很高，只要求他们会看常见病就可以。我们的常见病主要是两块，一块是呼吸系统常见病，比如说感冒、咳嗽、气管炎，一般的慢性咳嗽。第二个，消化系统的毛病，像急性腹泻的治疗。这两个毛病能处理就可以了，其他的毛病可以转到我们二级、三级医院治疗。如果他们觉得看不好，经过他们2、3次治疗就可以直接转到三级医院。其实我们也可以给社区开绿色通道，只要是他们转过来的病人都提前诊疗。如果需要住院的话，给他们开放绿色通道，直接可以住院，他们也可以跟进来了解送来的患者怎么处理，他们都可以看。我们也有微信群，如果他们在处理问题的时候发现问题，可以在微信群里面讨教、请教，我们也为他们配备了儿科常见的药物设施，常用的儿童药计量方法、配方。

采访人：常见病有什么专门的疾病？

许教授：有，主要就是上呼吸道感染、咽鼻炎（音），还有咽喉炎，或者鼻炎、或者急性腹泻、急性胃肠炎、急性胃炎、急性肠炎，主要就是这些毛病。

采访人：这些能编成手册或者书本吗？

许教授：我准备做这种简单的，做一个Pocket book，可以放在口袋里的，比如说38度体温怎么处理、39度体温怎么处理、咳嗽怎么处理、怎么雾化都可以教给他们。

采访人：有没有设立什么转诊指标，会不会他们只是一过手就转走了？应该有上下协调的机制，有没有规定达到某些指标、在他们不擅长的能力范围之内才能转诊？

许教授：如果这个孩子肚子痛他们搞不清楚，就可以直接转诊。如果单纯的呼吸道感冒这种的，我们要求先在社区就诊1-2次，如果还是处理不了的、情况不好的、有肺炎迹象的我们再考虑转诊。当然每个医生的能力不一样，他觉得无法承担下来了也可能转诊。

采访人：并没有硬性指标吗？

许教授：没有硬性指标，这需要要一边工作一边总结。

采访人：好的，谢谢许主任接受我的采访。

Appendix 6: Director of Pediatric Visit Record Dr Xu (English Version)

Interviewer: Hello, Professor Xu! I'm glad to have this interview with you! The competence of pediatricians is the focus of this interview. The first question is that what do you think about the current situation of pediatricians in China?

Prof Xu: There aren't so many pediatricians to serve child patients in China. The drainage of pediatricians is another reason of current situation. One pediatrician may serve 2,000 patients. I cannot remember exactly. Those are the data I saw last time. In general, each pediatrician has to see at least 60-80 patients per day, up to 100, to meet the needs. Therefore, we need more pediatricians.

Interviewer: So, what are the main reasons for the shortage? Is it relative to the management of hospitals and the cultivation of medical school?

Prof Xu: Yes, it is in fact. There were pediatric departments in China before. I majored in pediatrics. In 1997, pediatric departments were removed because of reduction of births and too many pediatricians at that time. Unexpectedly, child patients significantly increase due to the implementation of two-child policy. Secondly, the wage of pediatricians is lower than that of other internists and surgeons. As a result, some pediatricians switch to medical corporations or other administrative departments of hospitals. In addition, aged pediatricians retire and there is a lack of new ones. In a word, pediatricians are in desperately short supply.

Interviewer: so they have huge workload.

Prof Xu: Yes, they do. We have heavy pressure of work so we are very nervous at work. In our department, a pediatrician may see more than 100 children patients at most per day. I met a pediatrician in Fujian about my age who saw more than 100 child patients per day when I participated in a consultation last time. I asked him "why do you see so many child patients?" He told me that he couldn't do anything about it because so many child patients were waiting for him. There are only several pediatricians so they have no time to drink water or leave the room or eat. In addition, one child patient may be accompanied with 2-4 family members who are demanding and expect to see doctors as soon as they get to the

hospital. But in fact, most of them need to wait for five or six hours, even seven hours after they reach the hospital.

Interviewer: are there many opportunities for pediatricians to receive education and continuing education?

Prof Xu: Now, more and more attention is paid to them. I graduated from the department of pediatrics, and later most of pediatricians graduated from clinical medicine. After the adjustment, clinicians need to receive three-year standard training. If a pediatrician wants to become a specialist, the pediatrician needs to receive specialist training. Although many hospitals provide continuing education for pediatricians, they focus on training in digestology, respiratory system and cardiovasology. In fact, we have attached great importance to the continuing education of pediatricians. In our hospital, all resident physicians have to participate in the final assessment at the end of each year, including CPR and theoretical knowledge. Each doctor is required to further study, so as to obtain a certificate of continuing education after obtaining 10 points every year.

Interviewer: What do you make of the relationship between work and family of the pediatrician? Which one is more important, family or work, or both of them?

Prof Xu: Each physician has different family conditions. Pediatricians are very busy and work over 8 hours in general, so they cannot spend too much time to take care of their family members. There are several times after I finished my outpatient service at seven p.m. and made rounds at eight p.m., there were still many pediatricians in wards. In addition, pediatricians in the tertiary hospitals like our hospital also need to take charge of teaching while doing clinical research and prepare for lessons. Therefore, they get home very late. Pediatricians at these ages may not have children, but for those who have children, they don’t go home early. They often get home after working over eight hours to take care of their children. At weekends, they cannot spend too much time to accompany their children like other parents because they need to be on duty. In fact, this generation of young pediatricians have time to care for their families, but not so much time. They can’t devote themselves to their families, only part of the time, after all, there are so many patients waiting for them. Even at home, we often discuss how the patients in the ward are, should they be treated or not on WeChat and so on. They are too busy to take care of their children and families.

Interviewer: Do you think there is any chance for pediatricians to innovate or is there any

favorable condition to support innovation? For example, a pediatrician make innovative changes to the workflow or creates new matters. Will such ability be developed?

Prof Xu: All pediatricians really expect to make creation and change the conditions rather than be busy in work and clinical practice. Our hospital requires pediatricians to make creation in teaching. In addition to clinical practice, pediatricians are expected to summarize experience and put forward creative thinking, do clinical research or basic research with their students. But pediatricians are too busy to make creation within eight-hour working time. Therefore, they can only spend spare time to do research and work on projects, or do innovation research, pathogenesis research and clinical treatment research at home. They may read some latest literature and reports. In fact, we also participate in training regularly. For example, we study the latest knowledge and exchange with each other on Monday, so as to improve our ability and make creation. All these things can improve the medical skills of Chinese pediatricians.

Interviewer: is there a training that emphasizes achievement or makes pediatricians more competitive in their work?

Prof Xu: In fact, I also focus on the ability training, creativity and team building of pediatricians because the most prominent characteristic of pediatricians, the difference between physicians and pediatricians is that physicians don't work as much as our pediatricians. They don't need to see so many patients every day, but we spend a lot of time in daily clinical work. However, pediatricians are very united and often exchange ideas with each other to improve our abilities. Curing patients with normal diseases and difficult diseases and saving patients make us feel rewarding and happy, because saving a child means saving a family, which is the hardest thing in reality. What makes pediatricians happiest? It is the healing of patients. For example, a patient was dying but we brought him to life with great effort. We think it's a big achievement and we feel satisfied. This probably is the reason why most of pediatricians live longer. After all, if you are good to a child, the child will smile at you.

Interviewer: How stable are pediatricians now? For example, medical troubles and conflicts between doctors and patients, do these factors make them less stable?

Prof Xu: Yes, they do. Children are really cherished by parents because there are only one or two children in a family in China. Parents attach great importance to the

health of their children. If their children are sick and see doctors, they always hope to see the best doctors and get the best medical service at the lowest expenses. But now, child patients are too many and need to wait for a long time. As a result, there are medical troubles and conflicts between doctors and patients even physical abuse in hospitals. In addition, pediatricians in China generally earn less than physicians in other departments such as internal medicine department and surgery department. In short, the instability of pediatricians is caused by heavy workload, lower wage, long working hours and being misunderstood. Now, Chinese government is already paying attention to pediatricians by raising their wages, improving their working conditions, offering opportunities to participate in further study at home and abroad. Therefore, pediatricians are reassured now and more and more students want to study pediatrics, which are inseparable from measures taken by hospitals, leaders and governments.

Interviewer: what do you think about the future of pediatrics in China and which mode will be applied?

Prof Xu: Multiple medical modes are advocated by the government, including state-owned hospitals, private hospitals and overseas-funded hospitals. For example, there are several overseas-funded hospitals in addition to four top-level children hospitals and pediatric departments in general hospitals in Shanghai. Recently, several foreign hospitals from U.S. and other countries established obstetrics and gynecology hospitals and pediatric hospitals in Shanghai. At the same time, different pediatric medical institutions provide more pediatricians to ease the difficulty of getting pediatric medical service. Both high-grade and fair-price medical resources are provided so that parents can select different hospitals for treatment according to their own conditions.

Interviewer: what do we need to do now to improve the current situation?

Prof Xu: Although the wages of pediatricians are raised and pediatricians are increasingly respected by others, their wages are still lower than those of surgeons and internists. Thus, I hope the society and government should pay more attention to the pediatric department and further raise wages of pediatricians. I know that many pediatricians in local regions are very poorly paid, because without state subsidies, their incomes will not rise based on registration fees and visits. Therefore, I still hope to increase the income of pediatricians, offer them more

opportunities for study and improvement. In addition, they should be treated with more respect in the society and they should improve their own working abilities and other abilities.

Interviewer: We are strongly promoting to recover the community medical service. What do you think about the current pediatric medical service in communities?

Prof Xu: Twenty years ago, child patients were treated in communities. Child patients with common diseases such as cold and cough were treated in communities, while those who suffered from serious and incurable diseases were referred to tertiary hospitals. As income increases, parents put forward higher requirements for pediatricians. More and more experienced pediatricians retired but the young dare not to see children patients in communities. Thus, there are no child patients in the community. In fact, they think child patients as a Gordian knot. In my opinion, the government hopes to build pediatric hospitals in the community to cope with common diseases, and patients with serious and complicated diseases would be referred to tertiary hospitals, which is similar to some foreign countries and can be used to solve the difficulty of getting medical service fundamentally. But it's a long way. Firstly, there aren't enough pediatricians in the community and we need to cultivate them; secondly, parents don't approve of community pediatricians. In this case, most of child patients are still sent to major hospitals. However, what we are doing here is affiliating community hospitals to tertiary and secondary hospitals and dispatching experts of tertiary hospitals to provide medical services in community hospitals, so that some child patients with common diseases will visit community hospitals. In this way, community pediatric system will be established gradually.

Interviewer: What abilities do you think pediatricians should have today? Can you talk about it in medical treatment, teaching and research?

Prof Xu: Hospitals at different grades have different requirements on pediatricians. For example, pediatricians of primary and secondary hospitals are mainly responsible for clinical care. The main task of those of primary hospitals is child health care, that is, during the growth of a child, the child goes to a community hospital for regular examinations, and pediatricians should determine whether the child's health, growth, development and nutrition are abnormal. Secondary hospitals are mainly responsible for curing common diseases. Tertiary hospitals including our hospital bear heavy tasks. In addition to medical services, they also take charge

of teaching and scientific research because they are teaching hospitals and doctors in such hospitals should teach medical students. So, there are clinical students in such hospitals. Pediatricians in such hospitals have teaching tasks and are responsible for students' clinical clerkship. They have to teach students how to diagnose outpatients, examine inpatients, ask case history, analyze, diagnose and cure patients. Therefore, each pediatrician is a clinician and a teacher. Teaching tasks play a great role in clinical research. Hospitals require the doctors who are equal to research to apply for national and local clinical research projects. For example, I am a doctoral supervisor and master's supervisor and also apply for various national research subjects related to pediatric gastroenteropathy. I have published some papers in Chinese and English. I need to serve inpatients and outpatients, and I have to do research in the pediatric laboratory with a research team. I engage in clinical work, teaching and research, which are required by tertiary hospitals. I teach graduate students from three aspects including clinical care, teaching and research. In addition to case discussion and diagnosis of stubborn diseases every week, we also conduct regular research activities to discuss our research topics, experiments and clinical research, the latest development in China and breakthroughs. In fact, we see patients in the day and have to read, study and do research after work. Besides, many chief physicians in our hospital discuss research subject while having dinner. They often get home at nine p.m. and have no much time to take care of their families. Tertiary hospitals require every physician to do scientific research and teach, so each physician is a teacher and also a researcher.

Interviewer: Could you introduce any milestone events in the development of pediatrics of Ruijin Hospital?

Prof Xu: The pediatrics of Ruijin Hospital has been established for 110 years, which is the earliest pediatric department in Shanghai. Therefore, the founders of Chinese pediatrics come from our hospital, so do the earliest pediatricians. The pediatrics of Ruijin Hospital was just a department at the early stage and then was gradually developed to be an independent children's hospital affiliated to Ruijin Hospital, so it is the pioneer of Chinese pediatrics. At the early 1950s, many children suffered from infectious diseases and epidemic diseases, so pediatricians at that time mainly coped with various infectious diseases and epidemic diseases. Diseases suffered by children change with social development. At present,

diseases are becoming more and more westernized in China and there are less and less patients with infectious diseases, less and less undernourished people but more and more patients with chronic diseases. For example, I am studying nutrition milk powder pediatric hypersensitivity. When I was a student or resident, no Chinese had such diseases but the white race and Jew were more likely to have such diseases. However, after I finished my further study in America in 2000, I found that Chinese people with such diseases were increasing. If you have chance to visit the pediatric ward, you will find so many children suffer from such diseases. When I discussed with U.S. doctors, they told me that the diseases types in China are similar to theirs. Indeed, diseases are changing with the improvement of living standards. Our current diagnosis and treatment methods are in line with international methods. There are less and less children with infectious diseases but more and more children with chronic diseases and tumors. For example, in the wards under my control, one third of the patients suffer from leukemia and some patients have gastrointestinal tumors. Therefore, I may study the radiotherapy for solid tumors. In addition, patients with fever and cold are treated in outpatient departments now and so there are few patients with such diseases in our department. The diseases have changed a lot. Medical knowledge is updating and we should use new medical knowledge to cope with the current situation. Of course, there are epidemic diseases every year such as influenza pandemic in December of this year, which occurs in all of the world. However, other diseases may have changed. At the beginning of the foundation of PRC, there were many people with bilharziasis and parasitic disease and we learned from predecessors to research into and treat such diseases with traditional Chinese medicine. At that time, we collected herbal medicines and boiled them to cope with chronic diseases. In 1980s, we made many innovations in the terms of hereditary endocrine and metabolic diseases. Our hospital is the first medical institution to diagnose and treat nanism and hypotrophy in China, for which our hospital won the National Second-level Science Technology Improvement Award. Now, many hospitals are learning from our hospital throughout the country. Our hospital keeps ahead in medical development and medical advancement in China. Now, we are researching inherited metabolic diseases for next-generation sequencing. We also conducted gene testing for patients with immunodeficiency diseases, leukemia, endocrine and metabolic

diseases and other diseases and published some articles which were recognized internationally. We also communicated a lot internationally and published a lot of international reports. They all agreed that we had done a lot of work on genetic testing, and that we had been very successful.

Interviewer: Could you talk about the main problems in the development of pediatrics?

Prof Xu: At the beginning we were only a pediatric department of a tertiary hospital but now we rank fourth in China. In fact, our pediatric department included four inpatient wards and over 100 pediatricians in the early days of liberation. Later, half of the pediatric department was divided out to establish a new pediatric hospital. Therefore, inpatient wards were reduced to three. Later, the specialized hospital was developed into a general hospital. The inpatient wards of the pediatric department were reduced to two, with less pediatricians after job transfer. Besides, according to the national policy back then, one family was allowed to have only one child. Our hospital is located in the downtown, and many families in downtown have moved to the suburb, so there was a significant reduction in patients and most of them preferred to see doctors in specialized hospitals. Later, a high-quality team of adult cardiovascular surgery was established and three inpatient wards were equipped for it, so our pediatric department has only one ward. Now, the pediatric department has one inpatient ward with 14 beds and 21 pediatricians including me. We have invited some retired pediatricians to join us. We now take charge of pediatric outpatient service, pediatric inpatient wards, pediatric research, pediatric clerkship and teaching. In order to solve the shortage of pediatricians, we need more new pediatricians to join us. Currently, our hospital offers this chance to expand the inpatient ward. What we should do first is to cultivate more pediatricians to expand our team. Therefore, the most important thing is to reassure the existing pediatricians and employ new pediatricians. At present, we have reached international standards, and our pediatricians are able to conduct gastroscopy and enteroscopy. However, there is a lack of pediatricians, and that's why we have so much work to do and most of us have no much time to accompany our families.

Interviewer: what abilities do you think pediatricians urgently need to improve?

Prof Xu: First aid ability. Our hospital is weak in treatment of intractable diseases and first aid, so it is necessary to improve the first aid ability, the analysis ability of intractable diseases and the ability of clinical scientific research of doctors. We

have done well in teaching, but I want to do better. Actually, we did well in teaching, because my elders came back from America and Britain. At that time, our teachers spoke not only in Chinese, but also in English and French during the ward rounds. They are all excellent. I also teach in English and French now. The school requires us to teach in English and French, so we need to improve our foreign language skills, (32:26), and actually all of us are improving in this respect. In addition to learning new knowledge, we can also communicate with foreigners. We often invite foreign students to study here and also send young doctors to study in America, Britain and Europe. Basically, every one of us has the opportunity, and all of that is to improve the abilities of pediatricians in clinical practice, research, teaching and so on.

Interviewer: Thank you. If we need to help build community pediatrics, where should we start from?

Prof Xu: Communities are short of pediatricians, and their internists are afraid to see pediatric patients. So, we are going to do two things. First, we are going to train community doctors. They will learn intensively and be taught how to diagnose and treat pediatric diseases, such as cold, cough and fever. Second, we are also training new general practitioners to rotate in our department of pediatrics. After 3-6 months here, they will know the characteristics of pediatric diseases and how to diagnose and treat them. In fact, I often go to the grassroots to teach community doctors to diagnose and treat pediatric respiratory diseases. Why? It is to improve their ability to treat common clinical diseases, so that they can treat some child patients, thereby reducing the pressure on tertiary hospitals, which is taken seriously by the municipal government and necessary now. Of course, at the beginning, I also sent my senior students to primary pediatric clinics to teach community doctors, so as to solve the difficulty in accessibility. We also suggest communities to publicize basic science knowledge to parents, so that they know how to deal with some common symptoms and how to take care of their children.

Interviewer: What do you think makes general practitioners in communities qualified?

Prof Xu: Actually, I don’t expect much of them. I just want them to be able to diagnose and treat common diseases. Common diseases mainly include common respiratory diseases, such as cold, cough, tracheitis and chronic cough, and digestive system diseases, such as acute diarrhea. Patients with other diseases

can be referred to secondary or tertiary hospitals. Those who do not improve after treatment of two or three times can be directly referred to tertiary hospitals. In fact, we can also open a green channel for communities, that is, patients who are referred by them to us can be treated in advance or admitted to our hospital directly. Besides, they can also follow up to know how to treat such patients. We have a WeChat group, and if they find problems, they can consult in it. We also provide them with common pediatric drugs and facilities, common pediatric drug dosages and formulations.

Interviewer: are there any special diseases in common diseases?

Prof Xu: yes, they are mainly URI, pharyngorhinitis, sphagitis or rhinitis, or acute diarrhea, acute gastroenteritis, acute gastritis, acute enteritis and so on.

Interviewer: can these be compiled into manuals or books?

Prof Xu: I'm going to make a simple pocket book, which can be put in the pocket. It will state how to treat patients with body temperature of 38 or 39 degree Centigrade or cough, and how to conduct atomizing inhalation.

Interviewer: Are there any referral indicators? Will they refer patients directly? There should be a coordination mechanism. Is there a rule that patients can only be referred when they meet certain criteria or beyond the ability of community pediatricians?

Prof Xu: If a child gets stomachache but they are not clear about the cause, the child can be directly referred to our hospital. For patients with simple respiratory diseases, such as cold, they need to be treated once or twice in the community, and they can be referred to us only when community pediatricians cannot treat them, or they don't improve and have signs of pneumonia. Of course, every doctor's ability is different, and referral is allowed when a doctor feels that he can't deal with it.

Interviewer: no rigid indicators?

Prof Xu: no, and we need to sum up at work.

Interviewer: ok, thank you Prof Xu for accepting my interview.

Appendix 7: Head of Pediatric Nurse Visit Record (Chinese Version)

采访人：我现在在上海交通大学医学院附属瑞金医院北院采访儿科护士长。陶老师你认为中国儿科医生现状如何？

嘉宾：儿科医生现在就是人员非常紧张，然后工作也很忙，工作压力很大。

采访人：你认为现在儿科医生短缺的原因有哪些？

嘉宾：原因就是我刚才说的，第一个就是工作压力非常大，因为工作量也比较大，然后各方面收入也低，家属和病人对医生的要求也非常的高，理解度又很差。所以现在儿科医生工作起来就很困难。

采访人：那你从临床合作角度，有什么值得注意点的地方吗？

嘉宾：临床合作。

采访人：医护合作。

嘉宾：医护合作就是医院管理吗？

采访人：也可以从医院管理角度说。

嘉宾：医院管理肯定是要提升一下儿科医生的一些支持，比如说科研的支持，然后绩效，奖金收入方面的一个提升，然后儿科的病人因为他疾病的原因，不可能说是某一次就诊，然后收费很高。但是因为这个病人的收入低了之后就造成医护人员的收入也会相应的减低，我觉得儿科医生的医护人员的工作量和他的收入是不能按照，怎么讲，就是绩效来分配的。

采访人：在儿科护士工作中跟患者家庭的冲突程度有多高，是跟患者产生冲突，医患方面？

嘉宾：因为现在儿科病人比较多，然后首先从就诊的环节和流程上来看，候诊的时间比较长，那么家属肯定这个情绪上比较焦虑，这就是一个最大的矛盾。因为我们现在人力上是不可能马上达到一对一或者一对几的一个配比。那么病人的需求和医护人员的工作能力上的一个差距就造成现在矛盾最大的一个问题。

采访人：那工作和家庭之间的平衡，你认为如何做到？

嘉宾：本身做医护人员就已经是知道自己应该是以工作为中心，然后比如牺牲一点个

人的时间和与家人相处的时间，但是可能就是说在做好思想准备和变成实际行动中间，情绪上还是会有落差，所以说现在目前为止的话，只要是做医生对自己家庭的关注力或者说这种投入都会相对来说比较少。

采访人：那在平时工作中有没有那种创新，针对一些工作流程，然后新的事物发现保持自主性，有自主发挥的空间。

嘉宾：这个倒是有的，就是医院可以，经常性的在问我们怎么样可以做到一个优化的流程，比如说我们现在是把这个病人的就诊时间给他分段和预约，然后不要让他集中在候诊高峰期就诊，这样的话医护人员的工作，某个时段的工作压力可以减轻，然后病人就诊时间也会减少。但是事实上最大的问题就是人力和工作量的不足，那么就是说现在为止还没有很好地去解决这件事情。

采访人：那针对中国现在儿科未来走势是怎么样的，从综合医院儿科发展来说？

嘉宾：综合医院儿科就是因为是综合医院，它相对面对的患者都是经济能力比较差的，然后对就诊的经济负担压力也是承受能力比较差的患者，所以说我们的压力还是很大的，希望国家和政府能不能稍微支持和提升一下儿科的一个待遇，然后要有更多的医护人员参与到这项工作当中去，然后最根本的解决一下这个医护人员人力缺失的这个问题，我觉得将来就会好很多。

采访人：那如果我们现在社区联络的，如何帮助社区建设儿科资源。

嘉宾：因为儿科因为最近上海才刚刚又恢复了儿科系的一个建设，然后可能这个说要经验丰富的医护人员，目前为止在社区基本上是没有，由于小孩疾病变化的原因，可能社区医生对于儿科的这个病人的诊断都不是很准确？就是说不是很什么。

采访人：能力很强？

嘉宾：对。或者是说不敢下一个很准确的一个诊断，最后就是说，事实上社区目前为止协助或者是说帮助三级医院去诊断治疗儿科病人的能力还是有点差。可能将来会好一点，现在还是不行。

采访人：好的，谢谢。

Appendix 8: Head of Pediatric Nurse Visit Record (English Version)

Interviewer: Now I am interviewing the head nurse of pediatrics in the north branch of Ruijin Hospital affiliated to Shanghai Jiao Tong University School of Medicine. Ms. Tao, what do you think of the current status of pediatricians in China?

Guest: pediatricians are scarce, busy and stressed.

Interviewer: what do you think are the reasons for the current shortage of pediatricians?

Guest: As I said just now, the first one is great stress at work. Heavy workload, low income as well as high expectation and intolerance of family members and patients to doctors cause difficulty of pediatricians' work.

Interviewer: is there anything noteworthy about clinical collaboration?

Guest: clinical collaboration?

Interviewer: collaboration in hospital.

Guest: do you mean hospital management?

Interviewer: you can also talk about it from a hospital management perspective.

Guest: I think there must be increased support for pediatricians, such as scientific research, performance and bonus. We can't charge too much for one visit for many diseases. But the lower fee paid by patients leads to correspondingly lower income of medical workers. I don't think the workload and income of pediatricians and other medical workers in pediatrics should be allocated based on their performance.

Interviewer: how about the conflicts with patients' family members, or with patients, for pediatric nurses?

Guest: Due to the large number of child patients, from the perspective of treatment procedures, the waiting time of patients is relatively long, so their family members are more anxious, which is the biggest conflict. Because the ratio of doctors to patients is unlikely to reach one-to-one, the gap between the needs of patients and the ability of medical staff causes the biggest contradiction.

Interviewer: how do you balance work and family?

Guest: As medical workers, we know we should focus on our work, such as

sacrificing some of our personal time and time with our family members. However, mental preparation and practical action may have a gap. So, up until now, physicians actually pay less attention to their families.

Interviewer: do you innovate in your daily work, like in work procedures, finding new things, or allowed to act independently?

Guest: Yes, we do. We are often asked how to optimize the process, such as appointment measures, for the purpose of avoiding too many visits in peak times. By this way, the pressure of medical workers can be reduced and patients can get to their doctors sooner in peak times. But in fact, the biggest problem is the shortage of physicians and heavy workload, which had not been well solved yet.

Interviewer: what will be the future trend of pediatrics in China in terms of the development of pediatrics in general hospitals?

Guest: For pediatrics in general hospitals, just because patients in general hospitals are relatively poor, they have heavy economic burden and poor tolerance. Our medical workers bear great pressure. I hope the state and government can support and improve the benefits for pediatric workers a little bit, and more medical workers join us, to fundamentally solve the problem of shortage of medical workers, so that the situation will be better in the future.

Interviewer: how about community communication, and how to help communities build pediatric resources?

Guest: The construction of the department of pediatrics has just been resumed in Shanghai. So far, basically no communities have experienced medical workers. And community doctors may not be very accurate in diagnosing child patients because of changes in a child's disease. They are not that…

Interviewer: capable?

Guest: Yes, or they are afraid to make very accurate diagnosis. Actually, the ability of communities to assist tertiary hospitals in diagnosing and treating child patients is relatively poor, it may be better in the future, but now it's poor.

Interviewer: ok, thank you.

Appendix 9: Senior Pediatric Visit Record Dr Yu (Chinese Version)

采访者：现在我所采访的是于意副主任医师在上海交通大学医学院附属瑞医院北院儿科医生办公室。于医生我想问一下，你认为中国儿科医生现状如何？

于意副主任医师：中国儿科医生的现状两个字概括就是尴尬。首先就是一个它处于非常重要的地位。即使在医院内部医疗环境下，其他科室的医生也认为儿科医生是一个稀缺资源，对它们来讲也是非常重要的资源。但是同时儿科医生的工作量以及收入等等这些又都非常的堪忧，一个是工作量非常大，工作的时间也比较久，还有工作的环境比较噪杂。收入那跟其他科室是明显具有差异的，在综合医院来说其他科室的收入明显高的，最初医院的这种发展态度来说，综合医院的儿科都在萎缩，也能说明儿科的收入相对其他成人科室对医院经济建设上贡献是少的。

采访者：那你现在觉得从医学院的角度，医院如何从合作的角度来解决这方面的问题，缓解这方面的短缺问题？

于意副主任医师：这个通过行政手段的干预应该是有一定效果的，比如说像交通大学就把儿科独立设了一个儿科学院。然后这个应该是有一定的作用的，但是我觉得更多的还是应该从长远的一个儿科医生的发展以及他未来的工作环境工作收入这些方面来调节，才是一个比较正常可持续的一个调节。

采访者：那一般儿科医生怎么平衡家庭和工作之间的那些矛盾，怎么平衡？

于意副主任医师：这个的话应该说是中国医生的共同的问题，也可能是全世界的医生都要做一个调整，因为你在从事这样一个重要的工作，从事与人的性命健康相关的工作，那么一定是要拿出更多的时间去进行进一步地培训，自我的学习，要把这份工作做好，压力也是在所难免的。那么这个平衡是一定要做的，当然你可以列一些时间表，比如说我尽量在周末某些时间去陪孩子，陪家人等等这方面。另外一个就是，可能个人的调节能力是有限的，然后比如说医院，比如说设置更多的儿科岗位，根据你的病人量，然后使得这些医生能够有更多的时间去平衡这种工作量，能够稍微减少一点，那么对儿科医师的家庭和压力相对能够缓解一些。

采访者：那于医生你认为你在医院工作中有没有经常拥有创新的机会或者是提供

一些创新的支持。

于意副主任医师：创新的支持？

采访者：或者医院给医生提供一种什么独立研发、创新或者工作流程改造等，给予职工一定的发挥空间。

于意副主任医师：我认为新建的医院和这种三级的医院相对可能有一点点的空间，但是更多的时候这是行政层面干预的更多，比如说这种管理方面的，大多数时间可能我们的医生还是被动的。

采访者：那在工作中患者跟医生的冲突程度高不高呢？

于意副主任医师：应该说这个风险是高的，因为长期以来中国是一个独生子女政策，这个孩子在家庭中是一个核心地位，决定这个家庭存亡，就是不能有一点伤害的。如果说这个孩子在医生手里受了一点委屈或者认为被你误诊或者出现其他情况，那这个事情是非常严重地，而且家属是非常容易激动的，这就是为什么，包括我们护士经常有被打等等这种情况。可能如果是一个成人科室的老年患者在就诊过程中出现一点小失误或者怎么样，或者发生在他实际身上都能够理解，但是发生在孩子身上，往往家长会比较冲动。

采访者：那现在觉得以前的医疗教学和现在的临床能力有没有直接的联系，是不是直接可以从书中用于临床？

于意副主任医师：从书中用于临床，这个直接的运用可能还是不能够的，我觉得临床实践也非常重要。因为在这个过程中从书本到实践是有一定距离的，即使你是一个再聪明的人，在进行这个转换的过程中一定是需要一些其他的支持。当然不排除你通过临床教育，但是这个书本的教育是非常重要的，如果你连这个都没有掌握到，那就无从去结合临床实践产生更多的体会，这个过程是不可能有的，这是一个基础。但是这个直接的转换有困难，需要更多的临床实践。

采访者：那就目前的儿科现状，你觉得有哪些措施可以直接来改善现状，哪些东西可以直接有效的缓解一下现在的儿科医生现状。

于意副主任医师：比较能够短期改善的，我觉得是一个就诊的一个硬件环境，比如说你一个相对安全的职业空间，比如说你在这个过程中是有一些保安安全守护的措施，而且就是说如果这个整个空间比较足够，然后这个工作环境噪音比较小，这方面是比较能够短期达到的。比如你说其他的收入，包括一个职业的荣誉感等等这些与社会其他方方面面更多相关的东西，可能就需要时间，需要社会的进步来得到进一步改

善，是逐渐的，长期的。

采访者：你理想中的儿科未来走势会是怎么样的？

于意副主任医师：未来走势就是，那么基层的医生他的职业水平能够有一个飞跃是的发展，就说他的胜任力，能够比现在有大幅的提高，才可能让这些患者得到更好的救治，那么有足够的社区这种一级医生，一级医院的医生，并且能够提供良好的服务，那么这个时候我们才可能说真正的，大家的负担都减下来，大家能够各司其职。这个时候就比较理想了。

采访者：那这也是社区儿科的建设，对社区儿科的建设有什么建议吗？

于意副主任医师：第一个就是人，就是我们的医生的确需要更好的去提高自己的职业能力，但是也受到各种制约。因为你生活在这个世界上，可能你需要其他的一些条件，人有惰性，可能你需要一点推动力，需要一点牵引，比如说一些行政上的规定。当然了可能也要有基本的保障，比如说我已经有比较稳定地收入和比较可观，就是能让我在这个世上生存，觉得不被歧视的这种收入，已经比较好一点的收入。那么他自然就想要，让自己的这种创造力和自己的职业能力要匹配上我这一份薪水了。

采访者：好的，谢谢你接受采访，再见。

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Appendix 10: Senior Pediatric Visit Record Dr Yu (English Version)

Interviewer: now I'm interviewing Associate Chief Physician Yu Yi.

Dr. Yu, what do you think of the current status of pediatricians in China?

Associate Chief Physician Yu Yi: The current status of pediatricians in China can be summed up into one word, embarrassing. First of all, it is in a very important position. Even in the internal medical environment of hospitals, physicians in other departments also consider pediatricians as scarce and important resources.

However, at the same time the workload and income of pediatricians are very worrying, such as heavy workload, long work time and noisy environment. Their income is significantly different from that of other departments. In general hospitals, the income of other departments is significantly higher. From the perspective of the development trend of hospitals, pediatrics in general hospitals are shrinking, which also shows that the income generated from pediatric departments contributes less to the overall income of a hospital compared with adult departments.

Interviewer: so for medical schools, what do you think hospitals should do now to work together to solve this problem, to alleviate the shortage?

Associate Chief Physician Yu Yi: Administrative intervention may have certain effects. For example, Shanghai Jiao Tong University has set up an independent academy of pediatrics, which may help. Besides, I think it should be regulated from the long-term development of pediatricians and their future work environment, income and so on. This is a kind of normal and sustainable regulation.

Interviewer: how do pediatricians balance family and work in general?

Associate Chief Physician Yu Yi: This may be a problem for all Chinese doctors, or even doctors all over the world, because you are doing such an important job, engaged in the work related to human health. So, they have to spend more time for further training and self-learning, do their job well, and of course pressure is inevitable for them. They must be able to balance work and family. For instance, they can make a plan, to spend time with children and families on the weekend.

Moreover, as the ability of individuals is limited in regulation, hospitals can create

more pediatric jobs depending on their patients, so that physicians will have less work and more time to accompany their family. By this way, their stress can be relieved relatively.

Interviewer: Dr. Yu, do you think you often have innovative opportunities in your work or have you ever been provided with innovative support?

Associate Chief Physician Yu Yi: innovative support?

Interviewer: whether the hospital provides doctors with any opportunities for independent research and development, or innovation, or work process transformation, and gives the staff space to develop their capabilities.

Associate Chief Physician Yu Yi: relatively speaking, I think new hospitals and tertiary hospitals may have such opportunities, but more often it's about administrative intervention, such as management, and most of the time the doctors are passive in this.

Interviewer: are there fierce conflicts between patients and doctors at work?

Associate Chief Physician Yu Yi: Yes, I think so. Because the one-child policy exists for a long time in China. Children play a central role in the family, determining the survival of a family. They cannot be harmed at all. If parents think their children have been wronged a little or that their children are misdiagnosed or something else, the results can be very serious. And parents are very emotional. That's why nurses get beaten up a lot. If there are small mistakes in the treatment of elderly patients in the departments of adult medicine, they will understand the doctor, but if it happens to children, parents tend to be impulsive.

Interviewer: Do you think there is a direct relationship between the previous clinical teaching and the current clinical ability? Can we directly use the knowledge in the book to clinical application?

Associate Chief Physician Yu Yi: No, we can't. I think clinical practice is also very important. Because going from book knowledge to practice is a process, even if you are very smart, you will definitely need additional support in the transition. Of course, you can get clinical education, but book education is very important. If you don't have the book knowledge, you can't get more experience through clinical practice. It is impossible to miss this process, which is a foundation. But direct conversion is difficult and requires more clinical practice.

Interviewer: what measures do you think can directly improve or effectively alleviate the current situation of pediatrics?

Associate Chief Physician Yu Yi: In short term, I think they are the hardware environment in the consulting room, relatively safe occupational space, security guards,

enough working space, low noise, and so on. Income and a sense of honor to job, and relevant social aspects would be gradually improved for a longer time.

Interviewer: what's your ideal future for pediatrics?

Associate Chief Physician Yu Yi: In the future, grassroots doctors will develop greatly in profession and competence, so that patients can receive better treatment. If there would be enough primary doctors in the community and enough doctors in primary hospitals, and doctors can provide good services, the burden on all doctors will be really reduced and doctors will be able to perform their respective duties. This is the ideal situation.

Interviewer: do you have any suggestions to community pediatrics?

Associate Chief Physician Yu Yi: The first one is talents, that is, doctors really need to better improve their professional ability, but also are subject to various constraints. We also need other conditions. People have inertia, so we need a little push or pull, such as administrative rules. Of course, we need basic safeguard, like stable and considerable income for living, instead of discriminatory income. In this way, we will work hard to make our creativity and professional ability match our salary.

Interviewer: ok, thank you for accepting my interview, goodbye.

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Appendix 11: Hospital Manager Visit Record (Chinese Version)

采访人：我现在上海交通大学医学院附属瑞金医院北院行政楼采访，采访的是医务部主任汪老师。我想问一下你认为现在中国儿科医生的现状如何？

嘉宾：现在儿科医生的现状就是人不够，尤其到儿童流行病高发的时候，国家公立医院更加明显，就是出现儿科排队，医疗资源紧缺的现象更为明显，所以也引起社会上的一些反响。

采访人：那现在短缺具体原因有哪些？

嘉宾：这个因为前几年国家的政策，医疗资源的配置都是有关系的，因为以前是独生子女，就是那个相对来讲有一段时间综合性医院儿科，就是病人相对比较少，那么综合性医院其他科室发展比较快，那么作为医院层面的调整就把很多的综合性医院就关闭了儿科，把儿科集中到专科医院里面去了。所以这几年由于各种原因，就是上海外来人口也多，发展也快，所以造成了一个严重地儿科医疗资源不足。

关于儿科的医疗质量的这样一个控制，我觉得基本都是一致的。当然还是要体现儿科的一些特性，就适合儿科的，包括那个儿科的场地，环境的要求，包括儿科的一个检查方式模式的不同，还有儿科的一些特殊治疗设备这些设备，那么最主要的还是儿科医生的一个专业能力，专业知识的这方面，需要一个长期的临床实践，这些方方面面结合起来，才能够对儿科质量控，就是能够起到一个促进的作用。

采访人：你觉得儿科科室和成人科室在合作方面有没有一些壁垒。

嘉宾：如果合作的话我觉得不应该有壁垒的，尤其是像那个综合性医院的儿科，就是除了儿科它自己要专业以外，那么更多的它还是要依靠医院的综合实力，在儿科的医疗资源的使用上能够共享，使这个更好的服务于儿科患者。

采访人：在职业范围上有没有冲突，如果这样的话？

嘉宾：应该不会，因为很多还是，它是作为那个支撑性质的，比如说医科室超声这些，还是公共学科平台的，它还是属于支撑性质。

采访人：那从医院角度来说，有没有给他们创新的机会或者是改善工作流程的那些平台之类的，就是让他们有更多自主性，

嘉宾：应该有的，因为医院对儿科这一块还是非常重视的，首先医院整个的绩效

分配体系当中，设计当中已经对儿科有倾斜，那么这样鼓励更多的那个医生能够加入到儿科的这个工作当中来，还有一个就是医院有设了那个新技术这些，人才引入，核心技术的项目培育的这些奖项，而且这些奖项设置当中对儿科都是有倾斜的，所以应该医院这方面还是有一定的那个支持力度的。

采访人：那你认为中国儿科的未来走势大概是什么样子的，最终发展。

嘉宾：应该还是一个以专业化那个发展的吧，那个让专业更加齐全，专业化发展的这个趋势。

采访人：就目前情况来看，你看现做哪些工作可以及时缓解现在儿科医生的缺少现状。

嘉宾：比方像上海市政府现在采取的几个方法，一个就是说有一个儿科的，其他专业的医生转儿科专业的一个培训，就是说那个上海市政府统一组织的就是儿科医师师资培训，那么你加入了这个培训，经过两年的学习考核通过以后，那么你就持有儿科医生的那个资质。那么一旦如果需要儿科，需要医生，你可以转岗或者是在高峰时期可以应对那个高峰的时候，你可以儿科的师资，出来应诊，那么其他的还有就是，当然医学院这方面的招生，扩招，那么这个就是它的周期比较长，那么还有一个就是，专科医生的培养，那么对那些社区医生的一个，儿科自身能力的一个提高。那么这些都会缓解现行儿科的医疗力量不足。

采访人：请问你对社区儿科还有什么建议，对社区建议。

嘉宾：社区建议我觉得还是要提高社区医生的儿科专业能力，尤其是在常见病，多发病这方面。那么使得普通的疾病患儿就不要离开社区，小病在社区就可以解决。那么这样对大型医院，综合性医院或者专科医院儿科的压力就会减轻，主要还是在专业能力方面的提高，要给他们机会加强培训。

采访人：有没有综合性医院跟社区儿科联动，大概有没有联动那种方式的设想？

嘉宾：现在联动方式一般都是这样子，医联体，儿科全科-专科联合这种方式，医联体就是说三级医院，二级医院和几个社区医院，那么这个都包括儿科专科在内的，还有就是儿科的专科联盟，就是对一些专科医院的儿科，那么联合几个综合医院，中心医院和社区形成一个区域联动的这种方式，都是一个比较好的一个模式。

采访人：好的，谢谢汪主任。

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Appendix 12: Hospital Manager Visit Record (English Version)

Interviewer: what do you think of the current status of pediatricians in China?

Guest: The current status of pediatricians is that there are not enough doctors, especially when the incidence of pediatric epidemic is high, which is more obvious in public hospitals, that is, excessive queues and shortage of medical resources are more obvious, so it causes some social repercussions.

Interviewer: what are the specific causes of shortage?

Guest: It relates to the national policies and the allocation of medical resources in previous years. Due to the one-child policy, there were relatively few patients for a period of time in the pediatrics of general hospitals, and the development of other departments was relatively fast, so the pediatrics was closed in a lot of general hospitals, except those in the specialized hospitals. In recent years, the large number of migrants, rapid develop in Shanghai and other reasons cause a serious shortage of medical resources in pediatrics.

I think it's consistent basically in medical quality control of pediatrics. Of course, it should reflect some features of pediatrics, including suitable field, environment, inspection mode, treatment equipment, especially professional ability and knowledge of pediatricians. And a long-term clinical practice is also necessary. The combination of all of them can facilitate and promote the quality control of pediatrics.

Interviewer: do you think there are any cooperation barriers between pediatric departments and adult departments?

Guest: I think there should be no barriers, especially for the pediatrics in general hospitals, that is, in addition to its own specialty, it also relies on the comprehensive strength of the hospital, so that medical resources can be shared to better service child patients.

Interviewer: is there any conflicts in professional functions in this case?

Guest: I don't think so, because they support pediatrics, like the ultrasonic equipment in the medical department and the public discipline platform.

Interviewer: is there any opportunity provided by the hospital for them to innovate or any platform to improve the workflow, giving them more autonomy?

Guest: I think so, because the hospital takes them seriously. First, the performance and

distribution system of the hospital has been designed to support pediatrics and encourage more doctors to join in pediatrics. Besides, there are awards for new techniques, introduction of professionals, and growth of core technologies in the hospital, and all of them support pediatrics. Therefore, I think the hospital has provided some support.

Interviewer: what do you think is the future of pediatrics in China, ultimately?

Guest: I think it'll be more specialized, with more specialties.

Interviewer: according to the current situation, what do you think can be done to alleviate the shortage of pediatricians in a timely manner?

Guest: Shanghai municipal government has taken several measures. The first is that if a hospital has pediatrics, doctors of other specialties can transfer to the pediatrics after being trained. The government has organized training for pediatrician qualification. If you join the training, and you pass the examination after two years of study, you will have the certification of a pediatrician. Then once pediatricians are in great shortage, you can switch to pediatrics or see patients with your certification in peak times. Of course, the enrollment and expansion of medical schools can also alleviate the shortage, which however is a relatively long period. Besides, the training of specialists and the improvement of community physicians and pediatricians can also alleviate the current shortage of pediatricians.

Interviewer: what advice do you have for community pediatrics?

Guest: I think it is still necessary to improve the professional ability of community pediatricians, especially in common and frequent diseases, so that child patients with common diseases or slight illness can be treated in the community, and the stress of pediatrics in large hospitals, general hospitals or specialized hospitals will ease. For this purpose, they should be provided with training opportunities.

Interviewer: is there any plan to link general hospitals to community pediatrics?

Guest: It is now generally the medical treatment alliances or cooperation between general hospitals and specialized hospitals in pediatrics. The former involves tertiary hospitals, secondary hospitals and several community hospitals, and all of them include pediatrics. The latter means combination of several specialized hospital, general hospitals, center hospitals and communities in a region. Both of them are good modes.

Interviewer: ok, thank you Director Wang.

Appendix 13: Auxiliary Tables Ap.

Table Ap. 1-1 OLS regression for GI EPA 1

Model					*t*	*Sig.*	*Collinearity statistcs*	
		B (unstandardized)	Standard error	Beta (standardized)			Tolerance	VIF
1	(Constant)	.005	.202		.024	.981		
	EPA Lev1	.003	.055	.002	.060	.952	.551	1.815
	EPA Lev2	.095	.056	.072	1.713	.087	.465	2.151
	EPA Lev3	.340	.064	**.231**	5.293	.000	.428	2.337
	EPA Lev4	.687	.074	**.377**	9.340	.000	.499	2.004

a. Dependent Variable: B18 (GI EPA 1). Care acute / chronic GI disease.

Table Ap. 1-2 OLS regression for GI EPA 2

Model					*t*	*Sig.*	*Collinearity statistcs*	
		B (unstandardized)	Standard error	Beta (standardized)			Tolerance	VIF
1	(Constant)	.324	.222		1.454	.146		
	EPAGLev1	-.040	.061	-.027	-.659	.510	.551	1.815
	EPAGLev2	.096	.061	.070	1.567	.117	.465	2.151
	EPAGLev3	.329	.071	**.216**	4.658	.000	.428	2.337
	EPAGLev4	.638	.081	**.338**	7.880	.000	.499	2.004

a. Dependent Variable: B19 (GI EPA 2). Care acute / chronic hepatobiliary disease.

Table Ap. 1-3 OLS regression for GI EPA 3

Model					*t*	*Sig.*	*Collinearity statistcs*	
		B (unstandardized)	Standard error	Beta (standardized)			Tolerance	VIF
1	(Constant)	.839	.207		4.049	.000		
	EPAGLev1	.037	.057	.027	.652	.515	.551	1.815
	EPAGLev2	-.008	.057	-.007	-.147	.883	.465	2.151
	EPAGLev3	.328	.066	**.232**	4.983	.000	.428	2.337
	EPAGLev4	.588	.075	**.336**	7.797	.000	.499	2.004

a. Dependent Variable: B20 (GI EPA 3). Diagnose and manage common GI / hepatobiliary diseases.

Table Ap. 1-4 OLS regression for GI EPA 4

Model					*t*	*Sig.*	*Collinearity statistcs*	
		B (unstandardized)	Standard error	Beta (standardized)			Tolerance	VIF
1	(Constant)	.391	.223		1.755	.080		
	EPAGLev1	.137	.061	**.094**	2.253	.025	.551	1.815
	EPAGLev2	.186	.061	**.138**	3.033	.003	.465	2.151
	EPAGLev3	.276	.071	**.184**	3.900	.000	.428	2.337
	EPAGLev4	.348	.081	**.188**	4.288	.000	.499	2.004

a. Dependent Variable: B21 (GI EPA 4). Assess and provide counseling regarding nutrition

Table Ap. 1-5 OLS regression for GI EPA 5

Model					*t*	*Sig.*	*Collinearity statistcs*	
		B (unstandardized)	Standard error	Beta (standardized)			Tolerance	VIF
1	(Constant)	.881	.259		3.406	.001		
	EPAGLev1	.026	.071	.016	.368	.713	.551	1.815
	EPAGLev2	.036	.071	.024	.500	.617	.465	2.151
	EPAGLev3	.218	.082	**.132**	2.652	.008	.428	2.337
	EPAGLev4	.609	.094	**.299**	6.471	.000	.499	2.004

a. Dependent Variable: B22 (GI EPA 5). Using endoscopy.

Table Ap. 1-6 OLS Coefficients for GI specialist EPA 1

	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	-0.016	0.102	-	-0.159	0.874	-
L1 B1	0.047	0.023	0.048	2.032	0.042*	1.855
L1 B2	-0.018	0.024	-0.018	-0.738	0.461	1.973
L1 B3	-0.023	0.024	-0.024	-0.961	0.337	1.989
L2 B4	0.055	0.024	0.057	2.285	0.022*	2.064
L1 B5	0.003	0.026	0.003	0.100	0.920	2.281
L2 B6	0.047	0.025	0.047	1.867	0.062	2.100
L3 B7	0.08	0.028	0.078	2.902	0.004**	2.407
L3 B8	0.021	0.025	0.02	0.834	0.405	1.984
L3 B9	0.062	0.025	0.062	2.477	0.013*	2.069
L3 B10	-0.034	0.026	-0.034	-1.351	0.177	2.040
L4 B11	0.116	0.027	0.112	4.359	0.001**	2.185
L4 B12	0.055	0.027	0.054	2.089	0.037*	2.179
L4 B13	0.082	0.024	0.084	3.365	0.001**	2.060
L2 B14	0.013	0.025	0.013	0.494	0.622	2.272
L4 B15	0.126	0.027	0.119	4.677	0.001**	2.155
L3 B16	0.191	0.028	0.18	6.925	0.001**	2.240
L4 B17	0.181	0.023	0.186	7.891	0.001**	1.848

Dependent Variable：B18

F = 109.365 (p<.001); R^2= .560; R^2adj = .555; D-W Value：2.026

*** p<0.05 ** p<0.01**

Table Ap. 1-7 OLS Coefficients for GI specialist EPA 2

	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	0.104	0.112	-	0.924	0.356	-
L1 B1	0.051	0.026	0.051	1.995	0.046*	1.855
L1 B2	0.000	0.026	0.000	0.008	0.994	1.973
L1 B3	0.043	0.026	0.043	1.640	0.101	1.989
L2 B4	0.022	0.027	0.023	0.839	0.401	2.064
L1 B5	0.005	0.029	0.005	0.175	0.861	2.281
L2 B6	0.029	0.028	0.028	1.036	0.300	2.100
L3 B7	0.052	0.031	0.049	1.707	0.088	2.407
L3 B8	0.019	0.027	0.018	0.690	0.491	1.984
L3 B9	0.073	0.028	0.070	2.623	0.009**	2.069
L3 B10	-0.007	0.028	-0.006	-0.239	0.811	2.040
L4 B11	0.161	0.029	0.152	5.518	0.001**	2.185
L4 B12	0.046	0.029	0.044	1.587	0.113	2.179
L4 B13	0.090	0.027	0.090	3.348	0.001**	2.060
L2 B14	-0.002	0.028	-0.002	-0.066	0.948	2.272
L4 B15	0.040	0.030	0.037	1.358	0.175	2.155
L3 B16	0.126	0.030	0.116	4.139	0.001**	2.240
L4 B17	0.219	0.025	0.220	8.657	0.001**	1.848

Dependent Variable：B19

F = 82.876 (p<.001); R^2= .491; R^2adj = .486; D-W Value：1.989

*** p<0.05 ** p<0.01**

Table Ap. 1-8 OLS Coefficients for GI specialist EPA 3

	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	0.419	0.104	-	4.049	0.001**	-
L1 B1	0.016	0.024	0.017	0.674	0.500	1.855
L1 B2	0.016	0.024	0.017	0.662	0.508	1.973
L1 B3	-0.020	0.024	-0.021	-0.817	0.414	1.989
L2 B4	0.081	0.025	0.086	3.285	0.001**	2.064
L1 B5	0.006	0.026	0.007	0.242	0.809	2.281
L2 B6	-0.094	0.026	-0.098	-3.690	0.001**	2.100
L3 B7	0.214	0.028	0.216	7.606	0.001**	2.407
L3 B8	0.045	0.025	0.046	1.778	0.076	1.984
L3 B9	-0.035	0.026	-0.036	-1.358	0.175	2.069
L3 B10	0.090	0.026	0.091	3.488	0.001**	2.040
L4 B11	0.110	0.027	0.110	4.062	0.001**	2.185
L4 B12	0.069	0.027	0.069	2.550	0.011*	2.179
L4 B13	0.029	0.025	0.030	1.154	0.249	2.060
L2 B14	-0.001	0.026	-0.002	-0.058	0.954	2.272
L4 B15	0.093	0.027	0.091	3.409	0.001**	2.155
L3 B16	0.122	0.028	0.119	4.355	0.001**	2.240
L4 B17	0.170	0.023	0.181	7.290	0.001**	1.848

Dependent Variable：B20

F = 90.477 (p<.001); R^2= .513; R^2adj = .508; D-W Value：1.981

*** p<0.05 ** p<0.01**

Table Ap. 1-9 OLS Coefficients for GI specialist EPA 4

	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	0.508	0.110	-	4.620	0.001**	-
L1 B1	0.010	0.025	0.010	0.384	0.701	1.855
L1 B2	0.048	0.026	0.050	1.859	0.063	1.973
L1 B3	0.037	0.026	0.039	1.431	0.153	1.989
L2 B4	-0.053	0.026	-0.056	-2.012	0.044*	2.064
L1 B5	0.026	0.028	0.027	0.937	0.349	2.281
L2 B6	0.048	0.027	0.050	1.780	0.075	2.100
L3 B7	0.052	0.030	0.052	1.753	0.080	2.407
L3 B8	0.103	0.027	0.105	3.871	0.001**	1.984
L3 B9	0.006	0.027	0.006	0.222	0.824	2.069
L3 B10	-0.012	0.028	-0.012	-0.430	0.667	2.040
L4 B11	0.051	0.029	0.050	1.778	0.076	2.185
L4 B12	0.126	0.029	0.124	4.388	0.001**	2.179
L4 B13	0.046	0.026	0.048	1.733	0.083	2.060
L2 B14	0.116	0.027	0.122	4.204	0.001**	2.272
L4 B15	-0.002	0.029	-0.002	-0.080	0.936	2.155
L3 B16	0.208	0.030	0.201	7.003	0.001**	2.240
L4 B17	0.071	0.025	0.074	2.844	0.005**	1.848

Dependent Variable：B21

F = 73.659 (p<.001); R^2= .462; R^2adj = .456; D-W Value：2.039

*** p<0.05 ** p<0.01**

Table Ap. 1-10 OLS Coefficients for GI specialist EPA 5

	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	0.426	0.128	-	3.330	0.001**	-
B1	0.006	0.029	0.006	0.221	0.825	1.855
B2	0.049	0.030	0.046	1.618	0.106	1.973
B3	-0.045	0.030	-0.044	-1.525	0.127	1.989
B4	0.074	0.030	0.071	2.427	0.015*	2.064
B5	0.014	0.033	0.013	0.438	0.661	2.281
B6	-0.032	0.032	-0.03	-1.020	0.308	2.100
B7	0.100	0.035	0.091	2.87	0.004**	2.407
B8	0.129	0.031	0.119	4.155	0.001**	1.984
B9	0.011	0.032	0.011	0.360	0.719	2.069
B10	-0.102	0.032	-0.092	-3.174	0.002**	2.040
B11	0.110	0.033	0.099	3.293	0.001**	2.185
B12	0.098	0.033	0.088	2.944	0.003**	2.179
B13	0.045	0.031	0.043	1.463	0.144	2.060
B14	0.003	0.032	0.003	0.084	0.933	2.272
B15	0.188	0.034	0.167	5.586	0.001**	2.155
B16	0.086	0.035	0.076	2.488	0.013*	2.240
B17	0.159	0.029	0.152	5.491	0.001**	1.848

Dependent Variable：B22

F = 56.145 (p<.001); R^2= .396; R^2adj = .389; D-W Value：1.922

*** p<0.05 ** p<0.01**

Table Ap. 1-11 Predictors of general EPA Level 1

Linear Regression Analysis Results						
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	2.315	.135	-	17.180	.000	-
D1	.014	.034	.020	.423	.673	2.096
D2	.049	.036	.069	1.357	.175	2.433
D3	.046	.039	.063	1.169	.243	2.743
D4	.019	.035	.026	.530	.597	2.278
D5	**.090**	**.033**	**.121**	**2.764**	**.006**	1.812
D6	.052	.033	.076	1.577	.115	2.151
D7	.038	.033	.052	1.159	.247	1.909
D8	**.087**	**.034**	**.118**	**2.534**	**.011**	2.048

Dependent Variable：EPA Level 1

F = 21.464 (p<.001); R^2= .183; R^2adj = .174; D-W Value：1.624

*** p<0.05 ** p<0.01**

Table Ap. 1-12 predictors of general EPA Level 2

Linear Regression Analysis Results						
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	2.179	.142	-	15.309	.000	-
D1	.025	.036	.033	.704	.481	2.096
D2	**.095**	**.038**	**.124**	**2.493**	**.013**	2.433
D3	.019	.042	.024	.457	.648	2.743
D4	.005	.037	.007	.142	.887	2.278
D5	.006	.034	.008	.188	.851	1.812
D6	**.133**	**.035**	**.176**	**3.773**	**.000**	2.151
D7	**.082**	**.035**	**.104**	**2.369**	**.018**	1.909
D8	**.086**	**.036**	**.109**	**2.384**	**.017**	2.048

Dependent Variable：EPA Level2

F = 27.084 (p<.001); R^2= .220; R^2adj = .212; D-W Value：1.687

*** p<0.05 ** p<0.01**

Table Ap. 1-13 predictors of general EPA level 3

Linear Regression Analysis Results						
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	2.215	.124		17.798	.000	-
D1	.057	.031	.081	1.818	.069	2.096
D2	**.093**	**.033**	**.134**	**2.782**	**.006**	2.433
D3	.031	.036	.044	.857	.392	2.743
D4	.047	.033	.068	1.452	.147	2.278
D5	-.012	.030	-.016	-.390	.697	1.812
D6	.058	.031	.086	1.897	.058	2.151
D7	**.073**	**.030**	**.103**	**2.420**	**.016**	1.909
D8	**.108**	**.032**	**.151**	**3.413**	**.001**	2.048
Dependent Variable：EPA Level3						
F = 34.801 (p<.001); R^2= .266; R^2adj = .259; D-W Value：1.713						
*** p<0.05 ** p<0.01**						

Table Ap. 1-14 Predictors of general EPA Level 4

Linear Regression Analysis Results						
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	1.625	.098		16.563	.000	-
D1	.025	.025	.043	.993	.321	2.096
D2	.067	.026	.119	2.535	.011	2.433
D3	.003	.029	.005	.102	.918	2.743
D4	**.051**	**.026**	**.091**	**2.005**	**.045**	2.278
D5	.024	.024	.040	.992	.322	1.812
D6	.034	.024	.061	1.386	.166	2.151
D7	**.111**	**.024**	**.193**	**4.640**	**.000**	1.909
D8	**.084**	**.025**	**.145**	**3.368**	**.001**	2.048
Dependent Variable：EPA Level4						
F = 41.557 (p<.001); R^2= .302; R^2adj = .295; D-W Value：1.942						
*** p<0.05 ** p<0.01**						

Table Ap. 1-15 predictors of specialized GI EPA 1

Linear Regression Analysis Results						
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	1.600	.188		8.495	.000	-
E1	.074	.053	.070	1.394	.164	2.428
E2	-.029	.057	-.028	-.510	.610	2.913
E3	.098	.060	.093	1.641	.101	3.119
E4	.092	.055	.086	1.673	.095	2.561
E5	-.077	.049	-.072	-1.570	.117	2.080
E6	.065	.054	.060	1.190	.234	2.467
E7	**.149**	**.054**	**.140**	**2.787**	**.005**	2.468
E8	**.208**	**.052**	**.191**	**3.995**	**.000**	2.239

Dependent Variable：GI EPA 1 (Complex acute / chronic GI)

F = 26.099 (p<.001); R^2= .214; R^2adj = .206; D-W Value：1.767

*** p<0.05 ** p<0.01**

Table Ap. 1-16 predictors of Specialized GI EPA 2

Linear Regression Analysis Results						
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	1.736	.200		8.676	.000	-
E1	.022	.056	.020	.392	.695	2.428
E2	-.007	.060	-.006	-.114	.909	2.913
E3	**.199**	**.064**	**.181**	**3.124**	**.002**	3.119
E4	.004	.058	.004	.073	.942	2.561
E5	-.043	.052	-.039	-.825	.410	2.080
E6	**.178**	**.058**	**.159**	**3.095**	**.002**	2.467
E7	.075	.057	.068	1.319	.188	2.468
E8	**.109**	**.055**	**.097**	**1.975**	**.049**	2.239

Dependent Variable：GI EPA 2 (Complex acute / chronic hepato)

F = 20.399 (p<.001); R^2= .175; R^2adj = .167; D-W Value：1.949

*** p<0.05 ** p<0.01**

Table Ap. 1-17 predictors of Specialized GI EPA 3

Linear Regression Analysis Results						
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	1.706	.180		9.482	.000	-
E1	**.138**	**.051**	**.135**	**2.720**	**.007**	2.428
E2	.092	.054	.092	1.699	.090	2.913
E3	.068	.057	.067	1.191	.234	3.119
E4	.049	.053	.047	.924	.356	2.561
E5	.002	.047	.002	.040	.968	2.080
E6	.004	.052	.004	.079	.937	2.467
E7	.093	.051	.091	1.822	.069	2.468
E8	**.142**	**.050**	**.136**	**2.853**	**.004**	2.239

Dependent Variable：GI EPA 3 (Common GI diseases)

F = 27.491 (p<.001); R^2= .223; R^2adj = .215; D-W Value：1.989

*** p<0.05 ** p<0.01**

Table Ap. 1-18 predictors of Specialized GI EPA 4

Linear Regression Analysis Results						
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	1.343	.192		6.985	.000	-
E1	.052	.054	.048	.968	.333	2.428
E2	.059	.058	.055	1.008	.314	2.913
E3	.016	.061	.014	.254	.800	3.119
E4	.105	.056	.096	1.872	.062	2.561
E5	**.100**	**.050**	**.093**	**1.999**	**.046**	2.080
E6	.084	.055	.076	1.513	.131	2.467
E7	.093	.055	.086	1.701	.089	2.468
E8	.102	.053	.093	1.930	.054	2.239

Dependent Variable：GI EPA 4 (Nutrition assessment)

F = 25.153 (p<.001); R^2= .208; R^2adj = .200; D-W Value：1.921

*** p<0.05 ** p<0.01**

Table Ap. 1-19 predictors of Specialized GI EPA 5

Linear Regression Analysis Results						
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF
	B	Standard Error	Beta			
Constant	1.768	.220		8.023	.000	-
E1	-.039	.062	-.032	-.624	.533	2.428
E2	-.012	.067	-.010	-.176	.860	2.913
E3	**.154**	**.070**	**.129**	**2.192**	**.029**	3.119
E4	.084	.064	.070	1.301	.194	2.561
E5	.041	.057	.034	.707	.480	2.080
E6	.054	.064	.044	.847	.397	2.467
E7	.110	.063	.092	1.757	.079	2.468
E8	**.139**	**.061**	**.115**	**2.290**	**.022**	2.239

Dependent Variable：GI EPA 5 (Endoscopy)

F = 15.951 (p<.001); R^2= .143; R^2adj = .134; D-W Value：1.946

*** p<0.05 ** p<0.01**

Table Ap. 1-20 Factor analysis

Name	**Factor Loading Coefficient**								Communality
	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	
B11	0.590	0.186	0.305	0.412	0.125	0.164	0.155	-0.111	0.724
B14	0.647	0.224	0.068	0.059	0.252	0.207	0.161	0.356	0.735
B12	0.620	0.302	0.219	0.245	0.115	0.167	0.145	0.015	0.646
B16	0.507	0.123	0.222	0.372	0.183	0.237	-0.013	0.407	0.715
B13	0.723	0.105	0.226	0.097	0.152	0.08	0.185	0.166	0.686
B3	0.166	0.590	0.157	0.124	0.471	-0.024	0.089	0.256	0.712
B6	0.442	0.584	0.226	0.044	0.243	0.068	0.122	0.054	0.671
B4	0.035	0.601	0.116	0.481	0.159	0.153	0.133	0.217	0.721
B5	0.329	0.693	0.131	0.190	0.174	0.207	0.121	0.058	0.733
B19	0.286	0.167	0.781	0.110	0.18	0.130	0.104	0.174	0.823
B20	0.111	0.156	0.587	0.394	0.147	0.402	0.161	0.066	0.749
B18	0.347	0.182	0.616	0.235	0.143	0.228	0.024	0.251	0.725
B7	0.080	0.450	0.235	0.455	0.175	0.303	0.348	0.096	0.723
B15	0.347	0.150	0.122	0.577	0.29	0.351	-0.197	0.274	0.812
B10	0.224	0.196	0.197	0.752	0.098	-0.029	0.254	0.112	0.78
B1	0.198	0.166	0.209	0.258	0.774	0.085	0.091	0.045	0.794
B2	0.194	0.292	0.098	0.023	0.726	0.180	0.224	0.112	0.755
B21	0.411	0.209	0.393	0.013	0.174	0.466	0.205	0.119	0.671
B22	0.212	0.131	0.244	0.116	0.117	0.803	0.113	0.129	0.823
B8	0.304	0.219	0.122	0.211	0.306	0.273	0.605	0.009	0.734
B9	0.343	0.196	0.152	0.166	0.187	0.038	0.613	0.396	0.776
B17	0.187	0.222	0.346	0.194	0.106	0.170	0.199	0.677	0.779

Table Ap. 1-21 Regression of matched EPA on patient care

Linear Regression Analysis Results									
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF	R^2	Adjusted R^2	F
	B	Standard Error	Beta						
Constant	2.41	0.10	-	22.94	0.000**	-	0.205	0.203	189.360
B16	0.27	0.02	0.28	9.99	0.000**	1.46			(0.000**)
B17	0.20	0.02	0.22	8.14	0.000**	1.46			
Dependent Variable：Patient care									
D-W VALUE：1.939									
*** p<0.05 ** p<0.01**									

Table Ap. 1-22 Regression of matched EPA on medical knowledge for practice

Linear Regression Analysis Results									
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF	R^2	Adjusted R^2	F
	B	Standard Error	Beta						
Constant	2.13	0.10	-	20.66	0.000**	-	0.255	0.254	168.081
B18	0.17	0.03	0.18	5.61	0.000**	2.07			(0.000**)
B19	0.08	0.03	0.09	2.70	0.007**	2.19			
B20	0.29	0.03	0.29	9.65	0.000**	1.90			
Dependent Variable：Medical knowledge for practice									
D-W VALUE：1.959									
*** p<0.05 ** p<0.01**									

Table Ap. 1-23 Regression of matched EPA on practice-based learning and improvement

Linear Regression Analysis Results									
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF	R^2	Adjusted R^2	F
	B	Standard Error	Beta						
Constant	1.93	0.10	-	17.83	0.000**	-	0.267	0.264	106.981
B3	0.06	0.02	0.07	2.37	0.018*	1.77			(0.000**)
B6	0.11	0.02	0.11	3.88	0.000**	1.87			
B4	0.12	0.02	0.14	4.59	0.000**	1.88			
B5	0.15	0.03	0.16	5.00	0.000**	2.11			
B7	0.13	0.03	0.14	4.56	0.000**	2.00			
Dependent Variable：Practice-based learning and improvement									
D-W VALUE：1.976									
*** p<0.05 ** p<0.01**									

Table Ap. 1-24 Regression of matched EPA on professionalism

Linear Regression Analysis Results									
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF	R^2	Adjusted R^2	F
	B	Standard Error	Beta						
Constant	2.04	0.10	-	20.11	0.000**	-	0.279	0.277	189.592
B20	0.27	0.02	0.289	9.97	0.000**	1.71			(0.000**)
B21	0.20	0.02	0.215	7.43	0.000**	1.71			
B22	0.09	0.02	0.113	3.96	0.000**	1.67			
Dependent Variable：Professionalism									
D-W VALUE：1.960									
*** p<0.05 ** p<0.01**									

Table Ap. 1-25 Regression of matched EPA on interpersonal and communication skills

Linear Regression Analysis Results									
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF	R^2	Adjusted R^2	F
	B	Standard Error	Beta						
Constant	2.15	0.11	-	18.80	0.000**	-	0.212	0.21	98.784
B4	0.08	0.02	0.099	3.22	0.001**	1.76			(0.000**)
B7	0.16	0.03	0.177	5.55	0.000**	1.88			
B10	0.09	0.03	0.105	3.35	0.001**	1.84			
B15	0.17	0.02	0.18	6.04	0.000**	1.66			
Dependent Variable：Interpersonal and communication skills									
D-W VALUE：2.027									
*** p<0.05 ** p<0.01**									

Table Ap. 1-26 Regression of matched EPA on systems-based practice

Linear Regression Analysis Results									
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF	R^2	Adjusted R^2	F
	B	Standard Error	Beta						
Constant	2.57	0.10	-	24.53	0.000**	-	0.164	0.162	96.274
B1	0.10	0.02	0.11	3.80	0.000**	1.67			(0.000**)
B2	0.13	0.02	0.14	4.58	0.000**	1.78			
B3	0.19	0.02	0.21	7.44	0.000**	1.52			
Dependent Variable：Systems-based practice									
D-W VALUE：2.042									
*** p<0.05 ** p<0.01**									

Table Ap. 1-27 Regression of matched EPA on interpersonal collaboration

Linear Regression Analysis Results									
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF	R^2	Adjusted R^2	F
	B	Standard Error	Beta						
Constant	2.47	0.10	-	23.75	0.000**	-	0.183	0.182	164.843
B8	0.22	0.02	0.23	8.38	0.000**	1.45			
B9	0.23	0.02	0.24	8.65	0.000**	1.45			(0.000**)
Dependent Variable：Interprofessional collaboration									
D-W VALUE：2.001									
*** p<0.05 ** p<0.01**									

Table Ap. 1-28 Regression of matched EPA on personal and professional development

Linear Regression Analysis Results									
	Unstandardized Coefficient		Standardized Coefficient	t	p	VIF	R^2	Adjusted R^2	F
	B	Standard Error	Beta						
Constant	1.74	0.10	-	16.12	0.000**	-	0.293	0.29	101.360
B11	0.14	0.02	0.15	5.03	0.000**	1.92			(0.000**)
B14	0.03	0.02	0.03	1.18	0.238	2.07			
B12	0.06	0.03	0.07	2.20	0.027*	2.08			
B13	0.03	0.02	0.03	1.08	0.278	1.97			
B16	0.16	0.02	0.17	5.70	0.000**	1.89			
B21.	0.19	0.027	0.207	7.095	0.000**	1.76			
Dependent Variable：Personal and professional development									
D-W VALUE：2.024									
*** p<0.05 ** p<0.01**									

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Appendix 14: Auxillary Figures Ap.

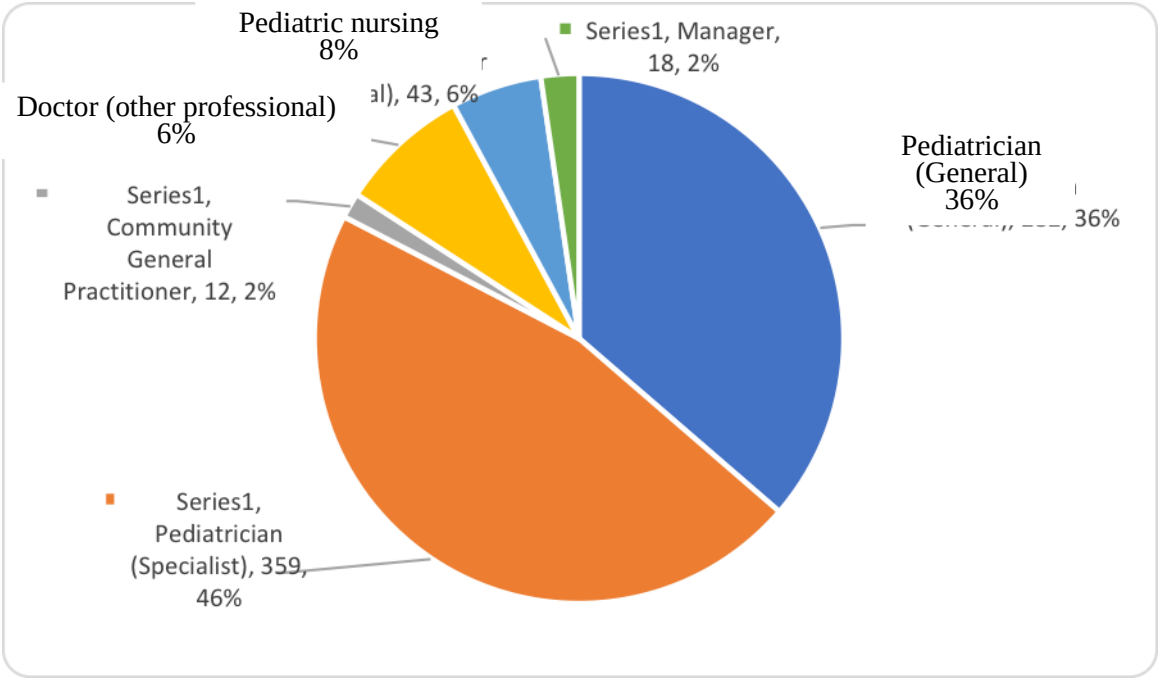

Figure Ap. 1-1 Distribution by job descriptions

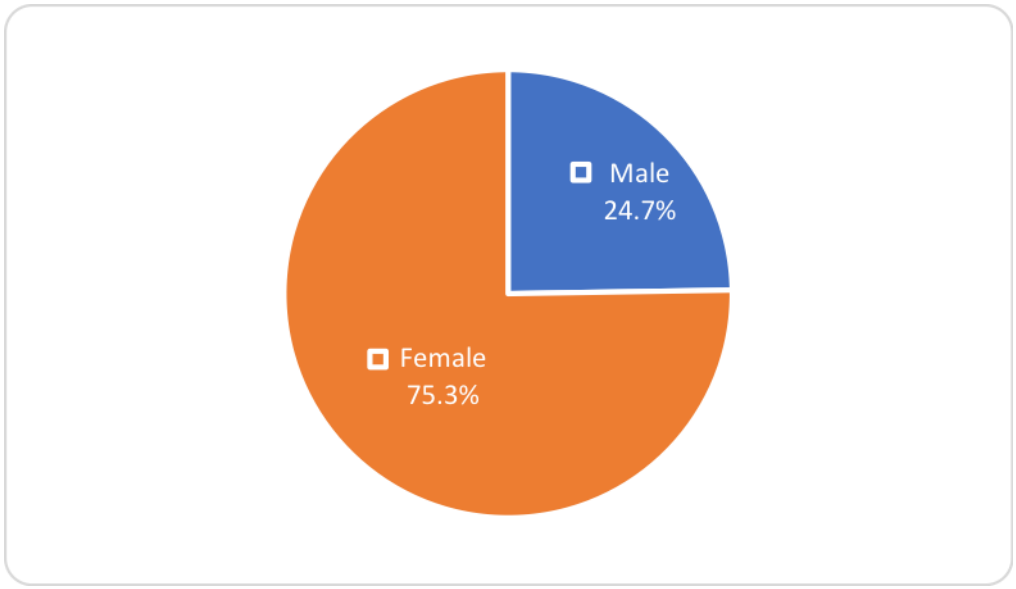

Figure Ap. 1-2 Gender distribution

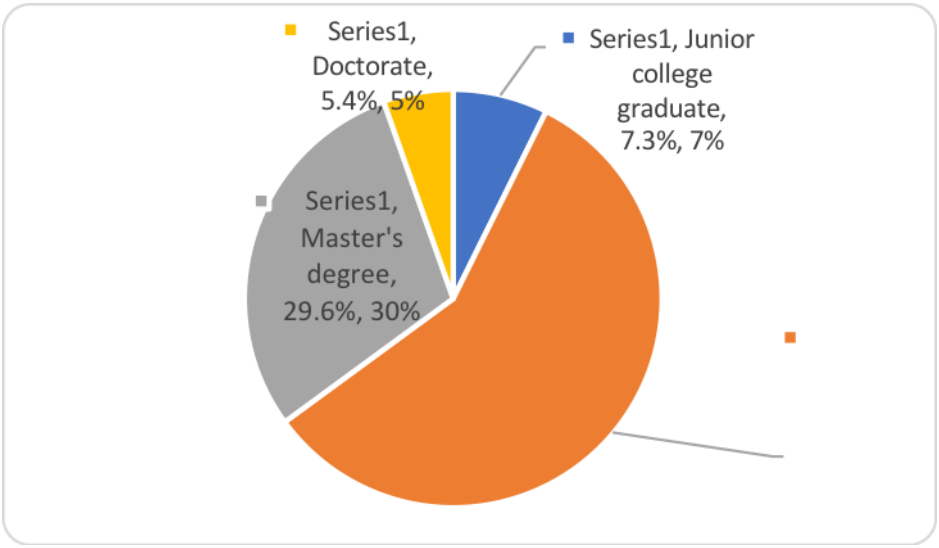

Figure Ap. 1-3 Education

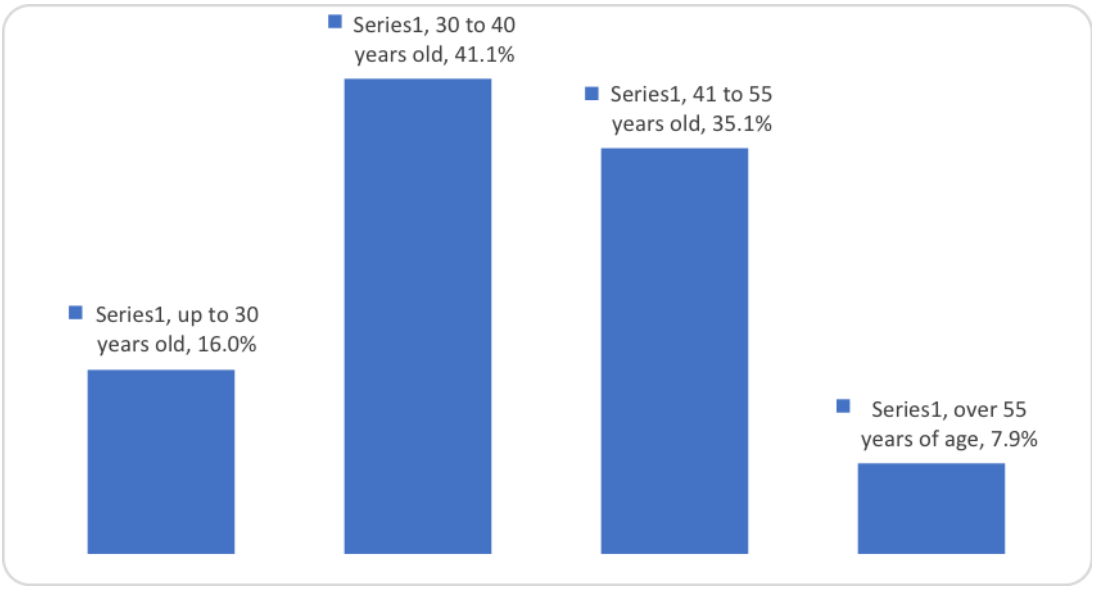

Figure Ap. 1-4 Age distribution

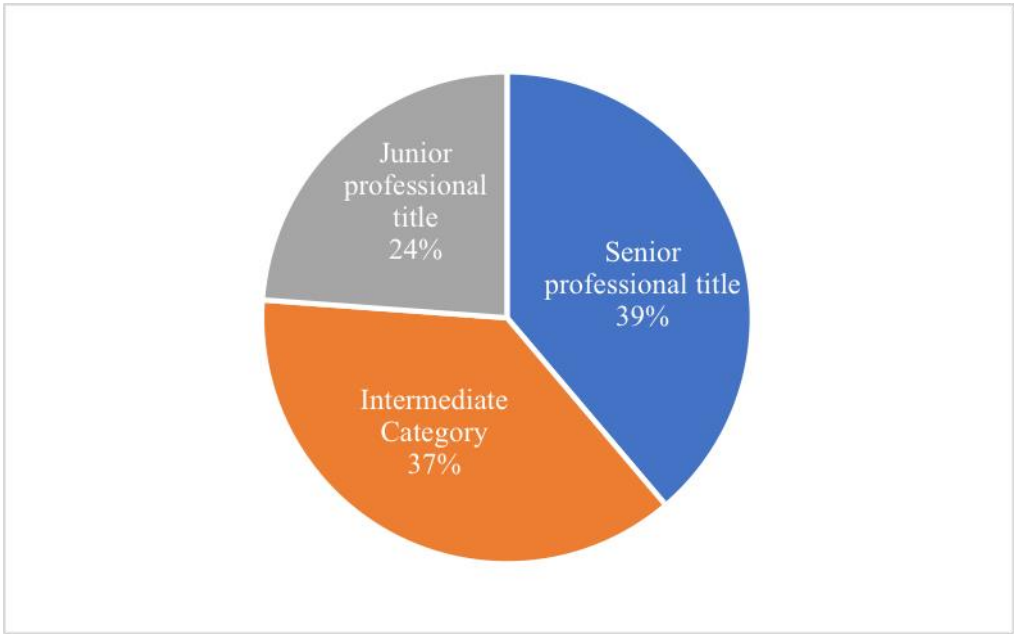

Figure Ap. 1-5 Distribution by titles

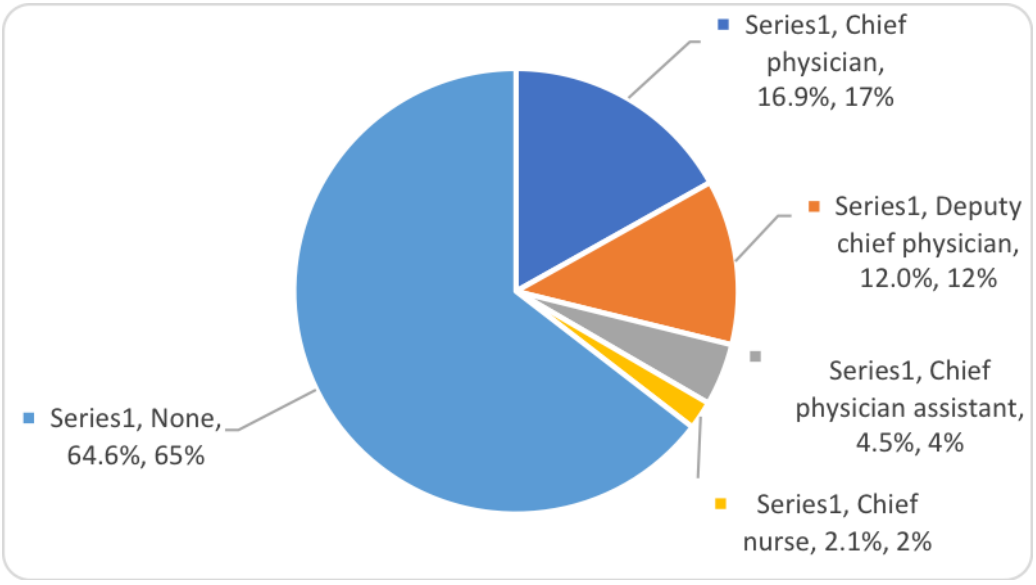

Figure Ap. 1-6 Distribution by leading responsibilities

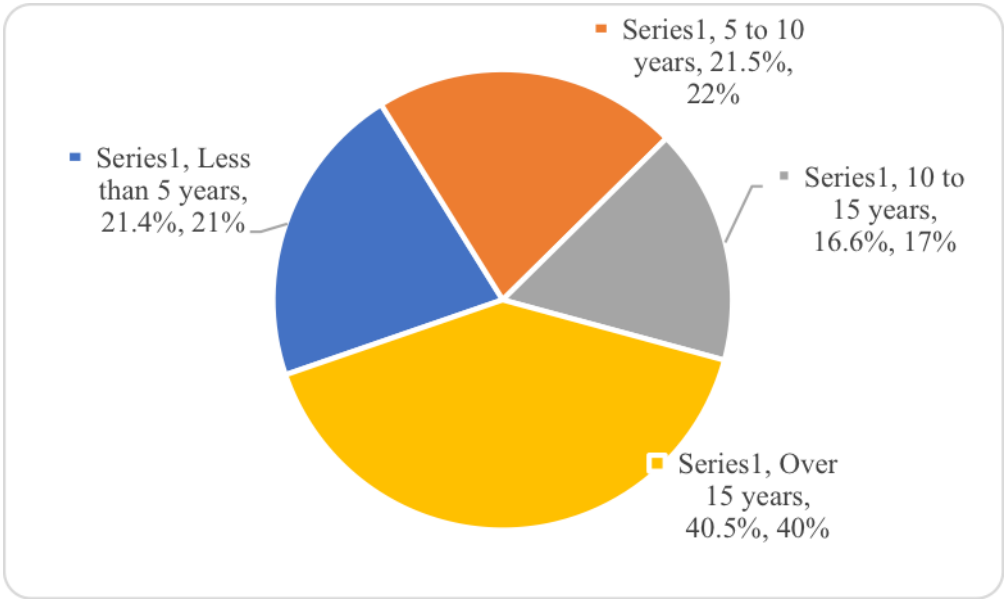

Figure Ap. 1-7 Tenure

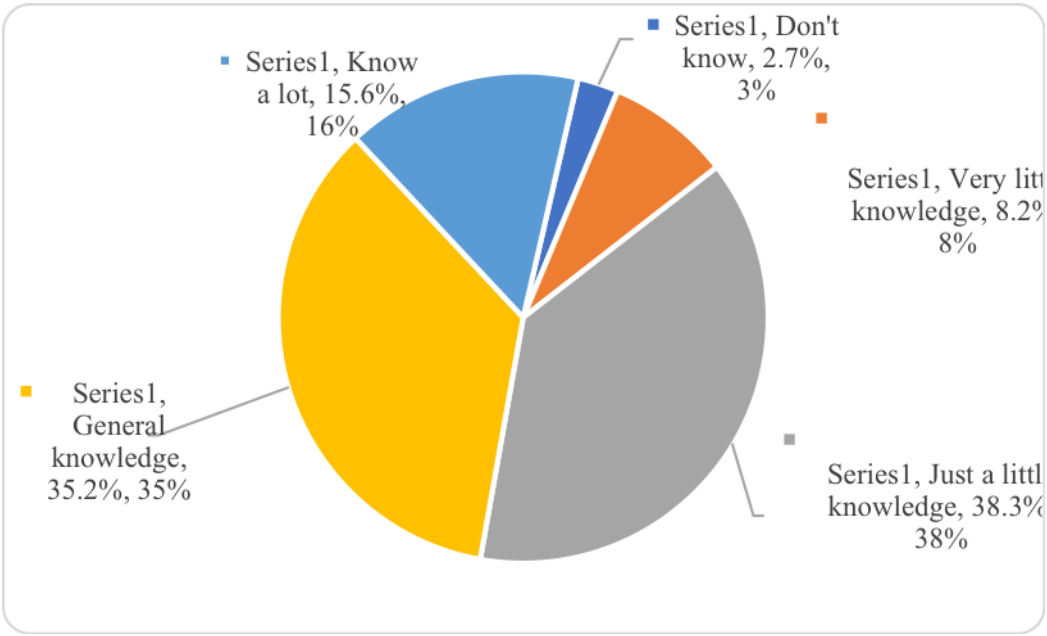

Figure Ap. 1-8 Distribution by Knowledge About GI Pediatrician

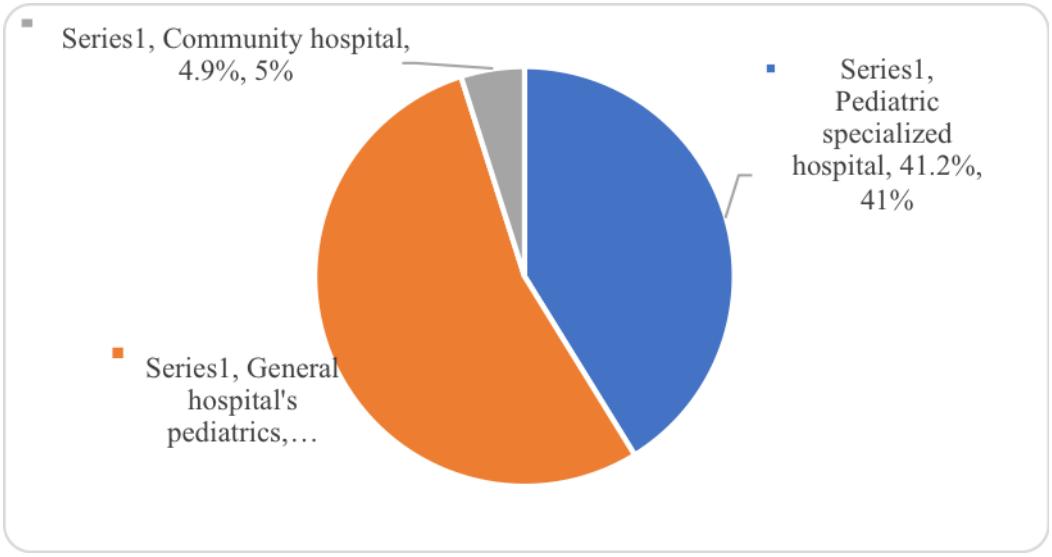

Figure Ap. 1-9 Distribution by the nature of hospital

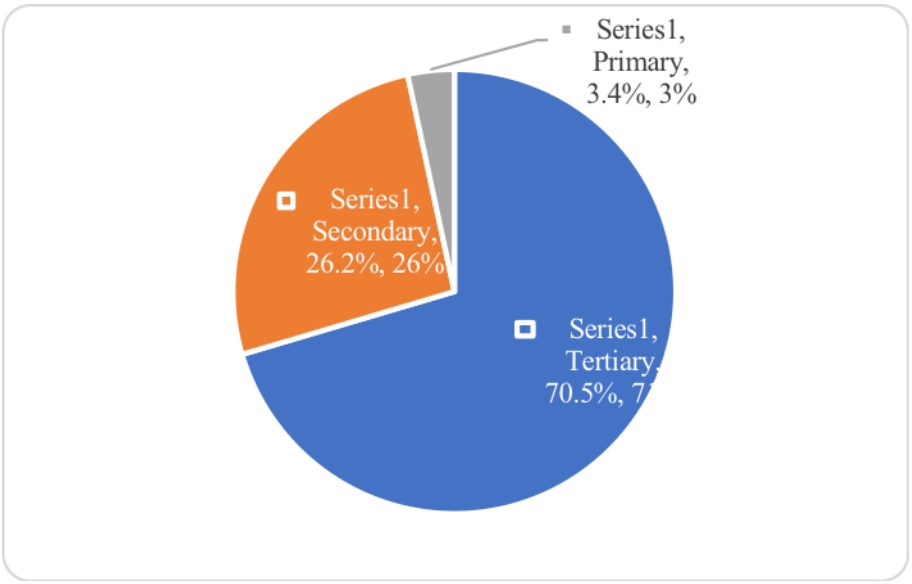

Figure Ap. 1- 10 Distribution by the grade of the hospital

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Appendix 15: Questionnaire (Chinese Version)

医联体内基于 EPAs（Entrustable Professional Activities）理论的三级综合性医院儿科医师能力培养模型的构建——以儿科消化专科医生为例

您好：

非常感谢您参加由上海中部儿科医联体、上海交通大学医学院附属瑞金医院（国家临床重点专科-小儿消化专业）、瑞金医院北院院级基金资助项目（2017GL01）、南方医科大学与葡萄牙里斯本工商管理大学合作举办公共卫生政策与管理博士（ISCTE Lisbon University Institute）论文课题组联合发起的医联体内基于 EPAs 理论的三级综合性医院儿科消化专科医师能力培养模型的构建研究。

本次调查仅用于科学研究，您的所有回答，我们将为您严格保密。真诚感谢您的参与和支持！

A1. 您所从事的(岗位)职业： [单选题] *

○儿科医生(普儿科\儿科保健)

○儿科医生(专科)

○社区全科医生

○儿科护理

○其他医务人员（临床专业）

○医院管理人员

A2. 您的性别： [单选题] *

○男

○女

A3. 您的最高学历： [单选题] *

○大专

○学士

○硕士

○博士

A4. 您的年龄： [单选题] *

○30 岁以下

○30-40 岁

○40-55 岁

○55 岁以上

A5. 您是否是儿科消化专科医师： [单选题] *

○是

○否

A6. 您工作的医院性质是： [单选题] *

○专科医院

○综合医院

○社区医院

A7. 您所在工作医院的等级是： [单选题] *

○三级

○二级

○一级

A8.您的职称： [单选题] *

○高级职称

○中级职称

○初级职称

A9. 您在科室担任的职位： [单选题] *

○主任

○副主任

○主任助理

○护士长

○无

A10. 您所在的医院是否是医联体的成员单位： [单选题] *

○是

○否

○我不知道

A11. 您从事本专业时间： [单选题] *

○五年以内

○五到十年

○十到十五年

○十五年以上

A12. 您对儿科消化专科医师的了解： [单选题] *

○不了解

○很少

○只是一点

○一般

○非常了解

二、本部分使用李克特五等量表。

三级综合医院的儿科消化专科医师是否应该经常完成以下医学相关任务？

请您对下列儿科消化专科医师相关的陈述进行评价，选择同意或不同意的程度，在1-5 之间选择。

完成该项工作有多重要，进行评估，并在与您的想法相符的空白处打勾“√”。

数字“1”代表“根本不重要”：它表明，是否能完成该任务与是否能胜任儿科消化专科医师并不相关。它对儿科消化专科医师的培养没有影响，甚至可能有负面影响。

数字“2”代表“不是很重要”：表明它跟是否能胜任儿科消化专科医师并没有很大关系，对儿科消化专科医师的培养没有直接影响。

数字“3”代表“一般”，表明对能否胜任儿科消化专科医师的一般，并对儿科消化专科医师的培养有一定的影响。

数字“4”代表“很重要”：表明这一点对能否胜任儿科消化专科医师很重要，对儿科消化专科医师的培养具有很重要的影响。

数字“5”代表“极其重要”：表明该项对能否胜任一名儿科消化专科医师极其重要，对儿科消化专科医师的培养也极其重要。

B1 与相关医疗、保健机构建立和维持工作关系，经常关注并解决相应临床问题，采集来自转诊医生或医疗机构提供的患者及家庭成员的重要（医疗）信息，用以诊断和治疗。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B2 使用筛查工具并进行相关解释（例如：用以评估生长和发育的量表，听力筛查等），吸引患儿和他们的家人了解情况并共同参与决策，以便制定健康计划。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B3 进行体格检查以明确正常的变异、变异特征和先天异常。根据相关指南找出关键

的临床证据并将其用于新生儿疾病诊断和治疗。为出生 28 天内的新生儿提供日常保健并处理常见疾病问题。确定哪些问题适合在家里处理，安排出院和随访。评估产妇及她的家庭是否做好了接受新生命的准备。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B4 具备在门诊或者病房处理儿科常见急诊的能力，包括：急性疾病的患儿和有急性发作风险的慢性疾病（例如癫痫病患儿出现发热，糖尿病患儿患感染性疾病，或者哮喘患儿准备参加竞技运动等）的患儿。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B5 和患者及其家属建立和谐的医患关系。通过对患者和家属进行综合评估，去判断特殊患者（例如，信仰佛教吃素但患有缺铁性贫血的患儿）和家属的需求。通过识别、获取和协调，去满足特殊患者和家属的需求，以确保患者获得最好的治疗方案并优化患者的初级治疗。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B6 主动了解基本的社区服务内容，帮助已确诊和有社区医疗需求的患者的转诊，为

病情复杂的患儿继续提供医疗支持，并继续开展以患者和家庭为中心的医疗保健，强调与跨学科团队的合作以保证对患者及家属的最佳治疗。协调相关专家、专科医师和其他护理专家或机构为有特殊需求的患儿提供治疗。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B7 鉴别出需要手术治疗或需手术联合药物治疗的患者。提供初步处理或稳定措施，以方便转诊和直接与儿科或专科外科医师沟通。协助患儿术前和术后的医疗(例如：营养支持、疼痛管理和患儿用药)。提供持续的医疗支持，以确保在患儿治疗方案上与外科医师达成共识。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B8 当患儿年龄超过了青春期，疾病会显现出成年人的特征，尤其在患复杂疾病或慢性疾病的患者身上更加显著。这种情况下儿科医师需要做到与相应成人科室或部门无缝衔接。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B9 识别和治疗常见的行为心理疾病(例如：抑郁、注意力缺陷和冲动、破坏性行为和

攻击性、焦虑、学习障碍、药物滥用)，包括启动社会心理干预治疗、监测治疗效果和诊断某些疾病(注意力缺陷多动障碍(ADHD)、抑郁和焦虑)并进行合理的药物治疗。[单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B10 识别病情并确定治疗的优先顺序。采集关键病史，以开始紧急治疗，对处于危重的患者进行心肺复苏，并开始必要的药物治疗。在抢救过程中，具备有效的沟通能力。初步稳定后将患者转移至其他专科。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B11 为了跟好地诊治患者，也为了自己的学习目的，及时地检索相关信息(例如：电子健康档案(HER)、互联网、期刊论文)，并评估信息的质量，以促进临床信息检索。根据信息参数如可靠性、有效性和即时性来确定收集的数据的重要性。结合临床实践或自身专业发展，对信息进行解读和应用。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B12 根据转诊指南做出恰当的决定，确保转诊后患者的医疗和随访。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B13 从医疗费用的角度来看，儿科医生需要了解复杂医疗环境中的最新文件、患者权利和相关法规，并结合患者经济能力提供合适的诊断和治疗计划。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B14 利用数据识别高危人群，运用基本流行病学原则批判性评估干预措施(例如，门诊中猩红热发生率增多，及时传报疾控中心或小学卫生保健机构合作)，并适当与其他人合作(如父母群体、疾病导向的非营利组织、社区领导、卫生专业人员和医疗管理者)以改善医疗服务和人群健康。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B15 作为医疗团队的领导者，确保团队提供高质量、安全和最有效的医疗(例如在抢救团队的领导作用)。 在团队的诊断和治疗中建立开放的沟通渠道(例如，抢救过程中双向的沟通，医生下达医嘱，护士复述医嘱)，促进专业领域的知识共享(例如，与团队成员一起总结成功的经验及失败的教训)。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B16 由于患者状况的变化，需要从诊所转诊到住院部或其他医疗机构，同时也要接受其他同事的患者。与患者家属进行双向沟通以解释转诊，同时也与同事交接所有相关信息，并在接收转诊患者时询问所有必要的问题以充分了解情况。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B17 有能力进行常规诊断和治疗操作，如：面罩通气、膀胱导尿、执行肌肉(IM)和皮下(SC)注射(如计划免疫)、腰椎穿刺、新生儿气管插管、静脉置入、缝合简单裂伤、清除伤口异物、暂时性夹板固定骨折、放置脐静脉导管等。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B18. 管理患有急性和慢性胃肠道疾病的儿童和青少年，从复杂多变的临床表现中识别和诊断患有疑似胃肠道疾病的儿童，并将循证医学应用于患者的诊治。管理这些儿童和青少年，包括急性表现、紧急情况以及复杂慢性病的长期管理。 就胃肠疾病对父母和孩子进行健康教育，包括病因、治疗和临床过程。组织和协调 本医疗系统和社区内胃肠疾病患儿的诊疗。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B19. 诊治患有急性和慢性肝胆疾病和肝移植、胰腺疾病的儿童和青少年，从复杂多变的临床表现中识别和诊断疑似肝胆胰疾病，并将循证医学应用于患者的诊治。管理患有肝胆胰疾病和肝移植后儿童和青少年患者，包括急性期、紧急情况以及复杂慢性疾病的长期管理。就肝胆胰疾病对父母和儿童行健康教育，包括病因、治疗和临床过程。 在本医疗系统和社区内，组织和协调患肝胆道胰疾病的儿童/青少年的诊治。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B20. 能够诊断和治疗门诊常见的胃肠道疾病(包括呕吐、腹泻、腹痛、便秘和发育迟缓)，和常见的肝胆胰门诊病例(转氨酶升高、 新生儿胆汁淤积)。并且可以区分器质性疾病和功能性疾病。 他们必须熟悉器质性疾病的症状和体征，以及功能性胃肠道疾病的诊断和治疗。最后，对患者、其家属和护理人员进行沟通和教育，使之了解疾病过程和诊疗计划。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B21. 能够进行全面的营养评估，并为各种疾病导致营养缺乏、不平衡的患者的家属

和护理人员提供咨询。 [单选题] *

○1 根本不重要

○2 不是很重要

○3 一般

○4 很重要

○5 极其重要

B22. 熟悉内窥镜的使用，并能够确定哪些患者有指征进行内窥镜检查，能够安全地进行高质量的检查，并结合临床表现与内镜检查结果进一步促进诊疗。1 根本不重要 [多选题] *

□2 不是很重要

□3 一般

□4 很重要

□5 极其重要

. 您认为下述事项与三甲医院儿科专科医师应具备的职业道德相关性如何？[矩阵单选题] *

	1 根本不重要	2 不是很重要	3 一般	4 很重要	5 极其重要
C1 保护孩子的利益	○	○	○	○	○
C2 保护病人家属的利益	○	○	○	○	○
C3 有能力在孩子利益与家属利益冲突时做出决策	○	○	○	○	○
C4 在青少年用药范围内，获得病人知情同意	○	○	○	○	○
C5 在新生儿畸形治疗跟家属要求之间	○	○	○	○	○

出现不一致时，能够进行协调					
C6 协调母亲与孩子的利益冲突	○	○	○	○	○

D. 针对普通儿科医师，考虑他们的整体责任与行为，您认为下列能力（胜任力）领域的重要程度如何？ [矩阵单选题] *

	1 根本不重要	2 不是很重要	3 一般	4 很重要	5 极其重要
D 1.诊治病患（收集信息，做出诊断和治疗决定，询问患者和家属）	○	○	○	○	○
D 2.临床实践所需的医学知识（了解、批判性评估和使用当前医疗进展和患者诊疗的科学证据）	○	○	○	○	○
D 3.基于实践的学习和进步（分析和评估诊疗实际操作;评估和吸收科学证据并使用该证据提高患者管理水平;有愿意从错误中学习的心态）	○	○	○	○	○
D 4.专业精神（履行专业职责、遵守道德原则和对不确定的事务灵活处理的坚定意愿）	○	○	○	○	○
D 5.人际沟通技巧（具备人际沟通技巧，与患者及其家属和专业同事进行有效的交流和协作）	○	○	○	○	○
D 6.基于体系的实践（在医疗体系内提供高质量低成本的医疗服务，为患者考虑）。	○	○	○	○	○
D 7.跨专业合作（与其他医疗专业人员互动，进行多学科团队合作）	○	○	○	○	○
D 8.个人和职业发展（在处理情绪和压力，平衡生活与工作方面能够把握好度，清楚自己的极限，清楚自己适应变化的能力，言谈举止令别人舒服并产	○	○	○	○	○

生对自己的信任）					

E．针对儿科消化专科医师，考虑他们的整体责任与行为，您认为下列能力（胜任力）领域的重要程度如何？ 1-5 表示不同的程度，同上。[矩阵单选题] *

	1 根本不重要	2 不是很重要	3 一般	4 很重要	5 极其重要
E 1.诊治病患（收集信息，做出诊断和治疗决定，询问患者和家属）	○	○	○	○	○
E 2.临床实践所需的医学知识（了解、批判性评估和使用当前医疗进展和患者诊疗的科学证据）	○	○	○	○	○
E 3.基于实践的学习和进步（分析和评估诊疗实际操作;评估和吸收科学证据并使用该证据提高患者管理水平;有愿意从错误中学习的心态）	○	○	○	○	○
E 4.专业精神（履行专业职责、遵守道德原则和对不确定的事务灵活处理的坚定意愿）	○	○	○	○	○
E 5.人际沟通技巧（具备人际沟通技巧，与患者及其家属和专业同事进行有效的交流和协作）	○	○	○	○	○
E 6.基于体系的实践（在医疗体系内提供高质量低成本的医疗服务，为患者考虑）。	○	○	○	○	○
E 7.跨专业合作（与其他医疗专业人员互动，进行多学科团队合作）	○	○	○	○	○

E 8.个人和职业发展（在处理情绪和压力，平衡生活与工作方面能够把握好度，清楚自己的极限，清楚自己适应变化的能力，言谈举止令别人舒服并产生对自己的信任）	○	○	○	○	○

Appendix 16: Questionnaire (English Version)

Construction of The Competency Training Model for Pediatric Digestive Specialists in General Hospitals Based on the EPAs Theory in Medical Treatment Alliance

Hello Everyone:

Thank you very much to participate in the research of construction of the competency training model for pediatric digestive specialists in general hospitals initiated by Shanghai Central Couplet of Pediatric Medicine, Ruijin Hospital Affiliated to Shanghai Jiaotong University School of Medicine, national clinical key specialty (pediatric digestive profession), North School of Ruijin Hospital Affiliated to Shanghai Jiaotong University School of Medicine's college fund research group (2017GL01).

Part One Basic Information

A1. Your current position is: [Single choice] *

○ Pediatrician (General)

○ Pediatrician(subspecialist)

○ Community General Practitioner

○ Pediatric Nursing

○ Doctor (other Professional)

○ Manager

A2. Your gender: [Single choice] *

○Male

○Female

A3. Your highest degree: [Single choice] *

○ Junior College

○ Regular College

○ Master

○ Doctor

A4. What's your age?

○ below 30 year of age

○ 30 -40 year of age

○ 40-55 year of age

○ over 55 year of age

A5. Are you a pediatric digestive specialist: [Single choice] *

○ Yes

○ No

A6. The nature of the hospital where you work is: [Single choice] *

○ Pediatric Specialized Hospital

○ General Hospital’s Pediatrics

○ Community Hospital

A7. The grade of hospital where you work is: [Single choice] *

○ Three-level

○ Two-level

○ One-level

A8. Your job title: [Single choice] *

○ Senior Professional Title

○ Medium-grade Professional Title

○ Junior Professional Title

A9. Do you have a position in your department: [Single choice] *

○ Director

○ Vice Director

○ Director Assistant

○ Head Nurse

○ None

A10. Is your hospital where you work a member of the medical treatment alliance: [Single choice] *

○ Yes

○ No

○ I Don’t Know

A11. How many years have you worked on pediatric professional: [Single choice] *

○ Less than five years

○ Five to ten years

○ Ten to fifteen years

○ Over fifteen years

A12. What do you know about pediatric digestive specialists: [Single choice] *

○ Don’t Know ○Very little ○Just A Little ○General ○Very Well

Part Two:

This part will use the Likert five-point Scale

Pediatric gastroenterologists in tertiary general hospitals should frequently complete the following medical tasks?

PLEASE STATE HOW MUCH YOU AGREE or DISAGREE WITH THE FOLLOWING STATEMENTS ABOUT PEDIATIRIC DIGESTIVE SPECIALIST PROFESSION. PLEASE USE THE SCALE FORM

How important it is to complete the task, give the evaluation, and draw a “√” in the blank that matches your idea

The number “One” means “Not important at all”: it indicates that it is not very important to be competent as a pediatric digestive specialist. It has no effect on the cultivation of

pediatric digestive physicians, and may even have a negative effect.

The number “Two” means “Slightly important”: it means it is not important to be competent as a pediatric digestive specialist and has no direct impact on the cultivation of pediatric digestive physicians.

The number “Three” stands for “Moderately important”, indicating that it is of general importance to be competent for the position of pediatric digestive specialist and has certain influence on the cultivation of pediatric digestive physicians.

The number “Four” represents “very important”: it means very important to be competent as a pediatric digestive specialist, and has very important impact on the cultivation of pediatric digestive physicians.

The number Five represents “Extremely important”: it means very important to be competent as a pediatric digestive specialist, and it also means very important to the cultivation of pediatric digestive physicians.

B1. Establishing and maintaining working relationships with medical and healthcare institutions, often focusing on solving corresponding clinical problems, and collecting important information of patients and their family members from referral doctors or health institutions for diagnosis and treatment [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B2. Using the screening tools and conducting related interpretation (such as: to evaluate the growth and development, hearing screening and health) to attract patients and their families to participate in codetermination, making patients' families understand the status in order to making health plan. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B3. Carrying physical examination to clarify normal variation, variant characteristics and congenital anomalies. Determining and applying key clinical evidence for neonatal diagnosis and treatment according to relevant guidelines. Providing daily care and

addressing common problems within twenty-eight days of birth. Determining which issues are appropriate to address at home, and schedule hospital discharge and follow-up visit. Assessing whether the maternal or family is readiness or not to accept a newborn. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B4. To handle common pediatric emergencies in the outpatient or inpatient department, including children with acute illness and children with chronic illness at risk of acute attack. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B5. Establishing a harmonious relationship with patients and their family members. To determine the needs of specific patients and their families by a comprehensive assessment of the patients and their families. To meet the needs of specific patients and their families through identification, access and coordination, to ensure that patients get the best treatment plan and optimize patients' primary treatment. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B6. To have an understanding of basic community services, to facilitate the referral of patients who have been identified for diagnosis and have medical needs to the community, to continue offer medical support for children with complex conditions, and to continue conduct patients and families-centered care, emphasize collaboration with cross-disciplinary teams to ensure the best treatment of patients and families. Coordinating the involvement of relevant experts, sub-specialists and other nursing professionals or institutions in the treatment of children with special needs. [Single choice] *

○One	○Two	○Three	○Four	○Five

Not important at all	Slightly important	Moderately important	very important	Extremely important

B7. Identifying patients who require surgery or a combination of surgery and medication. Providing basic treatment or stabilization measures, to make referrals and communicate directly with pediatric or subspecialty surgeons. Assisting children's preoperative and postoperative care (e.g., nutritional support, pain management, and medication for pediatric patients). Providing ongoing medical support, to ensure a consensus with the surgeon on the patient's treatment plan. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B8. As patients' age beyond puberty, adult disease characteristics become more pronounced, especially in children with complex or chronic diseases. This requires a seamless transition between pediatricians and adult medical corresponding departments. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B9. Identifying and treating common behavior and mental health problems (such as: depression, inattention and impulse, destructive behaviour and aggression, anxiety, learning disability and drug abuse), including starting-up social psychological intervention treatment and monitoring the efficacy of treatment and diagnosing some diseases (attention deficit hyperactivity disorder (ADHD), depression, anxiety) and conducting proper medication [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B10. Determine and prioritize treatment in order of importance and urgency. Collecting the

critical history, to initiate emergency treatment, resuscitate the patients on the verge of failure, and initiate the necessary drug treatment. Demonstrate effective communication skills in managing a severally ill patient. Transition the patient to other professional after initial stabilization. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B11. Both to better care for the patient and also for own learning purposes, in a timely manner to retrieve relevant information (such as: electronic health records (HER), social networks, Internet, journal articles), and evaluate the quality of information, to promote clinical data retrieval, and according to the sources parameters such as reliability, validity and immediacy to filter the importance of the data collected. Interpreting and applying information in combination with clinical practice or own professional development. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B12. Making appropriate decisions based on the knowledge of the referral guidelines for referral and ensuring patient care, coordination and follow-up visit after referral. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B13. From the perspective of medical costs, pediatricians must be able to understand the latest documentation, patient rights and relevant regulations in the complex medical environment, and provide patients with a cost-effective diagnosis and treatment plan. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important	Slightly	Moderately	very important	Extremely

at all	important	important		important

B14. Using data to identify high-risk populations, and applying basic epidemiological principles to critically evaluate interventions, and work with others duly (e.g., parent groups, disease-oriented nonprofit organizations, community leaders, health professionals, and medical care administrators) to improve care service and population health.[Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B15. Act as a management leader in medical care team to ensure the team provide high quality, safe and the most efficient care. Establishing open communication channels in the team's diagnosis and treatment, and to promote knowledge sharing in professional fields. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B16. Due to change in patient condition transfer from clinic to inpatient department or to other services is required as well as accepting patients from other colleagues. Engage in bidirectional communication with patient’s family to explain the transfer, also with colleagues to hand all the relevant information and asking all necessary questions when receiving a patient transferred to fully understand the situation. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B17. Have the ability to perform routine diagnostic and treatment operations such as: mask ventilation, bladder catheterization, execute muscles (IM) and subcutaneous (SC) injection (such as immunization), endodermal (I&D) abscess, lumbar puncture, trachea cannula of the newborn, intravenous placement, repair simple laceration, simply remove foreign matter, temporary splint fractures, the placement of umbilical vein catheter. [Single choice]

*

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B18. To care for children and adolescents with **acute and chronic gastrointestinal diseases** which involves recognizing and diagnosing children with suspected GI disorders in a variety of clinical presentations, also applying evidence-based medicine to the care of patients. Managing children and adolescents including the acute presentations and emergencies as well as long-term management of complex chronic diseases. Educating parents and children on GI diseases including cause, treatment, and clinical course. Leading and coordinating care for children/adolescents with GI diseases within the medical system and the community [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B19. Taking care of children and adolescents with ac**ute and chronic hepatobiliary diseases and liver transplantation and pancreatic diseases** which involves recognizing and diagnosing children with suspected liver, biliary and pancreatic disorders in a variety of clinical presentations, also applying evidence-based medicine to the care of patients. Managing children and adolescents with liver, biliary, pancreatic disorders, and liver transplantation including the acute presentations and emergencies as well as long-term management of complex chronic diseases. Educating parents and children on liver, biliary and pancreatic diseases including cause, treatment, and clinical course. Leading and coordinating care for children/adolescents with liver, biliary and pancreatic diseases within the medical system and the community [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B20. Be able to diagnose and manage common gastrointestinal diseases (including

vomiting, diarrhea, abdominal pain, constipation and developmental delay) in the outpatient department, as well as diagnosis and management of common liver, biliary, pancreatic outpatient cases (elevation of transaminase, cholestasis of neonates). And can distinguish organic disease and functional disease. They must be familiar with the signs and symptoms of organic diseases, as well as the diagnosis and treatment of functional gastrointestinal diseases Lastly, lastly to communicate and educate patients, their families and care givers about disease process and management plan [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B21. Be able to conduct a comprehensive nutrition assessment and provide counselling to family and primary care providers for patients with a variety of diseases causing nutritional deficiencies/imbalances.[Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

B22. Being familiar with the usage of endoscopy, and able to determine which patients are eligible for endoscopy, can safely conduct quality examinations, and combine clinical manifestations with endoscopy results for further management. [Single choice] *

○One	○Two	○Three	○Four	○Five
Not important at all	Slightly important	Moderately important	very important	Extremely important

C1. In your opinion, the medical ethics features of pediatric gastroenterologists in tertiary general hospitals are as follows： [Matrix single choice] *

	Not important at all	**Slightly important**	**Moderately important**	**very important**	**Extremely important**

	One	Two	Three	Four	Five
Safeguard the interests of children	○	○	○	○	○
Safeguard the interests of the patient's family	○	○	○	○	○
The ability to deal with inconsistencies between the interests of children and families	○	○	○	○	○
The informed consent of the patient within the scope of adolescent medicine	○	○	○	○	○
Coordinate the treatment of the malformation of the newborn and the parents demand inconsistent situation	○	○	○	○	○
To coordinate the conflict of interest between mother and child	○	○	○	○	○

D1. Considering the overall responsibilities and activities of a **General pediatrician**, how important would you state the following domains of competence are?

1. **Patient care** (gather information, make diagnosis and treatment decision, counseling patients, family)
2. **Medical knowledge for practice** (knowing, critically evaluating and using current medical information and scientific evidence for patient care)
3. **Practice-based learning and improvement** (Investigating and evaluating patient care practices; appraising and assimilating scientific evidence and using that evidence to improve patient management; demonstrating a willingness to learn from errors)
4. **Professionalism** (Demonstrating a commitment to carrying out professional responsibilities, adhering to ethical principles and being sensitive to diversity)
5. **Interpersonal and communication skills** (Demonstrating interpersonal and communication skills that result in effective exchange of information and collaboration with patients, their families and professional associates)

6. **Systems-based practice** (Practicing quality, cost-effective health care and advocating for patients within the health care system).

7. **Interprofessional collaboration** (Effectively interacting with other healthcare professionals into multidisciplinary teams)

8. **Personal and professional development** (know self limits in dealing with emotions, stress and balancing personal and professional life, adjusting to change, and behaving in a way that makes others trust and feel comfortable)

	Not important at all	**Slightly important**	**Moderately important**	**very important**	**Extremely important**
competence	One	Two	Three	Four	Five
Patient care	○	○	○	○	○
Medical knowledge for practice	○	○	○	○	○
Practice-based learning and improvement	○	○	○	○	○
Professionalism	○	○	○	○	○
Interpersonal and communication skills	○	○	○	○	○
Systems-based practice	○	○	○	○	○
Interprofessional collaboration	○	○	○	○	○
Personal and professional development	○	○	○	○	○

D2. And thinking now about **the Digestive specialized Pediatrician**, how important would you state the following domains of competence are?

1 to 5 (same scale)

	Not important at all	**Slightly important**	**Moderately important**	**very important**	**Extremely important**

competence	One	Two	Three	Four	Five
Patient care	○	○	○	○	○
Medical knowledge for practice	○	○	○	○	○
Practice-based learning and improvement	○	○	○	○	○
Professionalism	○	○	○	○	○
Interpersonal and communication skills	○	○	○	○	○
Systems-based practice	○	○	○	○	○
Interprofessional collaboration	○	○	○	○	○
Personal and professional development	○	○	○	○	○