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The Perceptual Differences between Parents and Nurses in Pediatric Orthopedic Wards: A Case Study based on SERVQUAL Model

ZHAO Yanjun

Doctor of Management

Supervisors:
PhD Nelson Antonio, Professor,
ISCTE University Institute of Lisbon
PhD WANG Dong, Professor,
Southern Medical University

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Abstract

The subjects of this study are nurses and parents of children in pediatric orthopedic wards. Factors such as the children's verbal communication skills, psychological stress response, and skeletal growth characteristics, as well as their parents' cognitive abilities and compliance can all affect the service process to be studied. These factors, insufficiently studied in existing relevant research, are well taken into consideration in this thesis. This study focuses on the differences between different participants in the pediatric orthopedic inpatient service process. It draws on the SERVQUAL model to analyze the differences in the perceptions of nursing service by the nurses and parents, rather than treating them as a "single group" with no differences. It is found that nurses and parents in the pediatric orthopedic inpatient process have different perceptions of nursing services, with positive correlations in tangibles, reliability, and responsiveness. The factors influencing such differences were also analyzed to identify the management problems in healthcare service. While addressing the fragmented problems found at several important points in the medical service process, we have also summarized the complete needs that are widely applicable and essential in medical service process design, and balanced between internal clients (nurses) and external clients (parents). The final findings of the study are not only useful for the pediatric health care system, but also can be applicable to adult patients who can cooperate with medical professionals, as well as patients with dementia and aphasia, coma, and other critical illnesses or patients who cannot cooperate with medical professionals. It is hoped that the exploration based on this study will eventually be replicated in the national health care system to improve the quality of health care services in general.

Keywords: Fractures in children; perceived differences; inpatient service flow; medical service quality; medical service system design

JEL: I18; M1

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Resumo

As enfermeiras e os pais das crianças internadas nas enfermarias ortopédicas constituem o objeto de estudo desta tese. Fatores tais como a capacidade de comunicação verbal das crianças, resposta ao estresse psicológico e as características de crescimento do esqueleto, assim como as habilidades cognitivas podem conjuntamente o processo de prestação de serviço que analisamos, contudo a pesquisa sobre estes fatores é insuficiente nos estudos mais importantes do passado, por esse motivo um caso de estudo sobre esta perspectiva é uma das importantes características desta tese. Esta tese foca-se nas diferenças entre os diferentes participantes no processo de prestação de serviço aos doentes ortopédicos internados, e baseia-se no modelo SERVQUAL para analisar as diferentes percepções da prestação do serviço pelas enfermeiras e pais, em vez de os tratar como um "grupo único" sem diferenças. Descobrimos que as enfermeiras e os pais das crianças internadas envolvidas no processo de prestação de serviço têm percepções diferentes dos serviços de enfermaria, com correlações positivas no que respeita às dimensões tangíveis, confiabilidade e capacidade de resposta. Os fatores que influenciam as diferenças de percepção dos serviços de enfermaria são analisados para identificação dos problemas de gestão na prestação dos serviços de saúde. Ao abordarmos os problemas que encontramos em vários pontos importantes, sumarizamos também os requisitos necessários para o desenho do processo médico de prestação do serviço enfatizando a necessidade de equilibrar as necessidades dos clientes internos (enfermeiras) e dos clientes externos (pais). Os resultados deste estudo são não somente uteis para sistema de prestação de serviços médicos pediátricos, como podem ser igualmente aplicáveis a pacientes adultos que pode cooperar com os profissionais médicos, assim como a doentes com demência e afasia, coma e outras doenças críticas ou a pacientes que não podem cooperar com os profissionais médicos. Esperamos que novos estudos que tenham como base nesta tese sejam feitos e que contribuam para a melhoria da prestação dos serviços médicos, na China.

Palavras-chave: Fraturas nas crianças; diferenças apercebidas; fluxo de prestação de serviços médicos; calidad de los servicios médicos; diseño de sistemas de servicios médicos
JEL: I18; M1

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摘　要

本次研究对象是儿童骨科病房的护士和患儿父母，由于儿童的语言沟通能力、心理应激反应、骨骼生长发育特点等要素以及患儿父母的认知能力和依从性等，都会影响所要研究的服务流程，这些要素在过去相关研究中明显缺失，同时这也是本研究的重要特色。本次研究关注在儿童骨科住院服务流程中不同参与方的差异性，借鉴 SERVQUAL 模型，着重分析在医疗服务流程中不同参与者，护士和患儿父母这两个群体对护理服务感知的差异性，而不再是将他们视为无差异的“单一群体”。本次研究发现儿童骨科住院流程中的护士与患儿父母对护理服务感知有差异，且会相互影响，在有形性、可靠性、响应性呈正相关，同时本研究也在护士和患儿父母对护理服务感知差异的影响因素进行了分析，从中发现医疗服务的管理问题，在解决医疗服务过程中若干重要节点发现的片段化问题的同时，以提炼出医疗服务流程设计所必须的、具有广泛适用性的完整需求，强调兼顾流程内部客户（护士）与外部客户（患儿父母）的需求，最终研究结论对儿科医疗服务体系的帮助，也同样适用于能够配合医疗护理工作的成人患者，更能辐射应用于失智失语患者、昏迷患者、重症患者以及其他不能配合的患者等，希望在此研究基础上的探索，最终在全国医疗系统中推广，全面提高医疗服务质量。

关键词：儿童骨折；感知差异；住院服务流程；医疗服务质量；医疗服务体系设计

JEL: I18; M1

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Chapter 1: Introduction

1.1 Research background

1.1.1 Status quo of medical disputes in China

In recent years, with continuous improvement of the living standards, the Chinese people have paid more attention to health and safety issues. However, with the increasing number of patients and corresponding surge in medical demands, the relationship between medical staff and patients has become an increasingly popular topic in China. Medical disputes have occurred frequently in China and have become a thorny problem that plagues the entire society and even the whole world. According to the latest information released in the Alpha database in 2020, over the 18 years from 2002 to 2019, the total amount of medical dispute cases across China was 108,905 (Qian & Yang, 2010). The largest increase occurred in 2014, with a year-on-year increase of 6,923 cases, up by nearly 275%. According to incomplete statistics, medical disputes have been among the top ten issues of consumer complaints and dissatisfaction since 1999. From 2010 to 2011, the China Hospital Management Association analyzed data of 326 medical institutions and found that more than 97.38% of hospitals had experienced medical disputes, and the occurrence was growing rapidly. A study on the current situation of the Chinese society showed that the clash of traditional and modern culture and the marketization of medical services in China during its continuous development exert a great impact on doctor-patient trust (Li, 2019). The reform of the medical market system not only affects the management model and organizational goals of the hospital, but also indirectly affects the medical treatment behavior and professional ethics of doctors, which brings about many problems such as bad manners and shirking responsibility of the medical personnel, and this phenomenon has been a rapidly growing trend. Researchers have identified the imbalance between supply and demand of medical staff and patients in China (Wang & Wang, 2019). At present, the number of doctors and nurses in China is far from meeting the needs of patients, especially the medical staff in pediatrics. Considering the particularity of pediatric patients, requirements for nursing skills are relatively high. The training of pediatric medical staff is difficult, with a long training period, and the number of qualified medical staff is far from enough.

Medical disputes refer to differences between doctors and patients in diagnosis and treatment (Wei et al., 2019). Intentional harassment is a kind of medical dispute that seeks compensation for actual or imagined medical malpractice or dissatisfaction with medical services (such as failed surgery, death, and medication side effects), in which they often threaten to use violence or directly attack the medical staff (Gao et al., 2019; M. S. Wang et al., 2020). Although the reasons are manifold, abuse of and violence against doctors out of economic reasons are extremely common and severe in China (J. Liu et al., 2020). These medical abuses worsen the working atmosphere of doctors and can jeopardize health services. According to two previous surveys, 7.96% of Chinese doctors experienced conflicts, 75.2% experienced verbal abuse, and 5.4% experienced physical violence (Kosik et al., 2018).

In view of the rapid development of these events, scholars have carried out research and evaluation from the perspective of China's national conditions. In China, the government spending on health accounted for 58% in its overall health spending, much lower than the world average of 74.3% (Jiang et al., 2018). In recent years, the government contribution to the overall revenue of public hospitals has been around 10%, which is one third of the global average (about 30%) (Lin & Hu, 2018). At the societal level, there is a tension between high demands for health services and slow growth of resources, especially in rural areas (Pan, 2018). In addition, with the surge of healthcare costs, many patients generate unreasonable expectations (Wu et al., 2021; Zeng et al., 2018). Many Chinese doctors lack the necessary professional training to communicate and identify and resolve conflicts (Zhang & Cai, 2019). The idea of "broken windows" may be a valuable tool for understanding why workplace violence occurs, and it is suggested to proactively address minor forms of abuse or violence where feasible (M. Wang et al., 2020). The doctor's state of mind or personality may be a major factor. There is little research on the link between abuse and doctor burnout, and further research is needed especially in terms of approaches, causes, effective treatments, and the recognized status of doctors. These critical issues must be addressed by hospital administrators and policymakers by taking immediate steps such as increasing health care budgets, strengthening legal protection for physician safety, hiring security guards in high-risk areas, hiring more social workers, and strengthening employee training to communicate effectively and resolve conflicts. A safer healthcare environment will benefit physician health quality as well as patient care (Du et al., 2020). The doctor-patient connection is the foundation for medical practice as well as a necessary condition for the provision of healthcare. According to some research (Li et al., 2018; Zhou et al., 2018). In recent decades, the doctor-patient relationship has undergone a dramatic shift from patriarchal relationship to contractual consumerism, which has led to a drastic

increase in global medical conflicts (Zhang et al., 2018). Medical dispute lawsuits have become common in many healthcare systems, with an increasing number of physicians being sued (Zhang et al., 2019). There is significant growth in patients' consumerist views of healthcare, resulting in greater expectations for healthcare. The social confidence in the medical profession has been diminished. These factors have led to different types of doctor-patient conflicts (H. Liu et al., 2020). To better understand why patients file malpractice lawsuits, western researchers conduct research on this respect. Adverse medical outcomes, advice from informed friends, detection of deception, and desire for monetary compensation have all been highlighted as major motivations for patients to take legal action and seek compensation (Li & He, 2018; W. Zhu et al., 2018). Even in China, over the past three decades, accessibility to medical service and equity in healthcare has declined dramatically, and it has experienced a growing wave of dissatisfaction among patients and physicians (Jiang & Hong, 2021). The "unregulated marketization" of healthcare over the past few years has led to a series of inappropriate incentives for providers and consumers. Due to these wrong medical practices, the doctor-patient relationship in China has deteriorated to an unprecedented level. In recent years there has been an increase in medical conflicts and sometimes there are outright violent events, which is defined by The Lancet as a crisis. Chinese health officials are implementing an ambitious reform plan and sounding the alarm for a series of serious impacts, such as brain drain, low morale, and changes in physician behavior (Sang et al., 2020).

In addition, Chinese medical professionals who were once revered as "angels in white" are now facing unprecedented challenges. Public confidence in Chinese doctors has been eroded over the past three decades of market-oriented reforms. In China, millions of doctors are dissatisfied with their profession due to the high requirement, low pay and tainted social status of healthcare, which are not common in other countries (Yan, 2018). In Chinese culture, there is a general distrust of ethics in the medical profession. According to a poll conducted by China Youth Daily, about 70% of patients have little or no confidence in doctors' diagnosis and treatment. Another national survey found that only 26 percent of doctors believed that their patients trusted them, and 70.9 percent would choose another career if they had the opportunity. Low income and poor doctor-patient relationship exacerbate brain drain in the Chinese healthcare system (Lin & Hu, 2018). Behaviors of the doctors in the aftermath of the crisis appear to have greatly altered the response to the broken doctor-patient relationship. It is reported that doctors at various medical facilities are taking defensive action out of fear of prosecution. Some of these activities are referred to as "defensive healthcare", including avoidance of patients or procedures that could lead to malpractice claims, prescription of

unnecessary medications or clinical tests, and overuse of medical services to prevent negligence lawsuits. Healthcare funding has been severely strained due to the "defensive healthcare" (Lu et al., 2020). One of the co-authors found evidence of Chinese physicians taking defensive action to respond to failures in the doctor-patient relationship in a related publication that also used the same quantitative data as this study. Therefore, poor doctor-patient interactions are detrimental not only to patients, but also to the healthcare system as a whole.

According to data released by Guangming Daily in 2016, there is a shortage of 210,000 pediatricians in China, and disputes between pediatricians and patients have attracted attention from all walks of life. Among all medical disputes, pediatric, surgical, and obstetric medical disputes have always accounted for a large proportion, and pediatric medical disputes account for the highest proportion among all medical disputes (Lan, 2018). Ji (2005) found that inappropriate communication, excessive medical jargons and inadequate explanations can exacerbate misunderstanding or dissatisfaction between pediatric wards nurses and patients. Li (2018) argues that pediatrics is special among all departments in the hospital. Many families have disputes with nurses because they cannot stand their children crying during treatment, which increases the difficulty of pediatric care and puts forward higher requirements for nurses. In recent years, medical disputes and malpractices have been increasing, and the relationship between nurses and patients has become increasingly tense. Nursing experts at home and abroad have conducted research on how to improve the quality of nursing and the relationship between nurses and patients. Nurses' medical service is the main factor affecting the relationship between nurses and patients, and it plays an important role in the whole nursing process. The behavior of nurses often plays a decisive role in the establishment of the nurse-patient relationship. Therefore, the development of the nurse-patient relationship largely depends on the factor of nurses. In addition, humanistic education on medical ethics should also be strengthened, because every action of the medical staff will directly or indirectly affect the physical and mental health of patients, which in turn affects the results of treatment (Wang & Yu, 2017). Finally, the most basic requirement for improving the doctor-patient relationship is the smooth and accurate collection of patient medical history and detailed information (Zheng et al., 2018).

1.1.2 Status quo of humanistic nursing service in China

The nursing profession is different from other medical professions in that it is primarily concerned with patients rather than diseases. The Ministry of Health of the People's Republic

of China has clearly incorporated humanistic care into the demonstration project of high-quality nursing (He et al., 2016). In the Outline of the Healthy China 2020 Plan, it is proposed to strengthen medical humanistic care and build a harmonious nurse-patient relationship (Zeng & Liu, 2016). Humanistic nursing is the core of the whole nursing work, and the importance of high-quality nursing is to let patients feel the humanistic care of medical staff. Jin et al. (2018) conducted a bibliometric study on the status quo of humanistic care practice in Chinese hospitals. An analysis of data from 181 studies shows that this trend has been on the rise since 2004. Humanistic nursing is widely applied in large general hospitals in the eastern coastal areas, accounting for 60% (108 out of 181). Humanistic nursing research is primarily targeted at a single department, and randomized controlled experiments accounted for the largest proportion (61%, 111 out of 181). Forty percent of researchers believe that humanistic environment, psychological care and communication are the most important humanistic care measures. Humanistic care has been widely applied, but there are still some problems in research methods, and there is no standard for practice and evaluation, which needs further exploration. According to Niu et al. (2021), humanistic nursing care started late in China, and its effect was not obvious. Professional identity, interpersonal skills, and lack of social resources were the main influencing factors. In the investigation of the influencing factors of the humanistic nursing ability of new nurses, Xin et al. (2021) mentioned that many nurses often cannot empathize with patients effectively when they begin to be engaged in nursing, so their humanistic nursing ability is low and they tend to generate nursing conflicts with patients. In addition, many previous studies around the world have shown that the range of nursing levels of Chinese nurses is lower than that of foreign nurses. According to Meng (2019), statistics of the World Health Organization show that the number of nurses per 1,000 people in the United States is 9.8, and 11.49 in Japan. At the end of 2017, the number of nurses per 1,000 people in China was 2.74, which is caused by shortage of nurses.

1.1.3 Status quo of fracture in children around the world

According to the research on European classification of diseases by Hedström et al. (2010), the incidence of fractures in children accounted for 1.33% to 3.61% of the total diseased population in 2010. According to the 2014 Pediatric Orthopedic Emergency Report of Beijing Jishuitan Hospital, there were about 10,000 accidental fracture injuries in children, accounting for 47.2% of the total pediatric orthopedic emergency visits (Zhang et al., 2014). In addition, the incidence of fractures in children aged from one to six years old increased gradually, reaching a peak at

the age of twelve years old. The incidence of fractures in boys is generally higher than that in girls, which may be related to the fact that boys tend to be lively and active (Christoffersen et al., 2016). Children with fractures have to not only bear the physical pain and mental pressure brought about by learning and life changes, but also suffer from the "sudden and unpredictable" characteristics of accidental trauma. Fractures will exert a huge impact on their psychology, mainly manifested in the anxiety caused by the pain as well as separation from familiar social environment (home, school) to unfamiliar environment (hospital). Crying is common in preschool children following limb fractures, and school-age children often refuse to communicate with medical staff and refuse to follow doctor's orders (Cooper et al., 2004).

The 2010 Kennedy Report published by the NHS Department of Health concluded that children and young people are undervalued in the NHS and generally receive mediocre healthcare (Fitzpatrick, 2010). An analysis of 38 national surveys by UK NHS investigator Douglas Hargreaves revealed that only one of the 38 surveys was for children under 16, suggesting that children under 16 received relatively little attention (Hargreaves & Viner, 2012). Beniwal and Bansal (2016) believe that complications after limb fractures in children include tension blisters, pressure ulcers, and osteofascial compartment syndrome (OCS). If not treated in time, it will cause acute ischemia, necrosis, scarring, secondary ischemic contracture and deformity of the limbs, and bring lifelong physical and mental pain to children and families. Prevention of OCS after fracture is usually based on subjective observation and judgment of some typical symptoms, such as limb blood circulation disorders including pain, paralysis, irregular skin color. However, a unified, authoritative, quantitative and operable standard nursing program is yet to be formulated. The typical symptoms of adults cannot be applied to children, and early diagnosis of OCS in children is particularly difficult, especially for preschool children, because they are unable to effectively communicate with others (Keudell et al., 2015). In addition, Chinese hospitals pay increasingly more attention to the accountability of medical personnel involved in medical event management, and formulate risk prevention measures on the basis of assessing liability risks. However, these measures fail to cover the entire process of nursing service life cycle management. The main purpose is hospital risk management, rather than patient-centered service quality management. In this process, participants in the whole service process, such as hospitals, doctors, nurses, patients and families, are often ignored. There are significant differences in their perception and evaluation of liability risk. In relevant practice and research, there lacks effective system design for the nursing process of pediatric patients. Given the high risk of blood circulation, the quality assurance protocols of many hospitals prevent them from dealing with such risks, resulting in

many invalid operations. In fact, lower medical risk of a hospital often means better performance of its risk management protocols. Therefore, the design and implementation of a whole-course service system can minimize the suffering of patients and their families, optimize the quality of medical services, and help reduce liability risks.

In particular, many children's limb fractures occur unexpectedly, further adding to the stress and anxiety of parent caregivers, who may not be prepared to deal with the emotional stress associated with acute injury in children. Stress can negatively affect children and can also increase stress for nurses. According to Kim and Sekol (2014), pediatric surgery nurses present higher levels of burnout and lower job satisfaction and compassion compared with hematology/oncology nurses and ICU nurses. To sum up, the above phenomenon also exacerbates the possibility of medical disputes in the pediatric orthopedic wards to a certain extent.

1.2 Research object and purpose

1.2.1 Research object

As a country with a large population, China has long been plagued with a serious and urgent problem of medical contradiction. In China, the average annual incidence of childhood trauma is 25%, and 10-25% of children's fractures are accidental, which is a special situation that cannot be predicted in advance, so the parents of the children are unable to be psychologically prepared in advance. In addition, a series of negative emotions such as agitation, pain, and anger are generated because of distress and anxiety about the subsequent rehabilitation of the affected area. As a result, pediatric orthopedics is a department where doctor-patient conflicts occur very frequently. Therefore, we choose to carry out this study in the wards of the pediatric orthopedics department. Based on the common medical disputes in the wards, we carried out research and investigation among the children, their parents and their nurses. However, since the children are young and their independent thinking is not mature enough, they cannot express their needs as accurately as adults, and mostly their thoughts and nursing needs are expressed by their parents. Also, we find that most of the current research is based on the relationship between the children themselves and their responsible nurses, with little research focusing on service quality satisfaction from the perspective of parents, guardians or primary caregivers. Therefore, we hope to bridge this research gap and select the parents of the children and relevant responsible nurses to carry out our research.

1.2.2 Introduction of case hospitals

This research selects the pediatric orthopedic wards of eight hospitals in China as the cases, including Shanghai Xinhua Hospital, Anhui Provincial Children's Hospital, Hainan Children's Hospital, Hunan Children's Hospital, Sichuan Luzhou Hospital of Traditional Chinese Medicine, Shenzhen Children's Hospital, Shenyang Children's Hospital, and Tianjin Hospital.

Established in 1958, Xinhua Hospital Affiliated to Shanghai Jiaotong University School of Medicine, is the first comprehensive hospital independently designed and constructed in Shanghai since the founding of People's Republic of China. With more than 60 years of development, it has developed to a Grade-A tertiary hospital with comprehensive and distinctive pediatrics and adult disciplines. The outpatient and emergency volume rank among the top in Shanghai all the year round. It has the ability to provide patients with whole life cycle care. Xinhua Hospital has successively won honorary titles such as National Advanced Collective, National Health System Advanced Unit, National Health System Health Culture Construction Advanced Unit, Shanghai Civilized Unit, and Shanghai May 1st Labor Award. The pediatric orthopedics department of Xinhua Hospital is one of the earliest clinical departments in China to set orthopedics for children, and it is also one of the founding units of the Pediatric Orthopedics Group of the Chinese Society of Pediatric Surgery. At present, a systematic discipline system with complete sub-specialties as well as a discipline echelon with regular structure and integration of healthcare, teaching and research have been formed. It plays a leading, radiating and driving role in the classic pediatric orthopedic diseases such as bone and joint trauma and deformity of spine and limbs in children and adolescents, and it also plays an important role in the field of international pediatric orthopedics. Its pediatric orthopedics has a strong technical force. In recent years, the outpatient and emergency volume has exceeded 60,000 cases, and patients from outside Shanghai account for 70-80%. The annual operation volume exceeds 3,000. The Pediatric Orthopedics Department of Xinhua Hospital is currently the largest clinical medical, teaching and scientific research center in Shanghai for diagnosis and treatment of children and adolescents with bone and joint diseases with the largest number of beds, and largest number of operations. It has carried out dozens of new technologies to fill gaps and is in a leading position in China.

Anhui Provincial Children's Hospital is affiliated to Fudan University. It is among the first batch of national regional medical center pilot hospitals approved by the National Development and Reform Commission and the National Health Commission. It is a public welfare medical institution organized by the government and co-established by the Anhui Provincial

Government and The Children's Hospital of Fudan University. It is a pilot unit for establishing and improving a modern hospital management system determined by the Secretariat of the Leading Group for Medical Reform under the State Council. Under the jurisdiction of the Anhui Provincial Health Commission, it is a Grade-A tertiary children's hospital integrating medical treatment, teaching, scientific research, prevention, health care, and rehabilitation. The Pediatric Orthopedics Department of Anhui Provincial Children's Hospital was founded in 1992. It is the deputy director member of the National Pediatric Orthopedics Department Commission, the provincial key clinical discipline of Anhui province, the key discipline of Anhui Medical University, and the only pediatric orthopedics specialist practice base and pediatric orthopedics master and doctor training bases in Anhui province. It is the regional promotion center for the Ponseti method global assistance organization in Anhui province, the provincial designated hospital for DDH, and the designated hospital for the early screening of DDH in Anhui province by the Provincial Science and Technology Department. It boasts honorary titles such as the National High-quality Nursing Demonstration Ward, the National Women's Civilization Post, the Provincial Jianghuai Famous Doctor, the Provincial Top Ten Nurses and the Provincial March 8th Red Banner Bearer.

Hainan Children's Hospital is a provincial-level not-for-profit medical and health care institution with public health nature directly under the jurisdiction of Hainan Provincial Health Commission. It undertakes public health functions and tasks such as medical treatment, health care, health education, training, maternal and child health information, scientific research, and teaching for women and children in Hainan Province, and it is the guidance center for the women and children's medical care business in Hainan. On May 23, 2019, it became the first Grade-A tertiary maternity and child health care hospital in Hainan Province. The pediatric orthopedics department of Hainan Children's Hospital was established in 2014 and it is the only professional pediatric orthopedic department in Hainan Province. It is the designated unit of the corrective surgery project for poor physically handicapped children by Hainan Disabled Persons' Federation and the national congenital structural deformity project (both with project funds). It took the lead in establishing the children's orthopedic department in the province, and carried out professional pediatric orthopedic treatment, which brings good news to the vast number of children in Hainan.

Hunan Children's Hospital was officially opened in 1987. It is a Grade-A tertiary children's hospital integrating medical treatment, teaching, scientific research, and preventive health care. With 1,800 beds, it has two national key clinical specialties (pediatric critical care, pediatric surgery), nine provincial key clinical specialties, 14 provincial clinical diagnosis and treatment

centers, one provincial key laboratory, and seven provincial clinical medical research centers. In 1995, it was among the first batch to pass the accreditation of the Grade-A tertiary comprehensive children's specialized hospital of the Ministry of Health. In 2004, it became the first medical institution in the province to pass the ISO9001/14001 international quality and environment system certification. In 2020, it became the founding member of the National Children's Regional Medical Centre. The pediatric orthopedics department of Hunan Children's Hospital was established in 2000. It is a professional children's medical department integrating medical treatment, health care and rehabilitation of bone and joint movement systems. Its medical, teaching and academic level has always been in the leading position in the field of children's medical care in Hunan Province, and is known as the "cradle of pediatric orthopedic surgeons in Hunan Province". The pediatric orthopedics department of Hunan Children's Hospital is famous across China for its profound academic background, superb clinical medical technology and innovative diagnosis and treatment team. The department is now the deputy chief unit of the Pediatric Orthopedics Group of the Chinese Medical Association, the chief unit of the Pediatric Orthopedics Group of the Hunan Medical Association, the Hunan provincial key clinical construction specialty, and the Hunan provincial clinical medical research center for children limb deformities. The annual outpatient volume reaches 48,000 person-times, and the annual operation volume exceeds 3,000 cases.

Sichuan Luzhou Hospital of Traditional Chinese Medicine, built in 1959, is a national Grade-A tertiary traditional Chinese medicine hospital. It is the national key TCM hospital construction unit, national chest pain center, China heart failure center (standard version), standardized training base for TCM residents and TCM general practitioners of the State Administration of Traditional Chinese Medicine, national standardized training coordination base for anesthesia, emergency, rehabilitation, obstetrics and gynecology, Luzhou Hospital of Traditional Chinese Medicine affiliated to Southwest Medical University, Sichuan digital hospital, Sichuan elderly friendly medical institution, West China Hospital distance teaching and consultation hospital, and teaching bases of Chengdu University of Traditional Chinese Medicine and Southwest Medical University, and it is among the first batch of employment and apprenticeship base in Sichuan. Its pediatric orthopedics department was established in 1959 when the hospital was established by one of the "Three Pengs in Sichuan", Mr. Wang Zhaopeng, one of the first batch of veteran traditional Chinese medicine practitioners in Luzhou. For more than 50 years, the department has always adhered to Mr. Wang Zhaopeng's unique orthopedic treatment method, which is a comprehensive treatment method integrating manual reduction, small splint fixation, and internal and external use of traditional Chinese medicine for

orthopedic injuries.

Founded in 1997, Shenzhen Children's Hospital is located in the central area of Shenzhen. It is a comprehensive children's hospital integrating medical treatment, health care, scientific research, teaching and rehabilitation, and it is also the only Grade-A tertiary children's specialized hospital in Guangdong Province. Covering an area of about 170,000 square meters, it has 1,300 open beds and boasts all business departments of a large general children's hospital. The Department of Pediatrics is a high-level clinical key specialty in Guangdong Province. In the ranking of Chinese hospitals released by the Hospital Management Institute of Fudan University, the Department of Pediatrics Internal Medicine of Shenzhen Children's Hospital ranks third in South China, and the Department of Pediatric Surgery ranks second in South China. The Pediatric Orthopedics Department of Shenzhen Children's Hospital is the largest diagnosis and treatment center for children's bone and joint diseases in South China. It is the leading member of the Pediatric Orthopedics Group of the Pediatric Surgery Branch of Guangdong Medical Association. It was accredited as the key specialty in Shenzhen in 2013. In addition, it is also a member of the China pediatric orthopedic multi-center research collaboration group. The department has an annual volume of more than 6,000 surgeries and an annual outpatient volume of nearly 100,000 person-times.

Founded in 1988, Shenyang Children's Hospital is a comprehensive tertiary children's hospital integrating medical treatment, teaching, scientific research, prevention, health care, rehabilitation and health education with 800 beds in total. The Department of Cerebral Palsy Rehabilitation is the "Twelfth Five-Year Plan" key specialty of the State Administration of Traditional Chinese Medicine, the key specialty of integrated Chinese and Western medicine in Liaoning Province, the first-level key discipline in Shenyang, and the rehabilitation base for disabled children in Shenyang. The Intensive Care Unit (ICU) is the second-level key specialty in Shenyang. Its Pediatric Respiratory Medicine is a second-level key specialty in Shenyang. The Pediatric Orthopedics Department is a comprehensive department that integrates orthopedics, neurosurgery, burns, and special treatment of hemangioma and lymphangioma. The department has strong comprehensive strength. The department is the "Youth Civilization Unit" of Shenyang, the national designated base for "Congenital Limb Structural Deformity Relief", and the designated unit of the "Sunshine Program" for orphans in welfare institutions. It has won two first prizes for new technology development in Shenyang, three third prizes, one third prize for major project research, and "advanced department" of the hospital.

Tianjin Hospital is a Grade-A tertiary specialized hospital that focuses on orthopedics and features modern medicine and integrated traditional Chinese and Western medicine for the

treatment of orthopedic diseases. As one of the famous orthopedic bases in China, the hospital now has added another name of "Tianjin Orthopedic Hospital". Tianjin Hospital and its predecessor was built in the early 1940s, inherited and developed on the basis of Tianjin Orthopedic Hospital founded by Chinese orthopedic pioneer Professor Fang Xianzhi. The hospital has a construction area of 54,000 square meters with 717 beds, among which 680 are orthopedic beds. The hospital has 35 clinical medical departments including trauma orthopedics, spine surgery, osteoarthritis, pediatric orthopedics, hand microsurgery, bone oncology, arthroscopy, Tianjin Shangtianyu Integrated Traditional Chinese and Western Medicine Orthopedic Treatment Centre, international diagnosis and treatment center and internal medicine and surgery departments as well as an orthopedic rehabilitation center. The Clinical Orthopedics gathers influential experts and scholars at home and abroad. The well-known trauma orthopedic department uses modern medicine and integrated traditional Chinese and Western medicine methods to treat various fresh, old and infected open fractures, and aseptic necrosis of the femoral head. It has introduced advanced concepts and technologies for fracture treatment at home and abroad such as "AO" and adopted integrated methods of Chinese medicine and western medicine. It has carried out many scientific and research projects, winning four international and national invention awards and obtaining national patents. It is the first pediatric orthopedic department in China to treat bone and joint diseases in children under the age of 14. It is well-known for treatment of congenital hip dislocation, congenital clubfoot, avascular necrosis of the femoral head, scoliosis, fractures of various parts, and epiphyseal injury. In particular, the early surgical treatment of congenital hip dislocation and congenital clubfoot has excellent results, playing a leading role in China in this respect.

1.2.3 Research purpose

Due to the sudden nature of childhood limb fracture trauma, families are often not prepared for the emotional stress associated with acute childhood trauma. When these accidents happen, parents are controlled by a series of negative emotions, which increases the psychological pressure on children and parents, and hinders the daily functioning of the family. Limb blood circulation disorders may also lead to lifelong complications such as osteofascial compartment syndrome (OCS) (Hernandez et al., 2012). The negative emotions will not only affect the family and the children, but also increase the pressure on the nursing staff, because they are close to each other and can influence each other. Nurses in pediatric department reported "highest job burnout and lowest job satisfaction and compassion satisfaction" compared with those in

hematology/oncology and ICU (Kim & Sekol, 2014). Various reasons have led to medical conflicts in pediatric limb fracture wards, which have affected the nursing service quality for children. Therefore, the purpose of this study is to obtain information, avoid the occurrence of medical conflicts and improve the quality of medical services, especially quality of nursing service for pediatric patients with high-risk limb fractures. Objectively collected qualitative research data may influence policies and procedures to improve the health service environment. This study focuses on patient-oriented quality management of services, which is an issue that requires further design and consideration by the government. Soliciting opinions from multiple stakeholders is designed around a bias that reducing service provider-patient conflict can reduce risk and thus liability. To reduce potential conflicts, service administration department needs unbiased data. Qualitative research is inherently subjective in that it attempts to collect data on subjective impressions, such as perceptions and expectations. According to Professor Anderson, qualitative research involves the collection, analysis and interpretation of data that cannot be easily reduced to numbers. McGillis et al. (2003) use the SERVQUAL model to measure the data collected through integration of qualitative methods and quantitative analysis.

Several previous studies on service quality and patient satisfaction in China have adopted the demographic approach. For example, in 2017, Gan et al. surveyed more than 1,500 patients in 15 provinces in China. Furthermore, in 2015, Li et al. (2015) investigated 1,963 patients in nine cities in China. Neither study differentiated between inpatients and outpatients. Both studies used the SERVQUAL model to identify the gap between expected service and actual received service, but both of them only investigated how patients felt. In 2018, J. J. Zhu et al. (2018) investigated the perception gap between patients and nurses in the Yi Autonomous Prefecture Area. The study surveyed 995 inpatients and 1,000 nurses from various departments. J. J. Zhu et al. (2018) used the SERVQUAL model to analyze the perception of service quality between patients and nurses. However, they did not establish a direct link to connect patients with the nursing staff. An important feature of this study is the use of the SERVQUAL model, an internationally recognized survey tool for assessing customer satisfaction, to analyze the difference between the perceptions of parents of children and the perceptions of nursing staff who provide direct care to the children. Differences in impressions and opinions between the two groups will determine the gap in service quality. We analyze the service process requirements through the SERVQUAL perception gap model, and after obtaining relevant data, through data analysis, we find the difference in perception between the parents and nurses. On this basis, we predict and prevent the risk of conflict between doctors and patients, and promote the application of scientific management model in the national medical system to

comprehensively improve medical service quality.

1.3 Research problem

Parents of children with limb fractures are often anxious because of the suddenness of the limb fractures and the subsequent treatment and rehabilitation of the children, resulting in a large number of medical disputes with nurses.

The frequent occurrence of medical disputes in pediatric orthopedic departments is resulted from a series of problems. For instance, children with limb fractures do not receive special medical care from the nursing staff, the hospital environment and facilities are not perfect, the nursing staff do not respond to the needs of children and their parents in a timely manner, and there lacks communication between the nursing staff and children's parents. In addition, since the parents and nursing staff are rarely involved in the survey of service perception, it is difficult for the hospital administrators to come up with relevant solutions to the disputes arising from the pediatric orthopedic department.

Targeting the current medical conflicts between nursing staff and parents of children in pediatric orthopedic wards, this research identifies the differences in perceptions of nursing staff and parents in terms of hospital tangibles, reliability, responsiveness, assurance and empathy through the SERVQUAL model, and analyses the perception differences in combination with practical problems to avoid the occurrence of medical conflicts and improve the quality of medical services.

1.4 Research questions

(1) Are there differences in perceptions of nursing service by parents and nursing staff?
(2) What are the perceptual differences between parents and nursing staff in the SERVQUAL model?
(3) What are the factors affecting the differences in perception between parents and nursing staff?
(4) Will the parents' views on the nursing staff in charge affect their own perception?
(5) Will the nursing staff's views on the parents affect their own perception?
(6) Are there relevant suggestions for possible differences in the perception of the SERVQUAL model between parents and nursing staff?

1.5 Research method

This thesis is a quantitative study of nurses and parents of children in the pediatric orthopedics department. Using descriptive and analytical research methods, we design questionnaires targeting nurses and parents with reference to the SERVQUAL scale. After communicating with the hospital administrators to explain the content and purpose of the questionnaires to them, the questionnaires were finally distributed to nurses and parents of children in pediatric orthopedic departments of eight hospitals in China (Shanghai Xinhua Hospital, Anhui Provincial Children's Hospital, Hainan Children's Hospital, Hunan Children's Hospital, Luzhou Hospital of Traditional Chinese Medicine in Sichuan Province, Shenzhen Children's Hospital, Shenyang Children's Hospital, and Tianjin Hospital). The questionnaire survey adopts the principle of voluntariness. In order to ensure the validity and integrity of the survey data, all the items in the questionnaire should be filled out. This study adopts the questionnaire survey method for data collection, and the questionnaire is divided into two parts. The first part involves demographic statistics, and the second part includes five dimensions: tangibles, reliability, responsiveness, assurance and empathy. The survey includes five options, namely "strongly agree", "agree", "neutral", "disagree" and "strongly disagree". For the data obtained from the questionnaires, SPSS 26.0 software is used to conduct independent sample T test, variance analysis, regression analysis by multiple linear regression model, and Pearson correlation analysis.

1.6 Research content

The thesis consists of five chapters, including introduction, literature review, research method, research results, and research conclusion and outlook.

The first chapter is the research background of this thesis. It mainly expounds the basic situation of this study from four aspects: the status quo of medical disputes in China, the status quo of humanistic nursing in China, the status quo of pediatric fractures, and research objects, research questions and research purpose.

The second chapter is the literature review. It mainly introduces the related theories involved in this research, such as the development and theories related to service and quality, hospital service quality and patient satisfaction as well as the theory of humanization. In addition, the special requirements for the nursing in pediatric orthopedic department are expounded, and the five aspects of the SERVQUAL model are introduced.

The third chapter is the research method. In this chapter, the tools used in the study, the

systematic approach and testing of the model as well as the research framework are described in detail.

The fourth chapter is the research results and discussion. It first analyses and expounds the relevant data involved in this study. Then, the nurses and the parents of the children are compared and contrasted for different aspects of the five dimensions of the SERVQUAL scale. In addition, the differences in the perception of nursing service quality between parents and nurses are also compared and contrasted.

The fifth chapter is research conclusion and outlook. This chapter points out the limitations of this study and discusses the content of this study. Based on this study, relevant improvement suggestions are proposed to be applied to various departments in hospitals around the world, which further clarifies the practical significance of this study.

Chapter 2: Literature Review

2.1 Overview

According to a report released by the Institute of Medicine in 1999, healthcare services should focus on service quality and patient safety, hence process management needs to be improved to prevent errors and patient priority needs to be identified to prioritize performance improvement in various dimensions of service quality. This chapter will therefore present literature on service quality and patient satisfaction, as well as the Service Quality (SERVQUAL) model. Ultimately, this literature review will serve as the basis for the implementation of a study that aims to identify and understand the perceived differences between nurses and parents of children and to identify areas for improvement in the provision of healthcare for children with limb fractures. This study will explore perceived differences with scientific norms in order to avoid increased conflict between pediatric patients and physicians. In addition, to clarify the perceived differences between different stakeholders in the provision of healthcare will also contribute to promoting the use of scientific management models in the national healthcare system for the care of pediatric patients and their families, and to improving the quality of healthcare services in general.

2.2 Service and quality

2.2.1 Service

Although the definitions of "service" differ, they are essentially the same. Juran (1974) defines service as work performed for someone else. Buell (1984) defined service as a variety of activities, benefits and satisfaction provided for or in conjunction with the sale of goods. Sugimoto (1986) argues that service is directly or indirectly required by some kind of supply and demand. Service satisfies the needs of customers and is an action that fulfils the purpose of the firm and ensures profitability. Stanton (1990) defines service as an intangible act that identifies and provides certain needs and the production of service does not involve a transfer of ownership even if goods are used. Murdick et al. (1990) define service as an economic activity that may be expressed in terms of time, place, form and psychological efficacy. Kolter

(1991) defines service as an activity or performance that is provided from one party to another. He notes that it is, in fact, intangible and does not necessarily depend on any entity, nor does it involve property rights. Similarly, Lovelock (1991) agrees with Kolter, arguing that service is simply a process or performance outside of business (Snoj et al., 2004).

According to the American Marketing Association, service will bring benefit or satisfaction to the sale. The BMS (Business, Marketing, Services) Council believes that services that provide something of value to the right person in need are those that provide value in a direct or indirect manner. Service is predicated on the satisfaction of the demander and is an activity undertaken to achieve business objectives to ensure the necessary profitability.

Although definitions of service vary from scholar to scholar, according to the generalized concept by Parasuraman et al., services are characterized by the following four points.

(1) Intangibility. Unlike physical products, services are intangible, which cannot be characterized by using the senses of sight, sound, taste and touch. As a result, customers often require tangible items to prove or assess intangible quality prior to purchase so as to reduce uncertainty. In this case, consumers will infer service quality based on location, personnel, equipment, promotional materials, offers or other information. Therefore, service providers must take into account the intangibility (Parasuraman et al., 1988).

(2) Inseparability. The production and consumption of services are often simultaneous, as consumers are often actively involved in the service process, which also exerts a significant impact on service quality.

(3) Heterogeneity. Services are highly variable, which means they cannot provide consistent procedures and quality. In addition, the quality of services can vary depending on factors such as differences in the skills of the service personnel, the time and location of service or the mood of the individuals.

(4) Perishability. Services cannot be stored and therefore changes in demand cannot be adjusted through inventory. As a result, changes in supply and demand become an important issue.

Service is work performed for someone else, and its intangibility, inseparability, heterogeneity and perishability suggest that service is in fact a feeling.

2.2.2 Quality

The definition of quality varies from field to field. The American Society for Quality Control (ASQC) defines quality as the overall quality and characteristics of a product or service's ability

to meet certain needs. Juran (1974) argues that quality can be divided into design quality, manufacturing quality and maintenance quality depending on function, with consumer demand as the primary guiding principle. Crosby (1979) developed Juran's view and believes that quality is consistent with demand, emphasizing "doing the job right in the first time". In addition, Deming (1982) argues that quality is the most economical means of producing the most useful product on the market. Moreover, from the customer's point of view, quality is also a criterion for improvement of satisfaction. Meanwhile, Feigenbaum (1987) considers quality as a product of customer satisfaction.

According to Garvin (1984) and Parasuraman et al. (1990), quality can be understood from five different approaches.

(1) Philosophical approach: Quality is an intuitive good that can only be felt after touching or feeling it.

(2) Product-based approach: Quality differences arise from measurable attributes. The higher the level of certain attributes, the better the quality.

(3) User-centered approach: Quality depends on the user, namely, a product or service that meets the needs of consumers indicates high quality.

(4) Manufacturing oriented approach: Quality meets specifications and requirements. The greater the gap between a product and its specification, the worse the quality, in which case it emphasizes producing according to specification and getting it right first time.

(5) Value-based approach: Quality is defined in terms of the concept of price or cost, namely, quality provides utility and satisfaction to the consumers within an acceptable price or cost range.

According to ISO 8462, the term "quality" is defined as the characteristics of a product or service and the completeness of the characteristics as well as the ability to meet its stated or implied requirements. Therefore, quality is closely related to demand, while good quality can bring good service experience to the customers and increase customer satisfaction.

2.2.3 Service quality

Service quality means the quality of service perceived by consumers. In the past, it is believed by scholars that customer satisfaction can represent service quality. From a certain point of view, service quality can indeed be assessed through attitude. Service quality can be known through comparison of consumers' expectations and their actual feelings about the service. Based on the cognitive psychology theory, Gronroos first introduced the concept of consumer perceived

service quality in 1982, and gave a scientific definition of its meaning. He believes that service quality is not only about the quality itself, but a subjective perception of consumers and refers to the degree of difference between their expected and perceived service performance. In this case, if the perceived service performance is higher than the expected value of the service, the service quality is good, and vice versa (Grönroos, 1990). According to Garvin (1983), Monroe and Dodds (1988) and Holbrook and Corfman (1985), service quality is a cognitive quality (perceived quality) rather than an objective quality, and service quality is the consumer's subjective response to things, their nature and characteristics. Both the American Society for Quality Control (ASQC) and the European Organization for Quality Control (EOQC) define service quality as the overall characteristics and features of a product or service that can satisfy a given need. Lewis and Booms (1983) contend that service quality is a measure of the extent to which service delivery meets customer expectations.

In 1985, American service management researchers Parasuraman et al. conducted further research on consumer perceptions of service quality, reporting that service quality is actually a comparison between consumers' perceptions and expectations of service quality and emphasizing consumers' assessment of service quality (Parasuraman et al., 1985). Lehtinen also agreed with Parasuraman et al., arguing that the comparison between reality and expectations is subjective through the customer's experience in a particular consumption scenario (Lehtinen & Lehtinen, 1991).

In summary, service quality is subjective. It is the perception and experience of the consumer as well as a consumer perception of whether their expectations can be met.

2.2.4 Development of service quality measurement

Service quality became popular in the marketing and business literature in the early 1980s (Parasuraman et al., 1985), as the rising trend among consumers in that decade was the pursuit of product and service quality (Rabin, 1983). At that time, there was a limited amount of research on consumer evaluation of service quality (Grönroos, 1982; Lewis & Booms, 1983; Sasser et al., 1978).

Early research on attitudes provides evidence that consumers enter a service experience with a set of expectations and quality is perceived based on how expectations of the consumers are met (Grönroos, 1982).

Service satisfaction is directly related to consumers' expectations and when their expectations are met, they will feel satisfied (Smith & Houston, 1982). Customers approach a

service with expectations of what should happen and compare them to their ideal expectations (Parasuraman et al., 1991). These expectations are expressed in terms of quality, service outcomes and processes. The quality of the service that consumers actually receive differs from the quality of the way the service is delivered (Grönroos, 1982). Consumers have expectations of both the service and the service delivery process, both of which are factors in the perception of service quality.

Consumer expectations are directly related to their consumption experience, and high expectations are related to consumer behavior (Sellers & Ove, 1990). Those who have higher expectations of service and whose expectations have been met are more likely to continue to hold a productive relationship with that business, at least in the retail sector (Dabholkar et al., 1996). Providing high quality service has been a target strategy for firms in various industries to create competitive advantage. Perceptions of poor service quality can lead to loss of customer confidence or even loss of customers, and negative customer experiences can be extremely costly to the business (Moore & Kelly, 1996).

Firms that can demonstrate high service quality are more competitive in the marketplace by attracting and retaining customers (Berry, 1986; Reichheld & Sasser, 1990). The more a service provider can assess consumer satisfaction and perceptions of service quality, the more it can enhance its attractiveness to other potential customers. The relationship between perceptions of service quality and consumer behavior has been documented in the literature and has attracted the attention of firms in all sectors of service provision.

However, there are many problems with firms that adopt a high service quality orientation (Swiss, 1992). One of these problems is how to assess service quality as it is difficult for to understand the customer's perspective when assessing service quality (Moore & Kelly, 1996). Assessing consumer perceptions of service quality is becoming increasingly important for firms in all industries as competition for business increases. It is difficult to do as they are by nature not directly observable and subjective (Parasuraman et al., 1985). The intangible definition of service quality makes it difficult to directly assess and collect data with validity and reliability, and the use of such data in the decision-making process is also challenging (Boulding et al., 1993). If reliable and valid data can be collected, these data can be used to assess the evolution of service quality in a given context or to measure employee behavior as a reference for service recovery or enhancement (Swiss, 1992). While there is a growing interest in service quality from the perspective of customers, it is difficult for service delivery companies to assess consumer perceptions and use this feedback to make decisions.

Since service provision is by nature a presentation rather than an object, most services are

intangible and distinctions in quality are difficult to judge (Parasuraman et al., 1985). To be precise, how service delivery is perceived and how consumers evaluate service quality is difficult to understand and measure by its inherent intangibility and subjectivity (Zeithaml, 1981). The multifaceted nature of service quality has long made it difficult for conceptualization, let alone measurement. Many researchers have attempted to define service quality as quality perceived by service providers and customers, but they have been bogged down by subjective interpretations of the service experience (Brady & Cronin, 2001; Parasuraman et al., 1988). Parasuraman et al. (1985) argue that quality is an elusive and vague concept, while others note that it is not easily articulated by the recipient or consumer (Takeuchi & Quelch, 1983). It is this inherent subjectivity and intangibility that has led many researchers away from the definition and measurement of service quality.

It goes without saying that the specificity of service quality makes it difficult to measure, but with the development of the times, the measurement of service quality becomes increasingly important and many companies choose to measure their services through customer satisfaction, because customer satisfaction is closely related to whether service expectations can be met.

2.3 Theories of service quality

2.3.1 Zero defect management

Zero Defect Management was proposed in the 1960s by Crosby (1979) who is known as the global guru of quality management. Defect means lack of management (both products and services) or imperfections, which are the focus of governance. “Zero” is the goal of management, which minimizes errors, maximizes the desired outcome of management and maximizes economic efficiency through effective management. The zero-defect management theory can be applied to the healthcare industry. The goal of zero defect in healthcare is to achieve patient satisfaction and zero complaints about the quality of healthcare services.

2.3.2 Hierarchy of needs

Maslow developed the famous hierarchy of needs theory. Human beings as an organic whole have many motivations and needs, including physiological needs, safety needs, love and belonging, esteem and self-actualization (Goble, 1970). He also pointed out that when lower-level needs are satisfied, people will move on to higher level needs. The need for self-actualization is transcendent and the pursuit of truth and beauty eventually leads to the

formation of a perfect personality (Wu, 2006).

2.3.3 Total quality management

In the late 1950s, Feigenbaum, an expert at General Electric, proposed the theory of Total Quality Management (TQM). He argues that TQM is an effective system to enable production and services to be delivered at the most economical level (DeCourcy et al., 2012). From the late 1980s, TQM was further expanded from the early TQC (Total Quality Control) to TQM (Total Quality Management), which means that TQM has gone far beyond the field of quality management in the general sense to become a comprehensive management model and philosophy.

2.3.4 Donabedian assessment theory

The Donabedian assessment theory, first proposed by the American scholar Donabedian in 1988, divides the health service quality evaluation system into three parts: structure, process and outcome, and decomposes health service quality into three parts: the quality of the underlying conditions, the quality of the working process and the quality of the service terminal. The theory is one of the most frequently cited classics in healthcare research and has become the most commonly used paradigm for assessment of the quality of healthcare services.

To be specific, the “structure” section describes the static allocation relationship and efficiency of the various resources of the healthcare institution, such as the number of beds, patient volume, medical equipment, service items, scope of services, and service volume; the “process” section includes the quality and efficiency of the dynamic operation of the healthcare institutions, such as clinical treatment and treatment pathways, activity testing and evaluation, staff training and education; the “outcome” section is about the operation and measurement of the structure of healthcare institutions, including patient satisfaction evaluation, readmission rate, and mortality rate (Donabedian, 1988).

2.3.5 SERVQUAL model

The Service Quality (SERVQUAL) model indicates that perceived quality as defined by Parasuraman et al. (1985) in 1985, influences customer judgments/decisions about the overall performance of the entity and that the quality of organizational services consistently meets the needs and expectations of patients (Parasuraman et al., 1988). In addition, SERVQUAL is the ability to meet or even exceed the outcomes or results jointly defined by the healthcare provider

and the patient at the service encounter (Dedeke, 2003). Dimensions of SERVQUAL include (1) technical service quality (the performance obtained by the patient); and (2) functional service quality (the subjective perception of how the service is delivered) (Grönroos, 1990). Good service quality always leads to high customer satisfaction (Subramanian et al., 2014) and four characteristics must be met to achieve high customer satisfaction (Kotler et al., 2006).

(1) Intangibility: Patients often do not know about services until they have entered into an exchange agreement with a health care provider;

(2) Perishability: Service must be received/provided on site;

(3) Inseparability: Service is produced and consumed simultaneously and cannot be separated from the healthcare provider;

(4) Heterogeneity: From one provider to another, the same provider delivers services at different levels and with different quality performance at different times).

After understanding the four characteristics of service, we can see that the improvement of service satisfaction is closely related to many aspects, and only by fully understanding these characteristics, can we be able to provide high-quality service. From these characteristics, we also learn that service satisfaction is actually a perception, and service perception is largely associated with the level of satisfaction. Through literature review, it is found that there are five dimensions of service perception in SERVQUAL.

SERVQUAL is based on five dimensions. Tangibles refer to physical facilities with comfort, accessibility, spaciousness, functionality and cleanliness (Cunha & Suresh, 2015). This factor is a key service quality dimension and is usually a factor that requires substantial improvement to meet customer/patient expectations (Caruana et al., 2000; N. V. Rad et al., 2010). Reliability involves consistency and dependability of services (Kondasani & Panda, 2015; Parasuraman et al., 1985, 1988). Patient satisfaction will increase if providers meet patients' wishes and expectations (N. V. Rad et al., 2010). Responsiveness is the willingness or readiness of a service provider to provide quick and timely service (Calisir et al., 2014; N. V. Rad et al., 2010; Parasuraman et al., 1985, 1988). Assurance is the knowledge, courtesy, and ability of employees to convey trust and confidence (Kitapci et al., 2014). Finally, empathy is care, understanding of the patient's needs and provision of personalized attention (Fitzpatrick, 1991; Parasuraman et al., 1985, 1988; Zarei et al., 2014).

Recently, there has been increasing interest in the association between SERVQUAL and satisfaction, loyalty, positive word-of-mouth, cost, and organizational profitability (Orel & Kara, 2014). In healthcare delivery organizations, SERVQUAL influences patient satisfaction and loyalty (Park et al., 2016; Shabbir et al., 2016).

Since 2007, the SERVQUAL model has been used to analyze patient satisfaction and dissatisfaction with healthcare delivery processes, so as to optimize communication between physicians and patients, improve the delivery of healthcare services, and improve staff training (Jain, 2017). The validity of specific elements of the SERVQUAL model for application in the healthcare delivery has been assessed (Ahmed et al., 2017; Dagger et al., 2007; Saulino et al., 2017).

According to Bahadori et al. (2014) and Cruz and Melleiro (2010), there are differences between hospitals and patients in terms of service quality evaluation and the impact on service improvement. However, these studies ignore health care providers (hospitals, doctors, and also nurses), children (patients) and family members (caregivers). Therefore, understanding the application of the SERVQUAL model to the treatment model, managing risk factors and reducing liability will help to improve existing healthcare delivery programs, ensure standardization of healthcare delivery processes and provide a vehicle for continuous quality improvement. Improving the satisfaction of healthcare system stakeholders, patients and service providers is the key to building a scientific healthcare delivery system and managing healthcare service processes.

Bowers et al. (1994) argue that the SERVQUAL scale cannot measure service quality, and especially medical service quality. On the other hand, Teng et al. (2007) contend that the SERVQUAL method is valid and reliable in assessing satisfaction of surgical inpatients, and Babakus and Mangold (1992) and Buttle (1996) also support this approach. As a result, the SERVQUAL model has been used both in China and foreign countries to analyze patient satisfaction and dissatisfaction during healthcare (Dagger et al., 2007), with the aim of strengthening communication between patients and doctors, improving service facilities and increasing staff training (Bahadori et al., 2014).

In summary, it is easy to see from the various theories of service quality that the ultimate goal is to enable customers to have a better service experience and service perception, and the service quality can be measured using the SERVQUAL model as shown in Figure 2.1.

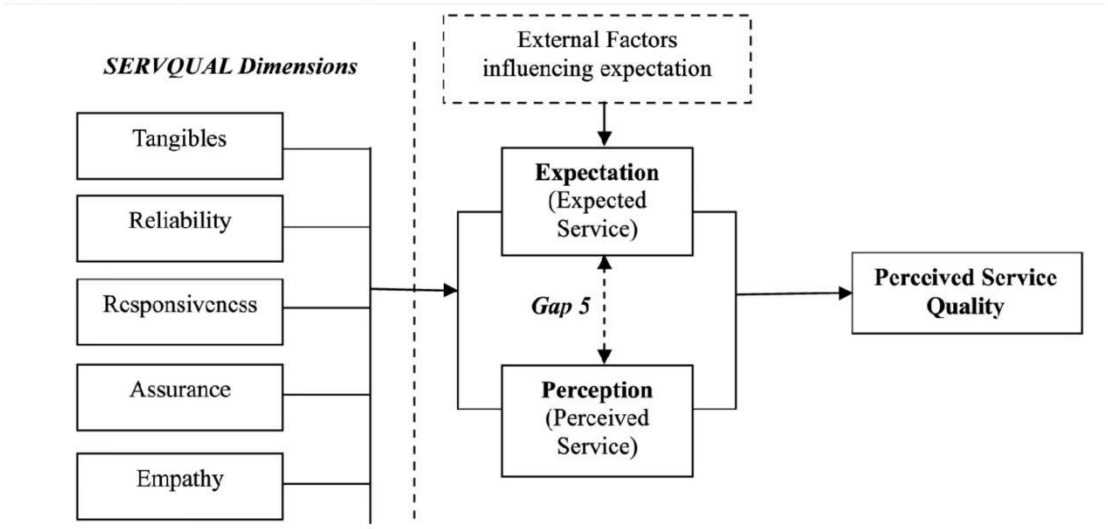


Figure 2.1 Measuring service quality using SERVQUAL model

2.4 Hospital service quality and patient satisfaction

Patient satisfaction is a widely used concept in healthcare to assess service quality (Fenton et al., 2012; Shabbir et al., 2016).

Hospital service quality is influenced by three factors: administrative service, medical service, and nursing care (Azizan & Mohamed, 2013). Leiter et al. (1998) conducted an empirical study in Canadian hospitals and observed that patient satisfaction is influenced by nurses, doctors, and provided/available information. In a study by Manaf et al. (2012), 46.4% of the patients were satisfied with service quality, whereas 7.3% were dissatisfied. According to Andaleeb (2001), responsiveness, assurance, communication, and discipline have a noteworthy influence on Bangladeshi patient satisfaction. Hence, the quality of services provided by healthcare personnel directly influences patient satisfaction.

Patient satisfaction results in loyalty, but patient loyalty can also be the result of a strategy to retain patients by providing better service quality (Anbori et al., 2010). To achieve patient loyalty, healthcare providers must fulfill the patients' needs and meet their expectations (Aliman & Mohamad, 2016). When the healthcare providers are able to identify which service quality aspects are the most important to their patients and have mechanisms to prioritize those aspects, then optimal patient satisfaction and loyalty will be achieved (Anbori et al., 2010; Hu et al., 2011).

Mortazavi et al. (2009) found that patient satisfaction and loyalty are significantly correlated, and are associated with nursing care, operating room, admission and administration services, and patient room. Importantly, loyalty is not exclusive, absolute, and/or permanent,

and must be maintained by continuously improving the services. Communication is paramount to achieve patient loyalty, in order to meet the needs and expectations of the patients (Roberge et al., 2001).

In the healthcare industry and services, any error, miscalculation, or misjudgment can have fatal consequences. Therefore, the patients expect only the highest quality services. In the United States alone, 98,000 deaths each year are attributable to medical errors (McDonald, 2013). Stressing the importance of healthcare service quality, in the United States alone, there are between 210,000 and 400,000 deaths each year due to preventable adverse events (Allen, 2013).

In recent years, the patients have progressively taken a more important and active role in their health care, mainly due to concerns about the safety of treatments, quality of the treatments, and costs. In China, the general health knowledge and awareness were historically low, but improved with the recent economic development (Song et al., 2013; Yang et al., 2010; Yuan et al., 2015), resulting in higher expectations from the patients, as well as them being more critic of the work of healthcare staff. This also placed a higher need for healthcare professionals to measure and monitor patients' satisfaction (McGillis et al., 2003; Williams, 1994).

Patient satisfaction is now so paramount that the reimbursement for healthcare services in the United States depends upon the evaluation of patients' perception of care (Kutney et al., 2009). It is paramount to highlight that healthcare quality perception varies among executives, stakeholders, frontline employees such as nurses, and patients/caregivers (Huang & Li, 2010; Lee & Yom, 2007). Therefore, to ensure optimal process optimization and healthcare services, the perspective of each of those actors in the healthcare system must be analyzed, and the gaps in views among them must be mitigated.

Since patient satisfaction is now central to healthcare providers, evaluating patient satisfaction is now paramount to every healthcare institution (Brice, 1994; Krowinski & Steiber, 1996; Shelton, 2000). Patients satisfied with the care are more likely to re-visit the hospital (Elder et al., 2004; Laschinger et al., 2005).

Therefore, a paradigm shift was necessary, namely, shifting from the use of clinical markers of performance (occurrence of pressure ulcers, mortality, and reoperation) to the use of patient satisfaction meters (Lynn et al., 2007; Tomlinson & Ko, 2006). Among the possible variables, the satisfaction with nursing care has been shown to be a reliable measurement of health care satisfaction (Abramowitz et al., 1987; Cleary et al., 1989; Delbanco et al., 1995; Drachman, 1996).

The relationship between the service provider and the clients is central to every service

company (Abbasi-Moghaddam et al., 2019). Customer evaluation and attention will be significantly influenced by the potential for personal interaction between the service provider and the service recipient. The production and use of these services are inseparable and this is an important factor for consideration (Ampaw et al., 2020). Clients often perceive the service contact system, including the person providing the service as well as the physical facilities, as an integral part of the service itself.

To further improve customer satisfaction, the focus of service management has been on the actual service delivery process, as well as the discussion of service encounters (Javed & Liu, 2018). Research shows that when customers have confidence in a company, their behavior is more predictable. In addition, trust can save money by increasing customer satisfaction and building long-term customer relationships through customer value creation. According to recent studies, trust is found to have a positive impact on happiness (Pekkaya et al., 2019).

Healthcare service experience is more than just the quality of service provided. It may be more dynamic and unique in the meaning if it is based on human interaction (Asnawi et al., 2019).

As a result, the initial focus on service quality has been replaced by research that emphasizes the human interaction inherent in customer service interactions. When it comes to customer satisfaction and long-term customer-seller relationships, previous research on the service sector has been focused on these issues. Few studies have examined the nature of interactions between business owners and customers in the service delivery process and the phenomenon of changes in the quality of interactions (Fauziah et al., 2019). This is particularly true when it comes to professions such as doctors, lawyers and accountants, where there are high levels of interaction between service providers and service recipients, but little empirical research has been conducted. To ensure that they maintain a significant influence advantage in this highly competitive market, professional service practitioners must understand their clients' needs when interacting with them and provide relevant services to ensure service quality (Sitio & Ali, 2019).

Positive word of mouth is said to come from satisfied patients who return to the hospital because of their involvement. The other side of positive word of mouth shows that repeated surveys and complaints are caused by dissatisfied customers. High levels of patient satisfaction make it necessary to maintain and expand the hospital's patient base (Zaid et al., 2020). Furthermore, previous studies have shown that high quality care increases patient satisfaction (Beni et al., 2018). As a result, hospitals embrace excellent nursing service to ensure hospitality, high quality care and civility (Essel, 2020). According to recent studies, the quality of nursing

services and patient satisfaction are closely related (Rostami et al., 2019; Sitio & Ali, 2019).

Furthermore, quality of care is also considered to be an important component that has a considerable beneficial impact on patient satisfaction (Pekkaya et al., 2019). Many previous studies have also shown that high-quality hospital facilities help patients to be happier (Abbasi-Moghaddam et al., 2019; Asnawi et al., 2019).

According to extensive research, the quality of hospital facilities is closely related to patient well-being (Essel, 2020; Fauziah et al., 2019). Studies suggest that patient satisfaction may increase if the quality of hospital facilities is high enough (Javed & Liu, 2018). The study also concluded that the quality of hospital facilities had no impact on patient satisfaction. However, previous studies have suggested that patient satisfaction with hospitals and healthcare facilities may be impaired by emotional fatigue. Recent studies have documented emotional fatigue among hospital staff (Man & Chen, 2020).

In the past, researchers have demonstrated that emotionally exhausted patients are less satisfied with their care (Man & Chen, 2020). Organizational citizenship behaviors of hospital staff and healthcare practitioners have also been found to significantly increase patient satisfaction (Abbasi-Moghaddam et al., 2019). Meanwhile, organizational citizenship behaviors have been proved to be able to increase patient satisfaction (other studies have shown the same results), while another study found a substantial link between organizational citizenship behaviors and patient satisfaction (Asnawi et al., 2019). For example, Man and Chen (2020) argue that patient-centeredness is at the forefront of private hospitals and that organizational citizenship behaviors of nurses will ultimately increase patient happiness. Credibility of healthcare practitioners can also increase patient satisfaction in the presence of other factors, and research has identified credibility as a key component of patient satisfaction. Furthermore, credibility plays an important mediating role between the parameters that influence patient satisfaction and patient satisfaction itself.

In the satisfaction of medical services, the quality of nursing services plays a very important role. There is an old Chinese saying that “30% depends on treatment, and 70% depends on nursing”. Throughout the treatment process, the nursing staff have the longest contact time with the patients and are closest to the patients, so they are also most likely to identify problems. Therefore, bridging the gap of the perceptions between the clients and the nurses has a great role to play in improving service satisfaction.

2.5 Humanistic nursing theory

Human caring was first introduced in the 1960s by American researcher Leininger, who defined human caring as activities or behaviors that help, support, and respect other people or organizations to meet their needs and thereby improve their living conditions (Marty, 1982).

Humanistic caring theory (Paterson & Zderad, 1988) is multifaceted. It illustrates the nature of nursing and embraces the dynamics of being, growth and change. It is an interactive theory of nursing that provides a method for the reflective expression of the nature of nursing. It is also a theory that builds a methodological bridge between theory and practice by providing a broad guide to the "dialogue" of nursing in a variety of settings.

Nursing, as seen through humanistic nursing theory, is a capacity to struggle. It is a peak experience related to health and suffering, in which participants in a care situation are becoming such persons according to their human potential. The struggle is shared through dialogue between participants. This empowerment to share the "struggle" allows participants to "become" each other in the relationship. In nursing, the purpose of this dialogue or intersubjective connection is to nurture a sense of well-being and more-being for those in need. Humanistic nursing theory is based on existentialism and emphasizes the living experience of nursing. An existential theme it builds on is the affirmation of the being and becoming of patients and nurses through the choices they make and the inter-subjective relationships they engage in. This dynamism is manifested in the caregiver's concern for the potential for self-fulfillment or "more being".

Humanistic care is a process of movement that takes place in the context of human life. This conceptual framework represents a non-linear process that spirals upwards over time. This fluidity may have been somewhat disconcerting to the initial explorers of humanistic care theory. However, it is this fluidity that, once mastered, can be extended to a wide variety of practice settings. In the world of humanistic nursing theory, the identified individuals are the patients (individual persons, family, community or human being) and the nurses.

When a patient calls for help with a health-related problem, he is identified as a patient. The person who hears and identifies the call is a nurse. Nurses are a group of people who, through a deliberate choice to become nurses, are committed to helping others with their health needs.

It is important to emphasize that both nurses and patients are human beings, or groups of human beings, with their own unique psychological minds. The Gestalt, which represents everything about human beings, includes all their past experiences, all their present existence,

and all their hopes, dreams and fears for the future that they experience in their own space-time dimension. This includes the environmental resources available to them, and these factors have increasing importance in times of financial constraint. In short, to use a humanistic nursing term, they exist "simultaneously". In nursing, when the patient and the nurse meet and interact, this role focuses on the call of one person, the patient, and the helpful response of the other person, the nurse. While the call and response are between the nurse and the patient, it is important to understand that all the other factors that make the patient being who he or she is are also involved in this interaction.

This gestalt includes the patient's past and present social relationships, such as experiences of gender, race, and religion, as well as education, work, and any personal patterns to cope with life experiences. It also includes past experiences of dealing with assistants in the health care delivery system, as well as the patient's image and expectations of what he or she is calling on the nurse for. As human incarnations, we exist in this particular space, at this particular time, in a physical body that perceives, filters and processes our experiences. The nurse also brings with her everything. Her expectation, however, is that as a nurse she will be able to respond to requests for help.

The nurse then Interweaves her professional Identity and professional education, as well as all her other life experiences, to create her own style, which is projected through the nursing response. One only has to observe the nurses' nursing work to see how individualized the dialogue expressed with a particular patient is. A very simple example might be two nurses performing the same task of suctioning a patient, and depending on the nurse and patient, I have seen them do this with gentleness, humor and sophisticated technique that makes the process go almost unnoticed. I noticed one nurse who, each time she posed and suctioned her patient, made sure she also adjusted the position of the small basket of flowers she placed next to the patient's bed.

It Is this Individuality as human beings that makes us similar and provides a thread that unites us throughout the course of our lives. However, similarity in our differences is only one of these core threads and in nursing, humanist theory seeks to reveal other unifying threads or essences that make up the human fabric of nursing. Nurses must always be aware that as stated in existential theory, human beings are made through the choices they make and the intersubjective experiences they engage in – the choices of intersubjective engagement and the level of intersubjective relating are jointly determined by the patient and the nurse (Smith & Parker, 2010).

2.5.1 Characteristics of human caring theory

Some aspects of the theory of human caring are obvious to researchers and in many cases are more clearly described. Each of these is described in this section.

(1) More-being

Many hospices and palliative care have adopted the human caring theory model. Nurses who responded to a survey on why they chose to work in that particular profession shared the same thoughts (alleviation of suffering and provision of holistic care) when asked why they chose to work in a hospice. There are many ways in which nurses can choose how to respond to various situations in the field. According to this theory, the desire for "more-being" (to help others) is an important component of the validity of the human care theory model (Rosa et al., 2020).

(2) Call and response

When a patient seeks help from a caregiver, the relationship between the patient and nurse is said to be "call and response". As the patient is in pain or discomfort, he or she is actively seeking treatment and the nurse responds in a specific way to provide quality care to the best of her ability, which is a very unique situation (Valentine et al., 2020).

(3) Inter-subjective transactions

According to the researchers, patients and nurses both have their own angles or unique perspectives through which they can perceive the world at the beginning of treatment. When two separate people (the nurse and the patient) have a trusting connection, they can help each other to achieve a sense of comfort, self-determination and an enhanced sense of dignity. This relationship may be fostered by demonstrating compassion, trust and good rapport (Bayoumi, 2018; Delmas et al., 2018).

(4) Uniqueness and difference

An important part of the theory of humanistic nursing is to emphasize and encourage the role of the nurse as a unique individual. Nurses have to face some of their own anxieties, insecurities and vulnerabilities when caring for patients. According to the concept of human caring (Carvalho & Cordeiro, 2018; Zamaniniya et al., 2021), clinical outcomes can be improved by increasing self-awareness of the nurses.

It is clear that human caring should be integrated throughout the nursing activities, and nurses need to respect patients from the heart, help them and support them in achieving health. Compassion and empathy of nurses help to build good trust between doctors and patients, thus building a harmonious doctor-patient relationship. Human caring is also evolving, and for

pediatrics, nurses, if possible, should not only take good care of the children, but also support and help their family, which will also help the children recover physically and mentally.

2.6 Special requirements of paediatric care

Children with limb fractures are generally difficult to control and are prone to negative effects such as uncooperativeness and pain during treatment and care, resulting in reduced satisfaction for the child and parents and increased disputes over care. Nursing for fractures in children is a difficult problem in orthopedics. It is difficult to control in two main ways. (1) It is difficult for medical staff to control the children; and (2) it is difficult for the children themselves to control their own physical behavior. As a result, pediatric patients often develop negative emotions during treatment, such as irritability, writhing, crying and fear. More importantly, if the timing of treatment is delayed, the rate of bone healing will be delayed, which will exert detrimental effects (Jiang, 2017). Therefore, the treatment of such special patients requires special care methods.

2.6.1 Special requirements for hospitals

Hospitals should strengthen health education for parents of children with limb fractures to raise awareness of the disease so that parents have confidence that their children will be properly cared for, thereby indirectly transferring positive attitude to the children and improving their psychological status and compliance. As a result, it enables hospitals to successfully carry out clinical care, improve the life quality of children with fractures and shorten the duration of hospitalization (Xiao, 2019).

If allowed, hospitals can arrange for patients and families to learn, communicate and share common problems together by conducting planned parent education classes. Various leaflets for free distribution can be produced to effectively alleviate the anxiety of the parents, guide the children to receive treatment and rehabilitation exercises after discharge, provide continuous care, and increase the children's compliance with functional exercises, so as to achieve rapid rehabilitation (Zhao et al., 2017).

If a child is receiving care in an inpatient or outpatient setting, hospitals must have plans in place to ensure that emergency plans or emergency transfers to higher levels of care can be provided (Espindula et al., 2019). There should be institution and procedure for emergency plans and emergency manpower deployment. Hospital rules, procedures and protocols should be overseen by a qualified general pediatrician or pediatric medical specialist to ensure that all

patients, regardless of age, receive adequate care (Rodrigues et al., 2018).

In the absence of a pediatrician, a board-certified family medicine or emergency medicine physician with competence in pediatric medicine could take over. Ideally, this physician would also be involved in hospital-wide initiatives to assess and improve the quality of pediatric care (Sano et al., 2018).

Children with psychiatric and behavioral problems at the same time may require inpatient treatment, which requires appropriate triage (Morrissey et al., 2019). The needs of adolescent patients should be taken into consideration when asking open-ended questions about sexual partners and drug use in private. Intoxication in young children may be accidental, but in adolescents it can be an indication of suicidal intent. Last year, 16 per cent of adolescents considered suicide and 8 per cent attempted it. Suicide attempts and behavioral problems are more common among certain ethnic groups, those with a history of suicide attempts or sexual minorities (Hockenberry & Wilson, 2018).

Hospital staff should be well informed about mental health resources and policies to appropriately classify patients. The policies, equipment, facilities and staff identified in this clinical report should be implemented in inpatient pediatric hospitals to ensure high quality and safe care (Rodrigues et al., 2018). Inpatient pediatric care differs significantly from inpatient adult care, and these differences must be taken into consideration when providing care for this particularly vulnerable group. Patients should only be admitted if the hospital has appropriate resources, such as physical space and equipment sufficient to meet the needs of the children. In the absence of such resources, procedures are needed to help physicians make appropriate triage, consultation and referral decisions (Comparcini et al., 2018).

For the hospital, it must first be qualified to treat pediatric patients. To some extent, the requirements of a hospital for pediatric patients are very different from those for adult patients. There are professional requirements for the hospital in terms of the treatment environment, the qualifications and training of pediatric medical staff, health education for parents and the ability to deal with first aid and emergency situations of pediatric patients.

2.6.2 Special requirements for medical staff

Medical professionals should seek to understand the universal needs of family supporters. Most fractures in children are sudden events that abruptly change parents' daily life patterns and emotions (Y. Y. Chen, 2014). The treatment and rehabilitation of fractures is a long-term process and many studies have shown that parents' need for health education is universal, but with a

specific focus on their knowledge needs at different stages of the disease (Zhang, 2009). The traditional nursing reception process focuses on the introduction to hospital rules and regulations and environment of the wards, neglecting the things parents most want to know, such as the length of treatment, and follow-up costs. This makes the parents anxious and nervous, repeatedly asking about the condition, while demanding that the nurses keep an eye on their child, always checking, and asking for early surgery and other unreasonable demands.

At this point, parents of children are in a state of irritability, which can easily lead to nurse-patient conflict and hostility (Liu & Zhou, 2011). In addition, healthcare professionals should inform the families of the most up-to-date information they want at the time of admission so that the families can quickly learn about the unfamiliar environment, the child's condition, knowledge about the disease, conventional treatments and outcomes in a short period of time, which can greatly help build their confidence in overcoming the disease, gain the trust of the family, as well as improve compliance with follow-up treatment.

The medical staff should enhance therapeutic communication during treatment. The Chinese Nursing Manual states that strengthening communication with patients in the treatment of diseases is beneficial to their treatment and recovery, which is one of the psychological treatment methods. Its specific application aims to help patients overcome psychological barriers with the available facts, and help them regain confidence and actively cooperate with clinical treatment (L. Chen, 2014). Liu et al. (2016) reported four main aspects of therapeutic communication. (1) Listen to and understand children's emotional changes and physical and psychological needs. Children's lower capacity to tolerate pain, coupled with the particular surrounding environment of hospital, makes it inevitable that they will feel scared. In fact, crying is relatively normal in clinical treatment. Therefore, given the poor self-control and tendency of young children to cry, nursing staff need to maintain a normal and gentle approach to pediatric patients. (2) Master conversation skills with pediatric patients, especially the setting and timing of the conversation. For example, if they are crying and screaming, the talk can take place when they are a little calmer to ensure that they can concentrate on listening and analyzing what the caregiver is saying. In addition, communication with children should endeavor to create a harmonious atmosphere so that children can communicate with caregivers in a warm, cozy and comfortable environment. (3) Correctly use of non-verbal communication. It has been pointed out that more than half of communication is expressed through body language, with verbal contents accounting for less than 10% of the overall communication process. In addition, intonation is also important (Zhao et al., 2015). Smiling, caring glances and appropriate body movements are important for optimization of doctor-patient communication. Using them

flexibly helps to achieve a personal emotional integration between the nurse and the patient. (4) Be good at considering the children's needs from the perspective of the children and their parents. As pediatric patients require family care, it is advisable in practice for caregivers to try to communicate with children from their parents' point of view, which can have a significant impact on increasing the intimacy between the caregiver and patients and reducing the children's psychological alertness to caregivers.

The medical staff should enhance humanistic care. Humanistic care is a kind of advanced, efficient and humanized nursing countermeasure. It is based on the development of the concept of humanized care, emphasizing "people-oriented and patient-first" and taking into consideration the patient's physiological and pathological status, so as to put the patients in a good treatment environment and improve the overall treatment quality of fracture treatment. Humanized care countermeasures not only improve the treatment environment for the patients, but also effectively improve the work quality and professional skills of the nursing staff, which helps fundamentally improve their working ability. In addition, strengthening the humanistic care and nursing concept in pediatric fracture wards can also enhance the integration of medical care, making medical care an organic whole and making treatment the ultimate goal of nursing.

An institution's ability to provide safe and high-quality pediatric medical care depends on the expertise and training of its pediatric nurses (Coats et al., 2018). The ability of nurses to identify indicators of decompensation and act quickly in emergency situations is critical, as they spend more time with patients than any other member in the health care team. As for pediatric patients, normal values for laboratory indicators may differ. Behavioral differences in children require the use of age-appropriate pediatric pain measures, and nurses must be aware of these differences. When treating adolescents, pediatric nurses must know how to strike a delicate balance between guiding and allowing them to make their own decisions (Broekema et al., 2018).

When nurses have a low level of expertise in venous access, it is recommended that the most experienced staff attempt to achieve venous access (Kellogg et al., 2018). Having a pediatric nurse educator on staff is ideal, but in the absence of such an individual, hospitals should strive to devote sufficient time to developing pediatric capacity.

Sometimes there are not enough nurses to meet the needs of pediatric patients and non-pediatric professionals should only be involved if they have demonstrated their ability to carry out the basic nursing activities required to care for pediatric patients. If qualified pediatric staff are not available in the area, children may need to be transferred to a facility that can better meet their needs. Qualified staff should undergo baseline and annual assessments, including

age-specific and psychosocial competencies and key pediatric skills (Thrasher et al., 2018).

Medical staff responsible for the care of children should be trained to identify and deal with abuse, child neglect and physical or sexual abuse (Smith, 2018). The staff should be able to identify the types of harm that are likely to occur at different ages, as well as the more likely types of harm narrated by the child or accompanying adult. Immediate intervention should be provided for children who have been physically, sexually or emotionally abused by child abuse teams and/or mental health professionals, or who have been diagnosed with a mental health problem. Policies should be in place to ensure that complaints are appropriately reported to the authorities for further investigation and that complaints are appropriately referred to mental health services with experience in pediatric care if there is no alternative locally (Akter et al., 2018).

As respiratory infections are the most common pediatric diagnosis requiring hospitalization, healthcare service providers need to have rapid access to airway management specialists and specialist equipment for children of all ages (Coats et al., 2018). The skills of pediatric respiratory therapists are crucial when providing safe treatment for children, who are more likely to develop respiratory failure rather than heart failure. Doctors who specialize in pediatrics should be able to locate the necessary resuscitation carts and equipment (Boyle & Bush, 2018). The use of pediatric-trained in-house staff or professionals from tertiary institutions for regular simulation training and debriefing is strongly encouraged. As a result of this training, multidisciplinary healthcare teams can work more effectively in emergency situations. Such training cannot replace real-life experience of caring for hospitalized children. The Joint Commission and the Hospital Quality Assurance Committee should be aware of educational programs, clinical training opportunities and simulation training (Boyle & Bush, 2018).

Pediatric inpatients should be treated by licensed and credentialed physicians and other health care professionals, either through formal training programs or under supervision in accordance with the institution's credentialing policy (Thrasher et al., 2018). Continuing education and maintaining active life support certification, particularly neonatal and pediatric advanced life support or similar training, is essential for healthcare workers. Depending on the severity of the children's condition, the person responsible for their care may be on site or on call, and the system may provide appropriate response time for on-call specialists. The most senior health professionals should be on call at all times for children who require intermediate or high-level care needs. Measures must be institutionalized to ensure that all staff expected to care for children have the capacity to treat pediatric patients and are aware of their responsibility.

Based on the established systems, the patient's family and medical staff should be able to identify the patient quickly and easily (Arabiat et al., 2018).

Due to their cognitive level and age, sedation is commonly used in children to reduce discomfort and anxiety and to ensure immobility in order to safely complete the surgery (Coats et al., 2018). Healthcare providers should have a thorough understanding of the medication they want to use and its possible side effects. The ability to differentiate between the different stages of sedation and to give appropriate monitoring and cardiac support when necessary is essential. All staff must be taught the use of cardiopulmonary monitors and associated alarms, as normal vital sign levels vary in the lower age groups. Annual assessment of pediatric sedation capacity and caseload is recommended. Children under one year old are four times more likely to die from anesthesia-related cardiac arrest than children aged from one to eighteen years old. For children under two years old or children with complex medical conditions, board-certified pediatric surgeons and anesthetists should supervise all elective surgical procedures (Smith, 2018).

Radiology technicians, dieticians, breastfeeding specialists, child life specialists, rehabilitation therapists, mental health specialists, medical interpreters and social workers should all be present on a regular basis to provide services to hospitalized pediatric patients (Thrasher et al., 2018). It is essential that those providing these services have appropriate training and continuing education in the pediatric applications of their respective disciplines. Competencies of those participated in serving pediatric populations in healthcare providers need to be assessed both for access and on a regular basis. In different institutions, the work of lactation support is usually performed by nurses. Continuing education courses should be provided for those who have to take on additional responsibilities when regular staff are not in the office (Mirlashari et al., 2020).

Employing family members as interpreters of medical information is inappropriate, and hospital personnel should generally strive to promote popularization of health knowledge (Dall'Oglio et al., 2018). Only 12% of Americans are fluent in healthcare language, and the ability to receive and apply health information may be affected by stress. If in-house interpreters are not available, telephone or telemedicine interpreting services can help with foreign language and sign language communication, and instructional materials can be translated by off-site providers. When full-time or cross-trained staff are not available due to budget or staffing constraints, facilities should maintain appropriate consultative links with tertiary hospital staff. Some of these focal points may provide regular orientation sessions to counsel individual patients and help develop policies and procedures (Dall'Oglio et al., 2018).

In summary, the responsibilities of medical staff in pediatric department are even greater, as children are not miniature versions of adults and they have their own characteristics. Children's conditions change rapidly and their ability to express themselves is weak. This requires a strong sense of responsibility and the ability to anticipate risks, communicate, educate and coordinate with families, as well as patience and compassion.

2.6.3 Special requirements of families

Parental attitudes towards illness directly influence the coordination of treatment and care for children, as well as the final treatment outcome and recovery (Committee on Hospital Care, 2003). A positive parental state of mind can promote the children's psychological recovery and healthy development. The family-centered model of care has become a tenet of Western pediatric care and has been incorporated into relevant clinical working guideline documents. It is emphasized that the role of the family should be valued in care and the responsibility and goal of healthcare professionals is not only to promote the children's recovery, but also to promote their healthy emotional and psychological development.

Family members should give special care to pediatric patients, which is reflected in the following aspects. (1) Psychological care. Pediatric patients tend to feel fearful due to their sudden admission to hospital. In addition, they often have poor compliance due to lack of health perception and pain. Therefore, family members should provide special care and communicate with them in a friendly manner. For very young children, family members need to use persuasion to improve compliance, especially by paying more attention to their daily lives. (2) Nutritional care. Pediatric patients need to eat frequently and in small portions, so families should pay special attention to calcium, iron and vitamin supplements by eating fish, spinach and other fresh vegetables and dairy products. (3) Daily care. Families should help the children with basic movements such as turning over, defecating, eating and drinking, and pay attention to preventing urinary tract infections, constipation and pressure sores. They should add air cushions and sponges to prevent long-term pressure and deformation of the apophasis. In addition, families need to strengthen daily supervision of the children and regularly massage the bedridden children to help promote bowel movement and urination. In addition, bed linen needs to be changed once a week to ensure the environment is kept dry and clean. It is also advisable to use a bed with guard rails to prevent falls and to add sponge pads to the hard areas of the bed to prevent bruising. The children should be accompanied when getting out of bed to avoid secondary injuries. (4) Supplementary rehabilitation training. For upper limb fractures,

family members need to help the children move the fingers freely during traction. There should be appropriate movements of the shoulder joint during arthrofusion as well as fist movements. For lower limb fractures, appropriate movement of the ankle and hip joints is needed during arthrofusion. The children should take a supine position and perform ankle pump exercises. When the fixation is removed, more movement of the elbow can be added, such as rotation, stretching and flexion (Long, 2019).

It Is understandable that almost all treatment and care for the children Is decided and completed by the family, so the philosophy of care has gradually changed to a family-centered model of care. It is because the family plays an important role in the children's recovery that a large part of the care is focused on communication and exchange with the family, gaining their trust and understanding and involving them in the care of the children, which is also more conducive to the recovery.

2.7 Special requirements for the care of children with limb fractures

The focus group of this study are parents and nurses of children with limb fractures in the pediatric orthopedic wards, so it is important to have a comprehensive understanding of the characteristics and special requirements for care of this group.

In China, the average annual incidence of childhood trauma is about 25%, of which about 10-25% is due to limb fractures (Xia & Shen, 2008). A large number of these children's limb fractures occur unexpectedly, which further increases the stress and anxiety of parental caregivers (Liu et al., 2002). They may not be prepared to cope with the emotional stress associated with their children's acute injury. When these accidents occur, parents experience pain, anger, and negative emotions, which can increase psychological stress for both the children and the parents themselves and impede the daily functioning of the family. In addition, impaired circulation to the limbs can lead to lifelong complications such as osteofascial syndrome (OCS) (Hernandez et al., 2012). This can further influence parents with stress, anxiety and fear for their children's health, which not only negatively affects the child, but also increases the stress of caregivers as they are in close proximity to each other and influence each other. Nurses caring for children in pediatric surgery reported the highest level of job burnout and the lowest level of job satisfaction and compassion satisfaction compared to nurses in hematology/oncology and intensive care unit (Kim & Sekol, 2014). Thus, assessment of the parental/caregiver perspective, expectations, and satisfaction as well as nursing care staff satisfaction with care is essential knowledge to provide high quality pediatric care.

2.7.1 Epidemiological features of limb fractures in children

Knowledge of the epidemiology of fractures in children is crucial to the perceived service differences. In 2010, based on the European Classification of Diseases, Hedström et al. (2010) noted that the prevalence of pediatric fractures in the total disease population amounted to approximately 1.33%-3.61%. In 2017, Chen et al. (2017) published the findings of the China National Fracture Study (CNFS), a study targeting more than half a million Chinese people across China, and attempted to predict fracture incidence, distribution and risky factors. The CNFS concluded that in the pediatric population (under 15 years of age), boys, primary school children, and children with less than seven hours of sleep per day were at the highest risk for limb fractures. Previously, a study by Zhang et al. (2014) on pediatric orthopedic emergencies at Beijing Jishuitan Hospital found that there were approximately 10,000 fractures among children with unintentional injuries, accounting for 47.2% of all pediatric orthopedic emergencies, with limb fractures being the most common. The incidence of fractures gradually increases from one to six years of age, with the highest incidence at 12 years of age. The incidence is generally higher in boys than in girls, which may be related to the fact that boys are more active. The two Chinese studies contribute to the inclusion of fracture risk and treatment in the Chinese government's long-term development outline "Healthy China 2030". It is clear that pediatric limb fracture is a heavy national health burden that requires a complete service quality assessment system and a corresponding comprehensive healthcare system.

2.7.2 Accumulation of research work relevant to the project and research achievements already achieved

The author of this thesis has been involved in clinical care of children's fractures for many years and have extensive clinical work experience. She obtained her master's degree from Flinders University in Australia and studied at the Children's Hospital of Pittsburgh in the USA, which gives her broad international perspective. She has conducted research projects for the Shanghai Science and Technology Commission, the Shanghai Nursing Society and the School of Medicine of Jiao Tong University, which has strengthened her research foundation and thinking. The previous project team consisted of researchers and postgraduates from Xinhua Hospital of Shanghai Jiaotong University School of Medicine. The author has participated in a number of research projects before and boasts a solid theoretical foundation and practical experience as well as good research quality.

2.7.2.1 Research on the psychological state of parents of children with limb fractures

2.7.2.1.1 Impact of different models of nursing intervention on the psychological state of parents

The author has previously conducted the project of "The impact of different nursing intervention models on the psychological state of parents of children with fractures, Jyh1305, Zhao Yanjun, Shanghai Jiaotong University School of Medicine, 2014.01-2016.04". The findings of this study have been published in the Journal of Clinical Pediatric Surgery in 2014 and 2016 respectively with the project applicant as the first author.

The study investigated the psychological status of parents of children with limb fractures who were hospitalized using the SCL-90 scale. It is found that the psychological status of parents of children with limb fractures was poor, causing stress to their children and directly affecting their cooperation with treatment and nursing, which was detrimental to the eventual treatment and recovery of the disease. After the cognitive-behavioral intervention, the parents' psychological status improved significantly, as shown in Table 2.1. As participants in the post-operative limb fracture service process, the parents of the children were able to reduce their risk level in the process and improve their cooperation with the medical and nursing care through an effective intervention model.

Table 2.1 Post-intervention comparison of the psychological status of parents in the control and experimental groups (n=196)

Factor	Control group (n=100)	Experimental group (n=96)	t	*p*
Somatization	1.52±0.46	1.24±0.33	14.818	.000
Obsessive-compulsive	1.45±0.45	1.33±0.27	37.465	.000
Interpersonal sensitivity	1.54±0.37	1.31±0.34	0.396	0.53
Depression	1.55±0.41	1.28±0.43	0.622	0.431
Anxiety	1.80±0.53	1.23±0.30	48.963	.000
Anger-hostility	1.57±0.50	1.30±0.32	23.552	.000
Phobic-anxiety	1.43±0.34	1.19±0.30	3.239	0.073
Paranoid ideation	1.53±0.40	1.24±0.42	0.798	0.373
Psychoticism	1.53±0.31	1.19±0.28	0.455	0.501
Additional items	1.66±0.44	1.34±0.32	2.205	0.139

Traumatic injuries such as fractures in children are mostly sudden and instantaneous accidents that change the daily life for the patients and family (Qu, 2013). According to an analytical study, parental stress and health are related to the characteristics of the children, such as the severity of the condition, age, and the degree of coexisting behavioral problems (Hastings, 2002). Parents of affected children can therefore experience varying degrees of psychological status. Parents are important caretakers and sources of social support for their children. The emotions of parents not only affect their physical and mental health but also directly affect the emotional well-being of the children and their treatment and recovery. It is agreed (Birch &

Davison, 2001; Chen, 1998) that children's behavioral abnormalities are a response to home and environmental factors, and are the result of inappropriate parental behavior, which occurs through psychological mechanisms such as learning, imitation and projection. Parental mental health and personality problems are inflicted on young children through inappropriate behavior, which in turn has a negative impact on their behavior. Jiang and Zhang (2005) concluded that the anxiety of the children's family is influenced by a variety of factors, mainly concerns about the condition and prognosis. Nursing staff should identify the factors associated with parental distress and take appropriate care countermeasures in a timely manner, so that the family can actively cooperate, which will have a multiplier effect on the children's treatment and recovery.

2.7.2.1.2 Impact of using an information-based health education model on parents of children with fractures

The author has previously conducted the project of "An empirical study on the impact of information-based health education model on parents of children with fractures under the guidance of FCC theory, 16XH14, Zhao Yanjun/Zhu Ting, Hospital Foundation Project of Xinhua Hospital, Shanghai Jiaotong University School of Medicine, 2017.01-2018.12". This study used information-based educational tools to improve the knowledge of parents of children with fractures about fractures, thereby improving the effectiveness of health education, increasing the compliance of children and their families, and promoting the recovery of children. It, in turn, reduces the stress level of the parents and improves the hospital experience of parents in pediatric orthopedic wards. This study was presented at the 6th International Conference on Advance Nursing Practice in Paris, France (Wang & Zhao, 2018).

It indicates that the family system has a direct impact on the psychological well-being of the patients. How the families perceive the fact that the children have the disease, how they communicate with the children, and how the health care professionals communicate with the parents all have a significant impact on the children's treatment and recovery. In the case of unintentional injuries to children from one-child families, the impact on them and their families is more psychological. This can be a very stressful event for parents, especially because of the guilt over the children's injury and the uncertainty of future recovery expectations. The children's inability to adapt to the closed environment of the hospital and the pain generated within the treatment period can also bring about negative impacts. This is why it is important to provide parents with effective information about medical care.

2.7.2.2 Psychological state of children with limb fractures

The author has previously conducted the project of "Applied research on the psychological

impact of mobile health on children with fractures, 2015MS-B14, Zhao Yanjun, Shanghai Nursing Society, 2015.05-2017.04". The findings of the study were published with the project applicant as the first author in the Chinese Journal of Clinical Medicine for Women and Children in 2017 and the Journal of Naval Medicine in 2018 respectively.

The study used the Child Stress Disorder Checklist (CSDC) to investigate the psychological status of children with limb fractures and the factors influencing their psychological status. It is found that the psychological status of children with limb fractures need intervention, with the age of the child, whether the child is an only child, and the level of parental knowledge of fractures all having an impact on the children's psychological status after the fracture. In a subsequent study, the team used an anthropomorphic drama video to intervene with the children, which simulated an accidental injury and explained the entire hospital process and knowledge of fracture to the children. The results of the study suggest that this intervention approach is effective in improving the children's acute stress reaction after the fracture, as detailed in Table 2.2. As participants in the post-operative fracture service process, the negative emotions of the children can be reduced through effective intervention methods, as detailed in Table 2.3. The method can improve their cooperation with the treatment process, thereby reducing their risk level in the process.

Table 2.2 Comparison of acute stress reaction scores between the two groups

Item	Group	Control group (n=81)	Experimental group (n=77)	Z	*p*
Acute stress reaction	Admission	4(3~6)	4(2~6)	-0.456	0.649
	Discharge	1(0~2)	0(0~1)	-2.788	0.005

Table 2.3 Comparison of children's anxiety and depression scores between the two groups

Item	Control group (n=34)	Experimental group (n=29)	Z	*p*
Depression	11(9~13)	10(6~13)	−1.598	0.110
Anxiety	10(4~15)	8(3~14)	−0.705	0.481
Somatization	2(0~4)	2(1~3)	−0.161	0.872
Generalized anxiety disorder	2(0~3)	1(0~3)	−0.359	0.719
Separation anxiety disorder	2(0~4)	0(0~2)	−1.589	0.112
Social phobia	3(0~6)	2(0~5)	−0.771	0.441
School phobia	1(0~2)	0(0~1)	−0.595	0.552

Approximately two-thirds of children and adolescents will experience at least one traumatic event, such as a fracture or abuse, and there is an urgent need for effective trauma intervention (Zhang et al., 2014). Although some children exposed to trauma do not exhibit long-term negative psychological outcomes as their psychological and social functioning returns, there are still some children who develop traumatic stress reactions, including post-traumatic stress

disorder (PTSD) (Copeland et al., 2007; Forman-Hoffman et al., 2013). Studies have shown that PTSD in children can lead to an unpleasant childhood, with psychological disorders that may extend into adolescence and adulthood. PTSD in children may lead to increased risk of psychiatric disorders such as depression, substance abuse, conduct disorders and suicide (Brown et al., 1999; Fergusson et al., 1996). It has also been observed that children and adolescents with PTSD tend to have reduced social functioning, such as social, family, school and interpersonal interactions (Saigh et al., 1997).

According to a survey of 400 injured patients, 33% of patients presented high risk clinical symptoms consistent with a diagnosis of PTSD one month after injury (Sanders et al., 2005). Wallace et al. (2013) surveyed 76 children (8-17 years old) in orthopedic surgery for traumatic experiences (fall from height injuries, sports injuries, and car accidents) and approximately 30% of these children are in line with the diagnosis of PTSD. Jia et al. (2013) conducted a community-based survey of 430 children who experienced the Wenchuan earthquake and concluded that children dealing with high levels of fear (fear of the earthquake happening again) felt concerned about their lives because their houses were severely damaged, and they felt scared and worried about the death or serious injury of other family members or close friends.

Children with fractures have to endure not only physical pain and changes in their school life, but also psychological impacts due to the “suddenness and lack of warning” of the trauma, mainly demonstrated in anxiety caused by the pain and fear of entering an unfamiliar environment (hospital) after being separated from their familiar social environment (family and school). In preschool children, this is mainly characterized by crying, and in school-age children, this is characterized by refusal to communicate with health care professionals, such as refusal to carry out medical instructions (Forman-Hoffman et al., 2013).

It is therefore important to understand the psychological status of children with limb fractures and to provide effective interventions at a critical age, which places high demands on both parents and caregivers.

2.7.3 Job burnout of the nursing staff

Burnout was first introduced in the 1970s by the American clinical psychologist FreudenBerger, who used the term “burnout” to describe “a state of exhaustion experienced by those who work in the helping professions as a result of excessive hours, workloads and work intensity”. It is a chronic reaction to an individual’s inability to cope effectively with the constant stresses of the job, including emotional exhaustion, depersonalization and a reduced sense of achievement.

Chinese and foreign studies have found that healthcare workers are a high prevalence group of burnouts, and that burnout among healthcare workers has a negative impact on the quality of healthcare, their own professional development and their lives.

Health care workers are often seen as the helpers in the hospital. However, they are constantly under high workloads and intensity, and are often blamed for various problems in communicating with the children's family, which can easily lead to negative emotions and affect their work life. At the same time, this can affect other children and their families, creating a vicious cycle of negative emotions. Many children in pediatric orthopedics are injured accidentally and parents are often irrational, angry and distressed, and medical staff often have to endure these negative emotions from parents who are often irritable and even angry towards medical staff out of no reason. This is why medical staff are in urgent need of help and adjustment.

In summary, we recognize that pediatric orthopedic care is so important that this study will focus on the perceived quality of care by a specific group of parents of children and by nurses who specialize in the care of children with limb fractures. While it is necessary to analyze parents' perceptions and expectations of the care received by their pediatric patients compared to nursing staff, both parents and nurses are affected by "STSD", or secondary stress syndrome disorder. According to a research review conducted by Missouridou (2017), "an alarmingly high percentage of secondary posttraumatic stress have been reported in several nursing domains." Pediatric nursing is designated as one of the areas of nursing. Meadors and Lamson (2008) specifically studied secondary trauma in pediatric nurses. In the healthcare industry, STSD is referred to as the "cost of care". This study will help to assess whether the "cost of care" affects the perception of quality of service by pediatric orthopedic nurses.

When a child is hospitalized for treatment of a fractured limb, the perceptions of the child's parents and nurses, as the child's primary caregivers, are very important. They will also suffer from secondary trauma during the care process. Although parents are the purchasers of the children's health services and nurses are the providers of the children's health services, as previously mentioned, few previous studies have investigated the perceptions of the children's parents and nurses and compared the differences.

2.8 Improving knowledge of the SERVQUAL model

A particular issue with the care of children is the parents' desire to obtain the best possible cares for their child (Homer et al., 1999; Lemoine et al., 2006; Oermann et al., 2000). Beyond

demonstrating caring behaviors and staying attentive to the needs of their children, some parents are very demanding towards the health care system, often leading to verbal and sometimes physical altercations between parents and health professionals. In 2015, the National Health and Family Planning Commission initiated the Plan for Further Improvement of Medical Services, which emphasizes that medical institutions should strengthen management and improve the level of medical services in a patient-centered and problem-directed mode. Hospitals should focus on patients' medical experience, and promote the innovation as well as reformation of the medical and health system. Service quality is key to patients' medical experience. Medical experience is the difference between a customer's perception and expectation of the service, and it is such a difference that determines the customer's evaluation of the service. According to previous reports, the scales used for assessment of nursing service in China has several shortcomings, as the results can be easily affected by emotional factors, and thus lack objectivity. The SERVQUAL scale is a relatively objective instrument for measuring service quality, but this model focuses more on people when used in nursing service assessment. Studies have shown that patients (customers) and nurses (service providers) often have different standards and criteria when evaluating the service quality. For example, if insufficient attention is paid, it will be difficult to achieve the expected goals when setting evaluation standards and providing nursing services (M. A. Lee, 2005). Based on the SERVQUAL scale, this study will investigate parents of inpatient children and nurses in pediatric orthopedic wards, and analyze the differences and gaps between perception and expectation of the two actors in the healthcare system.

Based on the SERVQUAL model, process management can be developed for the actual healthcare environment. Process management is a prospective assessment that identifies and improves steps in a process, aiming to ensure safe and clinically desirable outcomes, and to identify and prevent process problems before they occur (Joshi, 2012). Hazards can be attributed a severity rating: catastrophic (failure can cause death or injury), major (failure causes high degree of customer dissatisfaction), moderate (failure can be overcome with modifications to the process, but there is minor performance loss), and minor (failure is not noticeable to the customer and does not affect the service delivery). Hazards are also attributed a probability rating: frequent (likely to occur immediately or within a short period of time), occasional (probably will occur), uncommon (possible to occur), and remote (unlikely to occur). Finally, detectability is an assessment of whether the hazard is so obvious and readily apparent that a control measure is not warranted. Process management has a significant effect on the optimization of medical and nursing procedures and the optimization of drug and patient safety

(Ge & Huang, 2008; Li et al., 2014).

Nevertheless, because different groups of people perceive healthcare services from different angles, differences are inevitable. In South Korea, M. A. Lee (2005) compared customers and service providers' perception of healthcare services, and Kim and Lee (2005) compared the perception of healthcare services of hospital-based patients and nurses in four general hospitals by using self-designed questionnaire based on the SERVQUAL scale. Both studies showed that the perception of the patient as a customer and the nurse as a service provider is different, and the expectation and perception of the nurse are higher than that of the patient. In addition, Huang and Li (2010) divided outpatients, clinical medical care staff and hospital administrators into three groups for a comparative study, and observed that there were significant differences in service quality in the five dimensions perceived by the three groups.

Importantly, the customers (or patients in healthcare services) are the most important source of service failures (Geum et al., 2011). Since circulatory disorders of children with limb fractures are at high risk of complications, this study proposes to construct a quantifiable, operable and medically-compliant evaluation model to achieve accurate warning and effective treatment of complications of limb fractures in children, including OCS, in order to minimize the adverse outcomes of limb fractures. The study is designed around a bias that conflict reduction between medical services providers and patients reduces risks, and hence liability.

Therefore, based on the SERVQUAL model, process management can be applied to the actual hospital work to identify, evaluate, and adjust the risk of blood circulation disorder in children with limb fractures. Risk warning mechanisms and efficient management system for circulation obstacles can be sought using the SERVQUAL model to calculate the expectations and perceived medical services (Q values) of doctors, nurses, family members, and patients from the five dimensions of tangibility, reliability, assurance, responsiveness, and empathy. By using the SERVQUAL model in service quality management, we will explore the design of systematic, operational, and standardized risk identification and comprehensive process management and control systems to address the gaps in perception between patients and nurses, and to investigate the causes of the multi-party expectations and perceived medical service gaps to continuously improve existing medical service programs and systems, and improve patient satisfaction and outcomes. The medical service system will promote the postoperative risk prediction and prevention mechanism for patients applying scientific data tracking methods into the national medical system to comprehensively improve the quality of medical services in China.

Hospitals should promote innovation and reform in the healthcare system with the patient

experience at the center. Service quality is the key to the patient experience. The healthcare experience is the difference between the customers' perception of the service and their expectations, and it is this difference that determines the customers' evaluation of the service. According to previous research, the scales used to assess care services in China have some shortcomings and the assessment results are easily influenced by emotional factors and lack objectivity.

The SERVQUAL scale Is a relatively objective tool for measuring service quality, but the model is more person-focused when used in the assessment of nursing services. Research has shown that patients (clients) and nurses (service providers) often have different criteria and standards for assessing the quality of services. For example, if insufficient attention is given, it will be difficult to achieve the desired goals when developing assessment criteria and providing care (M. A. Lee, 2005). Based on the SERVQUAL scale, this study will investigate parents of hospitalized children and nurses in many different hospitals and analyze the differences and gaps between the perceptions and expectations of these two participants in the healthcare system.

Several previous studies of service quality and patient satisfaction in China have used demographic methods. For example, Gan conducted a study of over 1,500 patients in 15 provinces in China in 2017, but did not identify specific services. In addition, in 2015, Li et al. (2015) conducted a well-executed survey of 1,963 patients in nine cities in China. However, although both studies used the SERVQUAL model to obtain the gap between service expectations and actual service received, they only investigated patient perceptions.

In 2018, J. J. Zhu et al. (2018) investigated the perception gap between patients and nurses in Liangshan Yi Autonomous Prefecture, involving 995 inpatients and 1,000 nurses from different service departments. Although the study used the SERVQUAL model to analyze service quality perceptions between patients and nurses, it did not establish a direct link between patients and the nurses providing care. Therefore, this study aims to identify weaknesses in nursing services, improve service quality and provide a reference for improving patients' healthcare experience and achieving nursing goals and tasks.

It is important that in institutions committed to providing patient-centered care, patients and their families are actively involved in the decision-making process (Hill et al., 2018). Families with poor English proficiency and/or low general literacy need special attention in terms of informed consent, family involvement and education. Good communication with families requires appropriate dialogue around universal precautions based on the concept of health literacy. For reasons of faith and cultural considerations, you may change the children's

care schedule (Günüşen et al., 2018). At least one caregiver should be present at all times when a child is receiving care in hospital. Health care providers must take into consideration the adolescents' privacy and medical decision-making. Consent based on the children's age and developmental knowledge must be addressed. Once a child has been admitted to hospital, there should be a policy indicating where they will be placed. Single rooms are better suited to keep children away from prevalent infectious diseases, and they should also provide a place for caregivers to rest and keep a close eye on patient care (Bong, 2019). In the absence of single rooms, adults accompanying adolescents should be considered when setting appropriate age and sexual criteria for them to stay in the same room. Hospital managers can benefit from the involvement of patients' families in the development and implementation of new policies or the adaptation of existing facilities (Ford et al., 2018).

In summary, the SERVQUAL model can be used as a relatively objective tool to measure service quality in the care of pediatric children, and it is more focused on people when used to assess care. Parents and nurses have different perceptions of nursing care. The SERVQUAL model can be used in this study to analyze the differences in perceptions between parents and nurses in order to identify weaknesses in care delivery, improve service quality, and provide a reference for improving the patient experience and achieving the goals and tasks of care.

2.9 Introduction of the SERVQUAL model

SERVQUAL is a multidimensional research tool that captures customers' expectations and perceptions of service in five dimensions that are considered to characterize service quality. In 1988, Parasuraman et al. (1988) designed and implemented the Service Quality Model or SERVQUAL model. It is a technique for capturing and measuring the quality of customer service.

The first focus €s on developing a quality system for the quality of products on site. Improving the quality of interconnected services becomes increasingly important as time goes on. Improving the quality of services can provide an advantage to companies. In addition, the SERVQUAL model gained universal attention in the 1980s as services became more important in general. At that time measuring service was abstract and difficult to quantify. The SERVQUAL model focused on qualitative data. When satisfaction surveys were based primarily on supplier-buyer transactions, general environmental criteria were used to judge the observed quality.

In 1982, the Finnish scholar Grönroos (1982) introduced the concept of "service quality as

perceived by customers", arguing that service quality is a subjective category determined by a comparison between customers' expectations of service quality and the actual level of perception. In 1988, Parasuraman et al. (1988) proposed the service quality gap model by refining the theory of customer perceived service quality of Grönroos, and proposed the SERVQUAL evaluation method based on this gap model. The theoretical conceptual gap was converted into a numerical equation of Q-P-E model, where Q represents service quality, P is the actual perceived service quality, and E is the expected service quality. The service quality is determined based on the Q value: $Q>0$ indicates that the service quality exceeds the customer's expectation; $Q\approx0$ shows that the service provided just matches the customer's expectation; $Q<0$ suggests that the service quality is below the customer's expectation. Parasuraman finalized in 1988 the five dimensions of the SERVQUAL scale: tangibles, reliability, responsiveness, assurance, and empathy, including 22 items in total. To be specific, tangibles refer to physical facilities, equipment and personal appearance; reliability refers to the ability to deliver on service promises reliably and accurately; responsiveness refers to the willingness to help customers and provide prompt service; assurance refers to the knowledge and courtesy of staff and their ability to inspire trust and confidence in customers; and empathy refers to caring for customers and providing personalized service to them. When applying the SERVQUAL scale, each subject should be evaluated twice: the first time is for the expected service quality €, and the second time is for the actual perceived service quality (P). The service quality is finally evaluated based on the difference Q between P and E (Parasuraman et al., 1988).

Jun et al. (1998) used the SERVQUAL scale to measure different industries, including the healthcare field, and the results are mixed. Bowers et al. (1994) argued that the SERVQUAL scale is ambiguous when it comes to measuring service quality, in particular they argued that the SERVQUAL scale is inadequate for measuring the quality of healthcare services because it is originally developed for other industries. Teng et al. (2007) used the SERVQUAL scale to measure surgical inpatients and the scale was valid and reliable. Babakus and Mangold (1992) also believe that the SERVQUAL scale is valid and reliable. Buttle (1996) contends that the service quality model and service quality evaluation system of Parasuraman et al. has been widely accepted. Jing and Zhang (2011) applied the SERVQUAL model in surgical nursing service quality evaluation, indicating that the model is an effective quality measurement method with good reliability and validity. Since 2007, some scholars at home and abroad have started to apply the SERVQUAL model to analyze patient satisfaction and dissatisfaction in the whole process of medical services (Dagger et al., 2007), trying to optimize service quality by

strengthening doctor-patient communication, improving service facilities and enhancing personnel training (Bahadori et al., 2014).

2.9.1 Service recovery

Customers are not always right, which is contrary to popular belief. However, right or wrong, customers are always customers. For years, the Service Roundtable has advised contractors on an eight-step service recovery strategy. Your customer service representatives, dispatchers and plumbers are taught how to deal with angry consumers and how to take remedial actions when the company or employee makes a mistake. The act of contacting a consumer who has had a poor service experience in order to correct a problem is called a service encounter. Mistakes are an inevitable feature of any service. Even the best service organizations cannot prevent the occasional late flight, burnt steak or delayed delivery, no matter how hard they try. Mistakes are inevitable in services that are often performed in front of customers. While businesses may not be able to prevent all problems, they can learn to deal with the problems. A successful service recovery can turn a dissatisfied customer into a loyal one. In fact, it can generate more goodwill than if everything had gone well from the start. Consider how Club Med Cancun, a subsidiary of Paris-based Club Méditerranée, has recovered from a service disaster to win the loyalty of a group of holidaymakers.

2.9.2 Service assurance

Two non-profit organizations dominate the field of performance measurement in different countries. Health plans, medical institutions and various medical enterprises are accredited by the National Committee for Quality Assurance (NCQA). The Joint Commission reviews hospitals, laboratories and medical facilities, as well as a variety of other healthcare facilities. The Joint Commission and NCQA use a variety of methods to assess quality. It will be interesting to see how and when the federal government standardizes quality assurance indicators. There are other assessment systems, but the two most widely used in China, the NCQA and the Joint Commission, are both well established in their respective areas of expertise. Both rely on accreditation to ensure quality, and accreditation must be renewed every few years. Neither of them is likely to disappear any time soon. Service assurance is the extent to which a set of inherent characteristics meet the needs of patients and continue to meet the needs of customers. Service assurance in healthcare requires correct diagnosis, good communication, informed consent, respect for patient rights and finally patient safety. To ensure consistency

with quality standards, assessments will be provided from the patient end. Planned and systematic activities are an integral part of hospital management. There should be healthful activities in the hospital which will make patients live happily and forget about their pain.

2.9.3 Responsiveness

The World Health Organization (WHO) assesses the performance of health systems on three key objectives: health promotion, equitable financing and responsiveness. There is research on the way and context in which patients are treated during their interaction with the health system (Karami et al., 2014).

Non-healthcare concepts, laws and standards are well known and are considered reasonable expectations. WHO has proposed a model of responsiveness consisting of eight components. For patients, the responsiveness of the healthcare system is a key aspect of their overall experience. Throughout their time in a health care facility, patients understand and judge various aspects of their experiences.

Patient responsiveness can have a direct impact on the health. Patient comfort is critical as it promotes and improves the overall health of the patient. Therefore, health care systems should prioritize responsiveness (Prudencio & Mota, 2013). Patient expectations (medical or non-medical) are assessed to influence their assessment of care and satisfaction with treatment outcomes. Patient satisfaction is proportional to expectations and perceived performance (Sahoo et al., 2016). It is an emotional response to the disparity between expectations and apparent performance after using health care products (Zarei et al., 2014). If the patient's experience of the service is not what he or she expected, he or she will be dissatisfied with the outcome (Zarei et al., 2014). In other words, the service is not fulfilled.

Expectations can lead to disappointment, which can result in non-compliance (Barlow et al., 2016). If the service provided meets the patient's expectations, he or she will be satisfied (Sahoo et al., 2016; Zarei et al., 2014). On this basis, we argue that meeting patients' realistic expectations (responsiveness) leads to patient satisfaction. Previous research has shown that responsiveness has an impact on patient satisfaction and responsiveness of service provider has an impact on total patient satisfaction (Ali et al., 2015; Bleich et al., 2009; Messina, 2009). All in all, an increase in hospital responsiveness increases patient satisfaction with care providers, which in turn increases utilization of healthcare services (Naidu, 2009). Therefore, the hypothesis of this study is that hospital responsiveness has a direct and beneficial effect on patient satisfaction.

2.9.4 Empathy

"Em" means "in" and "pathy" means feelings. Therefore, patient care is vital. When someone is injured and is in hospital or clinic, he or she is already vulnerable and every small act of kindness will have an impact. Could there be a greater miracle than us looking at moments through each other's eyes? There should be an awareness from this that both patients and caregivers feel comfortable in the hospital environment. Empathy is a very effective and powerful tool for gaining the trust of patients, reducing anxiety and improving health. Empathy and compassion are associated with higher medication adherence, fewer allegations of misconduct, fewer errors and higher patient satisfaction. Effective communication has long been recognized as the most important competency for health professionals. In order to provide tailored care, effective communication requires therapists to be confident that they have actually heard and recorded the needs of healthcare users. It is vital for health practitioners to understand people's thoughts, ideas and experiences in order to determine their true needs and provide services that are appropriate for them. In order to achieve this goal, empathy must be developed. Many health professionals, including nurses, doctors, psychiatrists and social workers, recognize the concept of empathy. A person-centered approach to unconditional acceptance of healthcare users and empathy has been an important value in the education and implementation of clinical social practice for many years. For example, you may have a patient who is afraid of needles and refuses to receive a tetanus injection. "Do not get the shot, because I can see how scared you are." You may decide whether to be too empathetic to this emotional fear. However, when you return to work as a doctor, you will understand, "I need to help you overcome your anxiety because tetanus will be worse for you". Too much emotional empathy often distracts doctors from the difficult tasks they must perform in their training. If you are too afraid of hurting your patient, you may not learn the procedure. This is why, in most cases, empathy mitigates during medical school studies. Even if effective empathy is declining, you must use and maintain cognitive empathy so that you can understand what is helpful to your patients.

2.9.5 Staff performance

One of the fastest growing industries is the healthcare industry. In order to provide high quality care to patients, there is a need for a large number of highly trained and dedicated medical specialists and cost-effective clinical processes. In addition to doctors, nurses, residents and interns, the healthcare industry also needs to employ supporting staff who can help with front and back-end transactional activities, which is undoubtedly a highly labor-intensive industry.

Managing such a large workforce and making wise judgements is a huge challenge for the industry. Hospital administrators, including medically registered primary care physicians, are the team leaders, making decisions for the team about plans for diagnosis, treatment and supervision. Specialists include surgeons with expertise in a particular area such as heart, liver, kidney, GIT, spine or ear, nose and throat. When more specific treatment is required, attending physicians, residents, interns, medical student nurses, patient care technicians, patient representatives, therapists, pharmacists, dieticians, and interpreters are needed to deal with complex and serious complications.

2.9.6 Service quality

Measuring and improving service quality can improve revenue and reputation. Regardless of the industry, service quality can have a direct impact on the company's ability to meet customer expectations. Learning how to assess and improve service quality is a useful competency, but it requires a certain level of research and knowledge. This thesis explains what service quality is, why it is so important and how to maintain it. The healthcare service industry is becoming increasingly competitive among hospitals and clinics across China. Nowadays, the number of doctors is increasing. As the number of doctors is expected to grow continuously in the next 15 years, hospital and clinic managers are concerned about the fierce competition due to the oversupply of doctors. As a result, they are now more concerned with improving service quality and customer satisfaction to build long-term customer relationships and attract new customers. Researchers must provide them with more theoretically and strategically informed solutions. We therefore need more academic research based on service quality in the industry. There are plenty of studies on the quality of healthcare services. However, few of them compare the quality of services provided by hospitals and clinics.

2.9.7 Satisfaction

Patient satisfaction is a very important and widely used indicator for assessing the quality of healthcare. Clinical outcomes, patient retention and malpractice litigation are all influenced by patient satisfaction. It has an impact on the delivery of timely, effective and patient-centered health care. Patient satisfaction is therefore a valid indicator of the success of a doctor or hospital.

In summary, SERVQUAL is an objective, impartial and scientific evaluation method. Applying it to the evaluation of nursing care quality is conducive to identifying problems in

service quality and to improving and enhancing the nursing service quality. Different groups of people have different criteria and guidelines for judging the quality of nursing services, and evaluating the quality of nursing services perceived by different groups of people is an issue worth investigation. It not only can avoid wasting the efforts of service providers to evaluate service quality and preventing the hospital management from improving service quality based solely on their own criteria, but also help nursing managers to set standards for nursing service quality and clear targets for implementation, thereby improving patient satisfaction.

2.10 Improving knowledge of the SERVQUAL model

In summary, medical resources are still scarce in China and there is still a gap between the supply and demand for medical services. In pediatrics in particular, care and social support at the level of the children's parents is still largely neglected. A good psychological state plays an important role in enabling parents to actively cooperate with the healthcare institutions and participate in helping their children to cope with the illness. Review of literature indicates that parents of children hospitalized with limb fractures commonly suffer from severe guilt, anxiety, fear and depression, leaving many parents in a "vulnerable state".

Healthcare workers are often seen as people ready to help others at any time in the hospital, and nurses are the group that has the most contact with children and their parents. However, they are always under high workload and work intensity, and are often blamed for various problems in their communication with the children's family members. The build-up of stress makes them susceptible to various negative emotions, which affects not only their own work and life, but the children and their families, forming a vicious cycle of negative emotions. In the pediatric orthopedics, many children are injured accidentally and parents are often irrational, angry and distressed. Nurses often have to endure more of these negative emotions from parents than nurses in other departments. The parents often become emotional out of no reason and even project anger towards the nurses, so nursing staff are in desperate need of assistance.

Therefore, there are two important stakeholder groups in this study: (1) the parents of the service users, namely, the children and (2) the nurses who provide the service. In this study we need to explore the differences between the different parties involved in the service process. After review of the literature, we will use the SERVQUAL model (an internationally recognized survey tool for assessing satisfaction) to analyze the differences between the perceptions of parents of service users and the perceptions of the nursing staff providing direct care to the children, which will help identify gaps in service quality. Based on the subjective evaluation

gap revealed by the SERVQUAL model, our analysis focuses on the difference in the perceptions of different participants, parents and nurses, in the healthcare process, rather than treating them as a "single group" with no differences. Therefore, understanding the differences in perceptions of the SERVQUAL model in different groups will help to improve existing health care programs, ensure standardization of the healthcare process and provide tools for continuous quality improvement. Improving the satisfaction of stakeholders and providers in the healthcare system is key to building a scientific healthcare delivery system with process management capabilities.

This research will exert a positive impact on the quality of service in medical institutions by optimizing the treatment process. On the one hand, it can reduce the negative emotions of parents and promote the recovery of their children; on the one hand, it can reduce the negative emotions and job burnout of the medical staff and improve the quality and effectiveness of their service.

Due to the specific nature of the children in their verbal communication skills, psychological stress response, skeletal growth and developmental characteristics, their rehabilitation depends primarily on the cognitive ability and compliance of the caregivers, namely, their parents, as well as the nursing staff. These factors have been conspicuously absent from previous studies, and this is the primary innovation of this research. The final research results will exert a significant impact on the improvement of the healthcare system and will be equally applicable to adult patients who are able to cooperate with medical and nursing care, as well as to patients with dementia and aphasia, coma and other serious illnesses. It will also contribute to the improvement of healthcare service quality in the national medical system through the use of scientific management models.

Based on previous studies and theoretical foundation in the literature review as well as empirical research, we propose a perception model as per Figure 2.2.

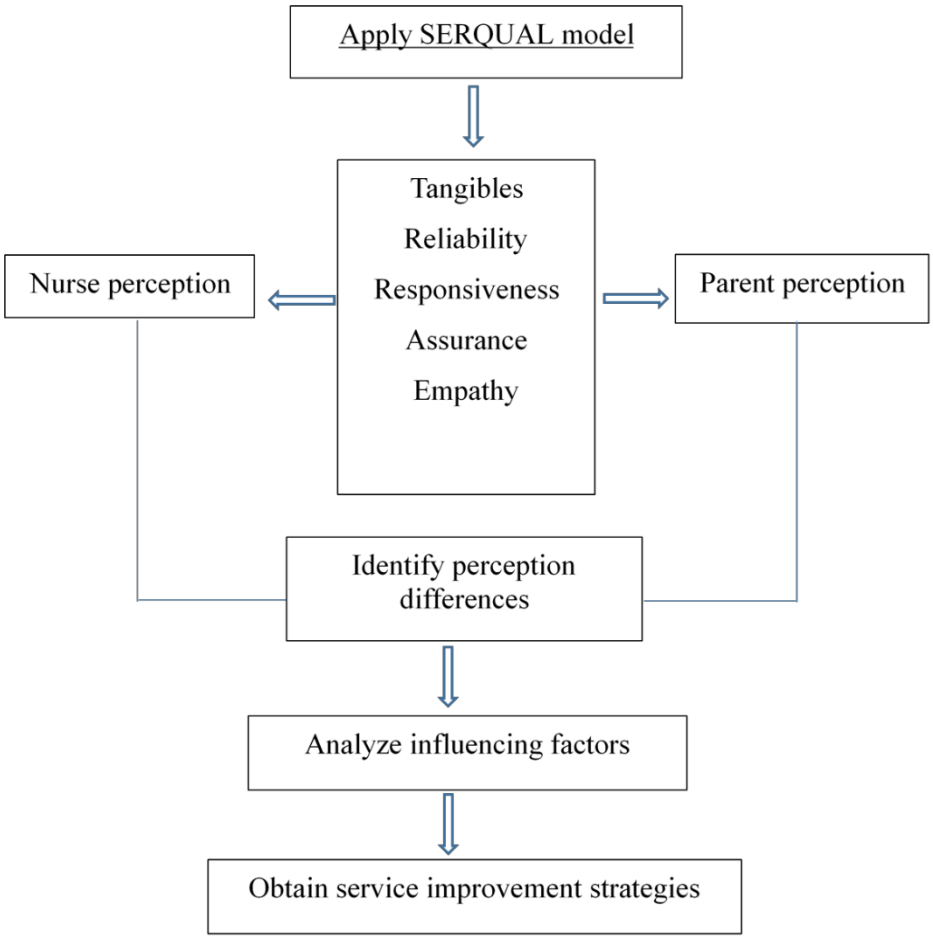


Figure 2.2 Perception model

Chapter 3: Research Design and Method

Pediatric orthopedic nurses and parents from secondary and tertiary hospitals in East China, South China, Central China, Northeast China, and North China were selected as the research respondents by convenience sampling. Based on the above theoretical model and research hypotheses, the questionnaire survey method was used to analyze the status quo as well as validate the theoretical model proposed in Chapter 2.

3.1 Research respondents

The respondents were 169 pediatric orthopedic nurses and 677 parents of children patients from eight secondary and tertiary hospitals in China including Xinhua Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, Anhui Provincial Children's Hospital, Hainan Children's Hospital, Hunan Children's Hospital, Sichuan Luzhou Hospital of Traditional Chinese Medicine, Shenzhen Children's Hospital, Shenyang Children's Hospital, and Tianjin Hospital. Inclusion and exclusion criteria were established respectively. The inclusion criteria for nurses are: (1) regular, contract, non-regular or third-party personnel agency nursing staff who have signed contracts with the hospital; (2) holding a nurse qualification certificate and working on the job post for half a year or more; (3) direct participation in the nursing of children patients; (4) informed consent to participate in this research; (5) no other physical or mental illness; (6) good communication skills. The inclusion criteria for parents are: (1) aged $\geq$ 22 years; (2) duration of hospitalization $\geq$ 2 days; (3) direct care of the children; (4) being literate and capable of answer questions correctly; (5) informed consent to participate in this research; (6) no other physical or mental illness; (7) good communication skills. The exclusion criteria are: (1) unwilling to participate in this research; (2) involvement in medical disputes. The respondents were selected strictly in accordance with the inclusion criteria and exclusion criteria and all of them participated in the survey out of their own willingness.

3.2 Measurement tools

3.2.1 Demographic characteristics questionnaire

Our data came from two surveys targeting nurses and parents of children respectively. As for the demographic characteristics of nurses, variables such as age, working years, educational background, professional and technical titles were included and the options for each variable were as follows.

(1) Age: 20-30 years old, 31-40 years old, over 41 years old;

(2) Working years: within one year, two to four years, five years and above;

(3) Educational background: junior high school and below, high school, undergraduate, postgraduate and above;

(4) Professional and technical titles: nurse, nurse practitioner, nurse-in-charge, associate chief nurse and above;

As for the demographic characteristics and related factors of the parents, variables such as age of the child, gender of the child, only child or not, location of fracture, age of the parent, gender of the parent, educational background of the parent, and parent's confidence in recovery were included and the options for each variable were as follows.

(1) Age of children: one to three years old, four to six years old, seven to twelve years old, thirteen to eighteen years old;

(2) Gender of children: male, female;

(3) Only child or not: yes, no;

(4) Fracture site: upper limb, lower limb;

(5) Age of parents: 20-30 years old, 31-40 years old, 41 years old and above;

(6) Gender of parents: male, female;

(7) Educational background of parents: junior high school and below, high school, undergraduate, postgraduate and above;

(8) Confidence in recovery: full of confidence, average, not very optimistic.

3.2.2 Nursing service perception evaluation scale

3.2.2.1 Introduction of SERVQUAL model

The service quality (SERVQUAL) model represents the perceived quality, which affects the customer's judgment and decision on the overall performance of the entity, and the service quality always meets the needs and expectations of the patients (Parasuraman et al., 1985, 1988).

In addition, SERVQUAL is an ability to meet or even exceed outcomes or results that are jointly defined by healthcare providers and patients at the service meeting (Dedeke, 2003). The dimensions of SERVQUAL include: (1) technical service quality (performance obtained by patients); (2) functional service quality (subjective perception of how services are provided) (Grönroos, 1990). A good SERVQUAL always leads to high satisfaction for family members of the children patients (Subramanian et al., 2014). To achieve high family satisfaction, four characteristics must be met (Kotler et al., 2006).

(1) Intangibility: Patients often know little about services before they reach an agreement with the healthcare provider;

(2) Perishability: Services must be received/provided on-site;

(3) Inseparability: Services are generated and consumed simultaneously and cannot be separated from medical service providers;

(4) Heterogeneity: From one service provider to another, the same service provider performs in different levels and quality performances at different times.

SERVQUAL is based on five dimensions. Tangibles refers to physical facilities such as signage, comfort, accessibility, spaciousness, functionality, and cleanliness (Cunha & Suresh, 2015). This factor is a key service quality dimension and is often one that requires more improvement to meet patient expectations (Caruana et al., 2000; N. F. Rad et al., 2010). Reliability includes service consistency and reliability (Kondasani & Panda, 2015; Parasuraman et al., 1985, 1988). Patient satisfaction will increase if service providers meet patient needs and expectations (N. F. Rad et al., 2010). Responsiveness refers to the willingness or readiness of a service provider to provide prompt and timely service (Calisir et al., 2014; N. F. Rad et al., 2010; Parasuraman et al., 1988). Assurance is the knowledge, courtesy, and ability to impart trust and confidence of the nursing staff (Kitapci et al., 2014). Finally, empathy refers to caring and understanding of the patient's needs, and provision of individualized attention (Fitzpatrick, 1991; Parasuraman et al., 1985, 1988; Zarei et al., 2014). Recently, there has been growing interest in the association between SERVQUAL and satisfaction, loyalty, positive word of mouth, cost, and organizational profitability (Orel & Kara, 2014; Shi et al., 2014). SERVQUAL affects patient satisfaction and loyalty in healthcare service organizations (Park et al., 2016; Shabbir et al., 2016). Since 2007, the SERVQUAL model has been applied to analyze patient satisfaction and dissatisfaction with the medical service process (Jain, 2017), so as to optimize the communication between doctors and patients, improve the provision of medical services, and promote personnel training.

The Service Quality Model is proposed as a SERVQUAL method for service quality

evaluation, and the theoretical and conceptual gap is transformed into a numerical equation: Q=P-E. Q stands for service quality, P is the actual perceived service quality, and E is the expected service quality (Parasuraman et al., 1988). Therefore, service quality can be determined by the Q value. Q>0 means that the service quality exceeds patient expectation; Q ≈0 means that the service quality meets patient expectation; Q<0 means that the service quality is lower than patient expectation. In 1988, Parasuraman finally defined the five dimensions of the SERVQUAL scale: tangibles, reliability, responsiveness, assurance, and empathy, with a total of 22 items.

In the application of the SERVQUAL scale, each respondent was evaluated twice, first for the expected quality of service (E), second for the actual perceived quality of service (P), and finally the service quality was evaluated based on Q, the difference between P and E (Parasuraman et al., 1988). This equation has been used by Jun et al. (Jun et al., 1998) to evaluate different types of services including healthcare. However, the results are inconsistent. It is argued that the SERVQUAL scale cannot measure service quality, especially medical service quality (Bowers et al., 1994). On the other hand, it is believed that the SERVQUAL approach is valid and reliable in assessing surgical inpatient satisfaction (Jing & Zhang, 2011; Teng et al., 2007). This approach is also supported by other scholars (Babakus & Mangold, 1992; Buttle, 1996). Therefore, the SERVQUAL model has been used in China and other countries to analyze whether patients are satisfied with the medical service process (Dagger et al., 2007), aiming to optimize service quality by strengthening doctor-patient communication, improving service facilities, and increasing staff training (Bahadori et al., 2014). However, since different groups of people have different perceptions of medical services, differences in perception are inevitable. In Korea, views of patients and service providers on medical services are compared (M. A. Lee, 2005), and views of inpatients and nurses on medical services in four general hospitals are compared using a self-designed questionnaire based on the SERVQUAL scale (Kim & Lee, 2005). Both studies showed that the perceptions of patients as clients are different from those of nurses as service providers, with nurses having higher expectations and perceptions than patients. In addition, researchers divided outpatients, clinical medical staff and hospital administrators into three groups for a comparative study, and found that there were significant differences in the five dimensions of service quality perceived by the three groups (Huang & Li, 2010).

3.2.2.2 Application of SERVQUAL in clinical practice

According to the SERVQUAL model, evaluation of service quality is a subjective evaluation from users, and the core of is the gap between user expectation and user perception. This gap stems from the deviation of service provider's understanding of user expectation as well as the deviation between service commitment and service delivery, which is finally manifested as the five dimensions of service, namely, reliability, assurance, responsiveness, tangibles, and empathy (Parasuraman et al., 1988).

Since 2007, scholars at home and abroad have begun to apply the SERVQUAL model to analyze the satisfaction and dissatisfaction points of patients in the medical service process (Dagger et al., 2007), trying to optimize service quality by strengthening communication between doctors and patients, improving service facilities, and increasing personnel training. They have also enriched the specific application elements of the SERVQUAL model in medical service (Bahadori et al., 2014; Cruz & Melleiro, 2010; Yan et al., 2009).

The goal of a quality assurance program is to prospectively evaluate, identify and optimize steps in the process to ensure safe and clinically satisfactory outcomes, and to identify and prevent process problems before they occur (Joshi, 2012). Hazards can be grouped into a severity scale: catastrophic (failures can result in death or injury), severe (failures result in high levels of customer dissatisfaction), moderate (failures can be overcome by modifying the process, but will result in a minor performance loss), and minor (failures are not obvious to the customer and do not affect service delivery). Hazards are also classified according to their probability: frequent (likely to occur immediately or within a short period of time), occasional (likely to occur), infrequent and unlikely. Finally, detectability is the assessment of whether a hazard is so obvious that no control measures are required (Joshi, 2012). Process management plays a significant role in the optimization of healthcare processes (Ge & Huang, 2008; Li et al., 2014) as well as optimization of drug and patient safety. Therefore, a good service perception is not only conducive to improving service quality, but also reducing risk factors in the service process.

3.2.2.3 Nursing service perception evaluation scale

Based on the original SERVQUAL scale (M. A. Lee, 2005) and take into account the specific conditions of clinical nursing practice in China, the first draft of the nursing service quality evaluation scale was formulated. After expert consultation, pre-investigation, and exploratory factor analysis, a scale with five dimensions (tangibility, reliability, responsiveness, assurance, and empathy) and 21 items was finalized. The items are as follows. E1: The health education

publicity materials in the wards are suitable for work needs; E2: The wards are equipped with advanced nursing service facilities; E3: The layout design/facilities of the wards reflect the hospital's nursing service concept; E4: All treatment and care can be finished within the estimated time; E5: Nurses show concern and offer assistance when patients encounter problems; E6: The performance of nurses is always reliable; E7: Nurses provide nursing services within the promised time; E8: The nursing records are accurate; E9: Nurses accurately inform the time and duration of nursing care; E10: Nurses are on call day and night; E11: Nurses are always willing to help patients; E12: Nurses respond to patients' needs in a timely manner even if they are busy; E13: Nurses are trustworthy; E14: Nurses make patients feel safe during the nursing process; E15: Nurses are polite; E16: Nursing work is valued and supported by the hospital; E17: Nurses offer individualized care to patients; E18: Nurses understand the patients' emotions, listen to their troubles, and offer comfort to them; E19: Nurses understand the needs of patients; E20: Nurses always consider the interests of patients; E21: Nursing service hours are flexible to meet the individual needs of patients. These 21 items in the nursing service perception evaluation scale are used to evaluate the perception value of parents and nurses on the nursing service. The scale adopts the five-point Likert scale analysis, in which respondents specify their level of agreement to a statement typically in five points: (1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree, with higher scores indicating higher perceptions of nursing services.

3.3 Data collection and analysis

3.3.1 Data collection

The two questionnaires, demographic characteristic questionnaire and nursing service perception questionnaire, were distributed to the target respondents from March 2021 to November 2021, and both of them were self-administered questionnaires. The specific distribution process was as follows. Pediatric orthopedic wards of secondary and tertiary hospitals in East China, South China, Central China, Northeast China and North China were selected by convenience sampling. Researchers explained the research purpose and questionnaire content to the nursing managers of the wards, and asked them whether they were willing to participate. In the end, pediatric orthopedic wards in eight secondary and tertiary hospitals agreed to participate. According to the above theoretical model and research hypotheses, the questionnaires were transformed into electronic version which could be shared

through WeChat links. Nursing managers in the wards sent electronic questionnaires to nurses and parents who voluntarily participated in this survey, and explained the research purpose to them. In order to ensure authenticity and reliability, the questionnaires were filled out anonymously. To ensure the validity and completeness, each item of the electronic questionnaire was set as a "must answer" choice. The specific survey process was as follows. The collected questionnaires were screened strictly in accordance with the inclusion and exclusion criteria and were eliminated according to the following principles: there are missing values in the demographic characteristic questionnaire and the nursing service perception questionnaire; the distribution of answers presents a wave state, or the answers are relatively concentrated on the same choices; and there are three or more answers that are illogical. Finally, 169 valid questionnaires from nurses and 677 valid questionnaires from parents were obtained. The effective survey data integration process is shown as per Figure 3.1. Please refer to Annex A and Annex B for the questionnaires in detail.

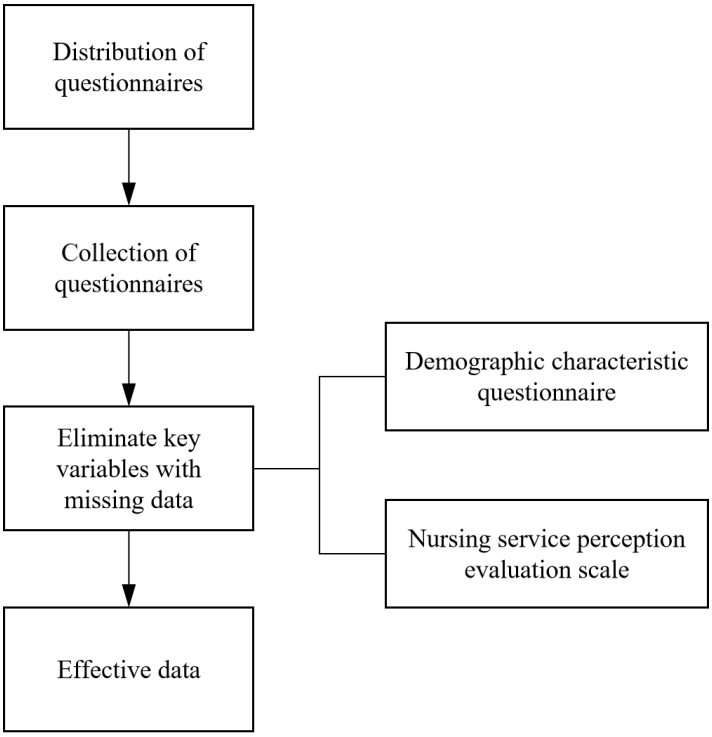


Figure 3.1 Data collection

3.3.2 Quality control

Quality control of this research is achieved through the following two approaches. First, the investigators are trained. The questionnaire survey was mainly completed by nursing managers of the pediatric orthopedic wards, so we arranged for unified training for investigators in the early stage to ensure that they understood the content, purpose, methods and connotations of

indicators and that they could follow the respondents to complete the questionnaire. Second, the respondents were properly guided. In the questionnaires, there were introductory words and filling instruction. The investigators were also required to explain relevant matters to the respondents to ensure that they were able to fill in the questionnaire after fully understanding the purpose, content and method of the investigation.

3.4 Research roadmap

Based on the SERVQUAL model, we design the nursing service perception questionnaire. After pre-survey and formal survey, we collect the data for statistical analysis and finally reach the conclusion. The roadmap of this research is shown as per Figure 3.2

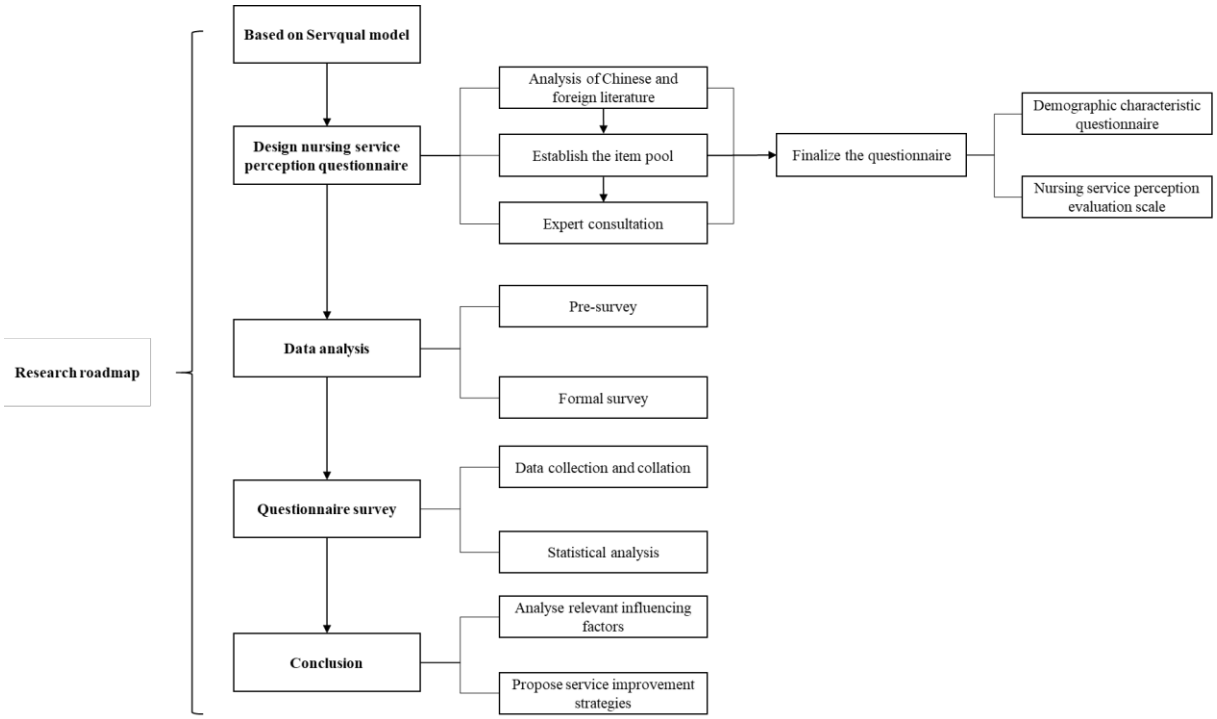


Figure 3.2 Research roadmap

3.5 Research innovation

Previous researchers have evaluated the effectiveness of SERVQUAL models for specific application elements in healthcare service (Dagger et al., 2007; Saulino et al., 2017; Yan et al., 2009). Studies have pointed out the difference between hospitals and patients in service quality evaluation and influence on service improvement (Bahadori et al., 2014; Cruz & Melleiro, 2010). However, the difference in service quality perception between healthcare service

consumers (parents/caregivers) and nursing service providers is ignored. Therefore, the needs of parents of children patients as well as the needs of clinical front-line nurses cannot be understood. The perceived differences cannot be identified, thus affecting the improvement of the quality of nursing services.

SERVQUAL is an effective tool to improve the quality of medical service and can be used to build a scientific medical service system. Based on the SERVQUAL model, we use the perception model to examine the perception difference between parents and nurses, and promote nursing managers to scientifically design family-related medical service processes for children with fractures in the future. In addition, we will put forward the perception of the parents of the children on medical service quality, and understand the relevant factors that affect the parents' perception of the service. It will help analyze factors influencing the parents' satisfaction, formulate targeted measures and adjust medical services to respond to changes in the conditions of the children. It will help enhance the efficiency of medical services, improve the perception of the parents, comprehensively promote the quality of the hospital, and build a harmonious doctor-patient relationship, which is conducive to the health and continuous development of the hospital.

3.6 Statistical analysis

SPSS 26.0 was used to establish a database and conduct statistical analysis.

Reliability analysis: Cronbach's α coefficient was used to analyze the reliability of the scale, and evaluate the consistency within the scale. Generally speaking, when the value is higher than 0.70, it indicates that the scale has good reliability.

Validity analysis: Factor analysis was applied to carry out a validity analysis of the scale. The Bartlett's test of sphericity as well as the KMO test were applied. Generally speaking, if the KMO value is higher than 0.70, then Bartlett's test of sphericity (p<0.05) can be regarded as an indication of good validity.

Statistical description: If the measurement data obeys a normal distribution, ($\bar{X}$±S) would be used to carry out the descriptive analysis; if the measurement data does not obey the normal distribution, the median (interquartile range) would be used to carry out the descriptive analysis.

Difference analysis: The data conforming to the normal distribution was expressed in the form of mean and standard deviation ($\bar{X}$±S). The difference analysis adopts independent sample T test and variance analysis, and the test level is α=0.05.

Regression analysis: A multivariable linear regression model was adopted for the regression analysis.

Correlation analysis: Pearson correlation analysis method was used for the measurement data.

Chapter 4: Research Results

4.1 Reliability and validity analysis of two questionnaires

4.1.1 Reliability and validity analysis of the questionnaire for nurses

A special exploratory factor analysis was carried out on the questionnaire for nurses, and the KMO value is 0.942, greater than the standard value of 0.7, namely, KMO = 0.942 > 0.70. As for the Bartlett's test of sphericity, $p < 0.001$, which is consistent with the factor analysis conditions. We also carried out reliability test on the questionnaire, and according to the empirical results, the overall value of Cronbach's α of the questionnaire is 0.962, and the values of Cronbach's α for the five dimensions are between 0.771 and 0.953. The factor loadings for each item are greater than 0.70, indicating that the items are a good representation of the structure they represented. The details are presented as per Table 4.1.

Table 4.1 Cronbach's α and factor loading of the questionnaire for nurses

Dimension	Cronbach's α	Factor loading
Overall	0.962	
Tangibles	0.856	
Q1		0.721
Q2		0.798
Q3		0.793
Reliability	0.893	
Q4		0.702
Q5		0.704
Q6		0.758
Q7		0.743
Q8		0.749
Responsiveness	0.885	
Q9		0.729
Q10		0.735
Q11		0.756
Q12		0.748
Assurance	0.771	
Q13		0.807
Q14		0.840
Q15		0.758
Q16		0.725
Empathy	0.953	
Q17		0.819
Q18		0.833
Q19		0.853
Q20		0.789
Q21		0.786

4.1.2 Reliability and validity analysis of the questionnaire for patients

A special exploratory factor analysis was carried out on the questionnaire for parents, and the KMO value is 0.977, greater than the standard value of 0.7, namely, KMO = 0.977 > 0.70. As for the Bartlett's test of sphericity, $p < 0.001$, which is consistent with the factor analysis conditions. We also carried out reliability test on the questionnaire, and according to the empirical results, the overall value of Cronbach's α of the questionnaire is 0.984, and the values of Cronbach's α for the five dimensions are between 0.896 and 0.975. The factor loadings for each item are greater than 0.70, indicating that the items are a good representation of the structure they represented. The details are presented as per Table 4.2.

Table 4.2 Cronbach's α and factor loading of the questionnaire for patients

Dimension	Cronbach's α	Factor loading
Overall	0.984	
Tangibles	0.896	
Q1		0.814
Q2		0.851
Q3		0.833
Reliability	0.957	
Q4		0.804
Q5		0.843
Q6		0.875
Q7		0.884
Q8		0.799
Responsiveness	0.954	
Q9		0.833
Q10		0.840
Q11		0.879
Q12		0.835
Assurance	0.973	
Q13		0.881
Q14		0.912
Q15		0.862
Q16		0.893
Empathy	0.975	
Q17		0.866
Q18		0.892
Q19		0.913
Q20		0.884
Q21		0.896

4.2 General data description

4.2.1 General data description of nurses

The results of the general data description of nurses are as follows. There are 169 nurses; 37.9%

of them are in Xinhua Hospital; 55.6% of them are 20-30 years old; 66.3% of them have been engaged in nursing for no less than five years; the majority of them are undergraduate, accounting for 91.7%; 45.6% of the them hold the title of nurse practitioner. The details are presented as per Table 4.3.

Table 4.3 General data analysis of nurses

Indicator		N	%
Hospital	Xinhua Hospital	64	37.9
	Anhui Provincial Children's Hospital	9	5.3
	Hainan Children's Hospital	17	10.1
	Hunan Children's Hospital	6	3.6
	Luzhou Hospital of Traditional Chinese Medicine	13	7.7
	Shenzhen Children's Hospital	14	8.3
	Shenyang Children's Hospital	11	6.5
	Tianjin Hospital	35	20.7
Age	20-30	94	55.6
	31-40	66	39.1
	41 and above	9	5.3
Working years	Less than one year	13	7.7
	Two to four years	44	26
	Five years and above	112	66.3
Educational background	High school graduate	14	8.3
	Undergraduate	155	91.7
Professional title	Nurse	51	30.2
	Nurse practitioner	77	45.6
	Nurse-in-charge	33	19.5
	Associate chief nurse and above	8	4.7

4.2.2 General data description of parents

The results of the general data description of the parents are as follows. There are 677 parents; 72.8% of the parents participating in this survey are mothers; 59.5% of the parents are from 31 to 40 years old; 24.7% of the parents are in Tianjin Hospital; 37.7% of the parents hold bachelor's degree; 65.4% of the children are boys; 43.3% of the children are from seven to twelve years old; 63.7% of the children have siblings; most of fractures are in the upper limbs (64.7%). The details are presented as per Table 4.4.

Table 4.4 General data analysis of parents

Indicator		N	%
Hospital	Xinhua Hospital	83	12.3
	Anhui Provincial Children's Hospital	9	1.3
	Hainan Children's Hospital	21	3.1
	Hunan Children's Hospital	366	54.1
	Luzhou Hospital of Traditional Chinese Medicine	2	0.3
	Shenzhen Children's Hospital	10	1.5
	Shenyang Children's Hospital	19	2.8
	Tianjin Hospital	167	24.7
Age of children	1-3	99	14.6
	4-6	226	33.4

Indicator		N	%
Gender of children	7-12	293	43.3
	13-18	59	8.7
	Male	443	65.4
	Female	234	34.6
Only child or not	Yes	246	36.3
	No	431	63.7
Fracture site	Upper limb	438	64.7
	Lower limb	239	35.3
Age of parents	20-30	130	19.2
	31-40	403	59.5
	40 and above	144	21.3
Gender of parents	Male	184	27.2
	Female	493	72.8
Educational background of parents	Junior high and below	189	27.9
	Senior high	205	30.3
	Undergraduate	255	37.7
	Postgraduate and above	28	4.1

4.3 Comparison of nursing service perception scores between nurses and parents

Results show that the overall score of nursing service perception by the burses is 4.32 points, and the overall score of nursing service perception by the parents is 4.46 points. There is a statistical difference (p<0.05) between nurses and parents in terms of their perception of nursing service. Analysis of results of each item and each dimension shows that the parents give higher score in Q2, Q3, tangibles; Q4, Q5, Q6, Q7, Q8, reliability; Q9, Q16, assurance; and Q19, empathy, and the difference is statistically significant (p<0.05). The details are presented as per Table 4.5.

Table 4.5 Comparison of nursing service perception scores between nurses and parents ($\bar{X}$±S)

Indicator	Nurses	Parents	t	p
Overall score	4.32±0.53	4.46±0.6	-2.949	**0.003**
Q1	4.2±0.81	4.32±0.81	-1.742	0.082
Q2	4.05±0.81	4.4±0.73	-5.501	**<0.001**
Q3	4.12±0.83	4.41±0.71	-4.605	**<0.001**
Tangibles	4.12±0.72	4.38±0.68	-4.298	**<0.001**
Q4	4.09±0.84	4.47±0.7	-6.153	**<0.001**
Q5	4.36±0.65	4.48±0.71	-1.963	**0.050**
Q6	4.35±0.67	4.47±0.69	-2.04	**0.042**
Q7	4.29±0.66	4.47±0.71	-2.973	**0.003**
Q8	4.25±0.66	4.49±0.65	-4.105	**<0.001**
Reliability	4.27±0.58	4.48±0.64	-3.818	**<0.001**
Q9	4.25±0.72	4.44±0.7	-3.182	**0.002**
Q10	4.44±0.66	4.48±0.69	-0.592	0.554
Q11	4.45±0.61	4.47±0.7	-0.29	0.772
Q12	4.36±0.69	4.44±0.72	-1.264	0.206
Responsiveness	4.38±0.58	4.46±0.66	-1.457	0.145

Indicator	Nurses	Parents	t	*p*
Q13	4.47±0.59	4.5±0.67	-0.542	0.588
Q14	4.43±0.59	4.52±0.65	-1.521	0.129
Q15	4.54±0.57	4.55±0.64	-0.013	0.99
Q16	4.04±1.12	4.52±0.65	-7.224	**<0.001**
Assurance	4.37±0.58	4.52±0.63	-2.784	**0.005**
Q17	4.41±0.63	4.49±0.68	-1.295	0.196
Q18	4.39±0.64	4.48±0.69	-1.541	0.124
Q19	4.36±0.64	4.48±0.68	-2.008	**0.045**
Q20	4.4±0.62	4.44±0.71	-0.785	0.433
Q21	4.35±0.67	4.45±0.68	-1.805	0.071
Empathy	4.38±0.59	4.47±0.66	-1.568	0.117

4.4 Single factor analysis

4.4.1 Single factor analysis of nurses' score of nursing service perception

4.4.1.1 Analysis of nurses' overall score of nursing service perception

Results of research on the nurses' overall score of nursing service perception show that there are statistically significant differences in the overall score of nursing service perception given by nurses in terms of hospital and professional title (hospital, F=6.794, $p<0.05$; professional title, F=8.891, $p<0.05$). Among all the hospitals, the overall score of nursing service perception is highest in Shenyang Children's Hospital, reaching 4.64 ($p<0.05$); among all the professional titles, nurses with the professional title of nurse practitioner give the highest overall score, reaching 4.43 ($p<0.05$).

4.4.1.2 Analysis of the dimension of nurse tangibles

In the dimension of nurse tangibles, there are statistically significant differences in the score given by nurses in terms of hospital, age and professional title (hospital, F=7.483, $p<0.05$; age, F=3.722, $p<0.05$; professional title, F=7.232, $p<0.05$). Among all hospitals, nurses in Shenyang Children's Hospital give the highest score in tangibles, reaching 4.64 ($p<0.05$); among all ages, nurses aged from 20 to 30 give the highest score in tangibles, reaching 4.24 ($p<0.05$); among all professional titles, nurses with the professional title of nurse give the highest score in tangibles, reaching 4.3 ($p<0.05$).

4.4.1.3 Analysis of the dimension of nurse reliability

In the dimension of nurse reliability, there are statistically significant differences in the score given by nurses in terms of hospital, educational background and professional title (hospital, F=6.145, $p<0.05$; educational background, F=2.042, $p<0.05$; professional title, F=6.462,

p<0.05). Among all hospitals, nurses in Shenyang Children's Hospital give the highest score in reliability, reaching 4.64 (p<0.05); in the two educational backgrounds, nurses graduated from high school give higher score in reliability, reaching 4.57 (p<0.05); among all professional titles, nurses with the professional title of nurse practitioner give the highest score in reliability, reaching 4.39 (p<0.05).

4.4.1.4 Analysis of the dimension of nurse responsiveness

In the dimension of nurse responsiveness, there are statistically significant differences in the score given by nurses in terms of hospital and professional title (hospital, F=4.300, p<0.05; professional title, F=4.202, p<0.05). Among all hospitals, nurses in Shenyang Children's Hospital give the highest score in responsiveness, reaching 4.64 (p<0.05); among all professional titles, nurses with the professional title of nurse give the highest score in responsiveness, reaching 4.48 (p<0.05).

4.4.1.5 Analysis of the dimension of nurse assurance

In the dimension of nurse assurance, there are statistically significant differences in the score given by nurses in terms of hospital and professional title (hospital, F=6.081, p<0.05; professional title, F=7.720, p<0.05). Among all hospitals, nurses in Shenyang Children's Hospital give the highest score in assurance, reaching 4.64 (p<0.05); among all professional titles, nurses with the professional title of nurse give the highest score in assurance, reaching 4.49 (p<0.05).

4.4.1.6 Analysis of the dimension of nurse empathy

In the dimension of nurse empathy, there are statistically significant differences in the score given by nurses in terms of hospital and professional title (hospital, F=3.866, p<0.05; professional title, F=8.893, p<0.05). Among all hospitals, nurses in Shenyang Children's Hospital give the highest score in empathy, reaching 4.64 (p<0.05); among all professional titles, nurses with the professional title of nurse practitioner give the highest score in empathy, reaching 4.52 points (p<0.05).

Results of the single factor analysis of nurses' score of nursing service perception are shown as per Table 4.6.

Table 4.6 Scores of different indexes by nurses

Indicator		Overall score	F/t	*p*	Tangibles	F/t	*p*	Reliability	F/t	*p*	Responsiveness	F/t	*p*	Assurance	F/t	*p*	Empathy	F/t	*p*
Hospital	Xinhua Hospital	4.47±0.46	6.794	<0.001	4.33±0.54	7.483	<0.001	4.46±0.48	6.145	<0.001	4.49±0.5	4.3	<0.001	4.51±0.51	6.081	<0.001	4.52±0.54	3.866	0.001
	Anhui Provincial Children's Hospital	3.78±0.62			3.19±0.9			3.78±0.55			3.94±0.98			3.97±0.73			3.87±0.69		
	Hainan Children's Hospital	4.13±0.41			4.12±0.35			4.06±0.49			4.15±0.44			4.18±0.49			4.16±0.42		
	Hunan Children's Hospital	4.27±0.23			4.06±0.33			4.33±0.33			4.21±0.37			4.5±0.42			4.2±0.25		
	Luzhou Hospital of Traditional Chinese Medicine	4.35±0.63			4.05±0.85			4.22±0.79			4.42±0.66			4.5±0.52			4.49±0.69		
	Shenzhen Children's Hospital	3.72±0.39			3.38±0.92			3.66±0.45			3.86±0.59			3.66±0.53			3.94±0.53		
	Shenyang Children's Hospital	4.64±0.5			4.64±0.46			4.64±0.5			4.64±0.5			4.64±0.5			4.64±0.5		
	Tianjin Hospital	4.39±0.49			4.16±0.7			4.28±0.57			4.53±0.48			4.45±0.52			4.46±0.61		
Age	20-30	4.38±0.5	1.593	0.206	4.24±0.6	3.722	0.026	4.32±0.57	0.893	0.411	4.43±0.58	2.158	0.119	4.43±0.56	1.337	0.265	4.44±0.53	1.21	0.301
	31-40	4.23±0.56			4.01±0.76			4.19±0.6			4.27±0.58			4.31±0.6			4.3±0.64		
	41 and above	4.26±			3.7±			4.29			4.61±0.			4.19			4.33		

Indicator		Overall score	F/t	*p*	Tangibles	F/t	*p*	Reliability	F/t	*p*	Responsiveness	F/t	*p*	Assurance	F/t	*p*	Empathy	F/t	*p*
		0.59			1.24			±0.64			49			±0.57			±0.69		
Working years	Within one year	4.45±0.45	1.435	0.241	4.44±0.6	2.52	0.084	4.34±0.66	1.097	0.336	4.54±0.45	0.996	0.372	4.5±0.46	1.57	0.211	4.48±0.51	0.472	0.624
	Two to four years	4.4±0.41			4.23±0.41			4.37±0.48			4.43±0.51			4.48±0.49			4.43±0.45		
	Five years and above	4.27±0.58			4.04±0.81			4.22±0.61			4.33±0.62			4.32±0.62			4.35±0.64		
Educational background	High school graduate	4.55±0.48	1.739	0.084	4.43±0.66	1.671	0.097	4.57±0.54	2.042	0.043	4.54±0.58	1.078	0.283	4.54±0.49	1.103	0.272	4.63±0.52	1.645	0.102
	Undergraduate	4.29±0.53			4.09±0.72			4.24±0.58			4.36±0.58			4.36±0.58			4.36±0.59		
	Nurse	4.42±0.42	8.891	<0.001	4.3±0.46	7.232	<0.001	4.35±0.54	6.462	<0.001	4.48±0.5	4.202	0.007	4.49±0.49	7.72	<0.001	4.48±0.47	8.893	<0.001
Professional title	Nurse practitioner	4.43±0.57			4.23±0.75			4.39±0.6			4.44±0.62			4.48±0.59			4.52±0.62		
	Nurse-in-charge	4.01±0.45			3.77±0.69			3.95±0.5			4.16±0.5			4.07±0.55			4.05±0.5		
	Associate chief nurse and above	3.82±0.46			3.46±1.08			3.9±0.51			3.94±0.61			3.84±0.33			3.83±0.53		

4.4.2 Single factor analysis of parents' score of nursing service perception

4.4.2.1 Analysis of parents' overall score of nursing service perception

Results of research on the parents' overall score of nursing service perception show that there are statistically significant differences in the overall score of nursing service perception given by parents in terms of hospital, age of children, age of parents, confidence, gender of children, fracture site, and gender of parents (hospital, $F=7.941$, $p<0.05$; age of children, $F=4.695$, $p<0.05$; age of parents, $F=4.009$, $p<0.05$; confidence, $F=11.904$, $p<0.05$; gender of children, $t=2.326$, $p<0.05$; fracture site, $t=1.961$, $p<0.05$; gender of parents, $t=2.726$, $p<0.05$). Among all hospitals, the overall score of nursing service perception by parents is highest in Shenyang Children's Hospital, reaching 4.94 ($p<0.05$); among all age groups of children, the overall score of nursing service perception is highest for parents whose children aged from 13 to 18, reaching 4.58 ($p<0.05$); among all age groups of children, the overall score of nursing service perception is highest for parents over 41 years old, reaching 4.55 ($p<0.05$); among all levels of confidence, the overall score of nursing service perception is highest for parents full of confidence, reaching 4.50 ($p<0.05$); compared with female children, parents of male children give higher overall score of nursing service perception ($p<0.05$); compared with children with fracture in lower limb, parents of children with fracture in upper limb give higher overall score of nursing service perception ($p<0.05$); compared with mothers, fathers give higher overall score of nursing service perception ($p<0.05$).

4.4.2.2 Analysis of the dimension of parent tangibles

In the dimension of parent tangibles, there are statistically significant differences in the score given by parents in terms of hospital, age of children, and confidence (hospital, $F=3.413$, $p<0.05$; age of children, $F=4.727$, $p<0.05$; confidence, $F=6.426$, $p<0.05$). Among all hospitals, parents in Shenyang Children's Hospital give the highest score in tangibility, reaching 4.81 ($p<0.05$); among all age groups of children, parents of children aged 7-12 give the highest score in tangibility, reaching 4.46 ($p<0.05$); among all levels of confidence, parents who are not very optimistic and full of confidence give higher scores in tangibles than those who are neutral, and the difference is statistically significant ($p<0.05$).

4.4.2.3 Analysis of the dimension of parent reliability

In the dimension of parent reliability, there are statistically significant differences in the score given by parents in terms of hospital, age of children, age of parents, confidence, gender of

children, fracture site, and gender of parents (hospital, F=17.715, p<0.05; age of children, F=3.310, p<0.05; age of parents, F=4.727, p<0.05; confidence, F=11.369, p<0.05; gender of children, t=2.539, p<0.05; fracture site, t=2.015, p<0.05; gender of parents, t=2.293, p<0.05). Among all hospitals, parents in Shenyang Children's Hospital give the highest score in reliability, reaching 4.93 (p<0.05); among all age groups of children, parents of children aged 13-18 give the highest score in reliability, reaching 4.60 (p<0.05); among all age groups of parents, parents over 41 years old give the highest score in reliability, reaching 4.54 (p<0.05); among all levels of confidence, parents who are not very optimistic and full of confidence give higher score than those who are neutral (p<0.05); compared with the female children, parents of male children give higher score (p<0.05); compared with children of lower limb fracture, parents of children with upper limb fracture give higher score (p<0.05); fathers give higher score in reliability than mothers (p<0.05).

4.4.2.4 Analysis of the dimension of parent responsiveness

In the dimension of parent responsiveness, there are statistically significant differences in the score given by parents in terms of hospital, age of children, age of parents, confidence, gender of children, fracture site, and gender of parents (hospital, F=15.507, p<0.05; age of children, F=3.033, p<0.05; age of parents, F=3.904, p<0.05; confidence, F=11.929, p<0.05; gender of children, t=2.531, p<0.05; fracture site, t=2.245, p<0.05; gender of parents, t=2.470, p<0.05). Among all hospitals, parents in Shenyang Children's Hospital give the highest score in responsiveness, reaching 4.97 (p<0.05); among all age groups of children, parents of children aged 13-18 give the highest score, reaching 4.58 (p<0.05); among all age groups of parents, parents over 41 years old give the highest score in responsiveness, reaching 4.53 (p<0.05); among all levels of confidence, parents who are full of confidence give the highest score in responsiveness, reaching 4.49 (p<0.05); compared with female children, parents of male children give higher score in responsiveness (p<0.05); compared with children with lower limb fractures, parents of children with upper limb fractures give higher score in responsiveness (p<0.05); fathers give higher score in responsiveness than mothers (p<0.05).

4.4.2.5 Analysis of the dimension of parent assurance

In the dimension of parent assurance, there are statistically significant differences in the score given by parents in terms of hospital, age of children, age of parents, confidence, gender of parents, and fracture site (hospital, F=6.073, p < 0.05; age of children, F=5.164, p<0.05; age of parents, F=3.610, p<0.05; confidence, F=12.745, p<0.05; gender of parents, t=2.967, p<0.05;

fracture site, t=2.502, $p<0.05$). Among all hospitals, parents in Shenyang Children's Hospital give the highest score in assurance, reaching 4.96 ($p<0.05$); among all age groups of children, parents of children aged 13-18 give the highest score, reaching 4.64 ($p<0.05$); among all age groups of parents, parents over 41 years give the highest score, reaching 4.61 ($p<0.05$); among all levels of confidence, parents who are full of confidence give the highest score, reaching 4.56 ($p<0.05$); compared with children with lower limb fractures, parents of children with upper limb fractures give higher score ($p<0.05$); compared with mothers, fathers give score in assurance ($p<0.05$).

4.4.2.6 Analysis of the dimension of parent empathy

In the dimension of parent empathy, there are statistically significant differences in the score given by parents in terms of hospital, age of children, age of parents, confidence, gender of children, and gender of parents (Hospital, F=5.960, $p<0.05$; age of children, F=4.874, $p<0.05$; age of parents, F=3.686, $p<0.05$; confidence, F=8.920, $p<0.05$; gender of children, t=2.240, $p<0.05$; gender of parents, t=3.331, $p<0.05$). Among all hospitals, parents in Shenyang Children's Hospital give the highest score in empathy, reaching 4.99 ($p<0.05$); among all age groups of children, parents of children aged 13-18 give the highest score in empathy, reaching 4.61 ($p<0.05$); among all age groups of parents, parents over 41 give the highest score in empathy, reaching 4.58 ($p<0.05$); among all levels of confidence, parents who are full of confidence give the highest score, reaching 4.50 ($p<0.05$); compared with female children, parents of male children give higher score in empathy ($p<0.05$); compared with mothers, fathers give higher score in empathy ($p<0.05$).

Results of the single factor analysis of parents' score of nursing service perception are shown as per Table 4.7.

Table 4.7 Scores of different indexes by parents

Indicator		Overall score	F/t	*p*	Tangibles	F/t	*p*	Reliability	F/t	*p*	Responsiveness	F/t	*p*	Assurance	F/t	P	Empathy	F/t	*p*
Hospital	Xinhua Hospital	4.45±0.53	7.941	0	4.34±0.55	3.413	0.001	4.53±0.51	17.715	0	4.46±0.59	15.507	0	4.5±0.56	6.073	0	4.4±0.63	5.96	0
	Anhui Provincial Children's Hospital	3.98±0.29			4.22±0.67			3.16±0.34			3.36±0.33			4.67±0.5			4.62±0.6		
	Hainan Children's Hospital	4.52±0.49			4.25±0.91			4.56±0.52			4.56±0.58			4.56±0.54			4.57±0.49		
	Hunan Children's Hospital	4.37±0.67			4.31±0.72			4.39±0.69			4.37±0.7			4.4±0.71			4.36±0.72		
	Luzhou Hospital of Traditional Chinese Medicine	4.79±0.3			4.67±0.47			4.8±0.28			4.63±0.53			5±0			4.8±0.28		
	Shenzhen Children's Hospital	4.01±0.25			4.03±1.19			3.36±0.39			3.38±0.43			4.7±0.48			4.6±0.64		
	Shenyang Children's Hospital	4.94±0.14			4.81±0.37			4.93±0.24			4.97±0.11			4.96±0.17			4.99±0.05		
	Tianjin Hospital	4.67±0.44			4.53±0.57			4.7±0.44			4.7±0.46			4.71±0.44			4.66±0.5		
Age of children	1-3	4.28±0.75	4.695	0.003	4.17±0.85	4.727	0.003	4.32±0.76	3.31	0.02	4.31±0.78	3.033	0.029	4.33±0.79	5.164	0.002	4.27±0.82	4.874	0.002
	4-6	4.44±0.64			4.36±0.67			4.45±0.67			4.43±0.7			4.49±0.68			4.45±0.69		
	7-12	4.52±			4.46			4.52			4.5±0.5			4.59			4.52		

Indicator		Overall score	F/t	*p*	Tangibles	F/t	*p*	Reliability	F/t	*p*	Responsiveness	F/t	*p*	Assurance	F/t	P	Empathy	F/t	*p*
Age of parents	13-18	4.58±0.47	4.009	0.019	4.4±0.54	2.436	0.088	4.6±0.49	3.879	0.021	4.58±0.55	3.904	0.021	4.64±0.46	3.61	0.028	4.61±0.49	3.686	0.026
	20-30	4.35±0.58			4.28±0.7			4.34±0.62			4.32±0.61			4.41±0.61			4.37±0.62		
	31-40	4.47±0.62			4.38±0.69			4.49±0.65			4.47±0.68			4.53±0.65			4.46±0.68		
	41 and above	4.55±0.56			4.46±0.63			4.54±0.61			4.53±0.63			4.61±0.57			4.58±0.59		
Educational background	Junior high and below	4.49±0.52	0.259	0.855	4.42±0.56	0.429	0.732	4.5±0.56	0.232	0.874	4.48±0.56	0.26	0.854	4.54±0.54	0.617	0.604	4.5±0.56	0.306	0.821
	Senior high	4.47±0.52			4.37±0.7			4.46±0.58			4.46±0.58			4.55±0.52			4.47±0.57		
	Undergraduate	4.45±0.7			4.35±0.75			4.48±0.73			4.45±0.76			4.49±0.74			4.45±0.75		
	Postgraduate and above	4.4±0.73			4.43±0.62			4.4±0.75			4.37±0.85			4.45±0.71			4.39±0.84		
Confidence	Full of confidence	4.5±0.58	11.904	0	4.4±0.68	6.426	0.002	4.51±0.62	11.369	0	4.49±0.63	11.929	0	4.56±0.6	12.745	0	4.5±0.64	8.92	0
	Neutral	4.1±0.68			4.07±0.58			4.09±0.76			4.06±0.78			4.13±0.76			4.12±0.69		

Indicator		Overall score	F/t	*p*	Tangibles	F/t	*p*	Reliability	F/t	*p*	Responsiveness	F/t	*p*	Assurance	F/t	P	Empathy	F/t	*p*
Gender of children	Not very optimistic	4.41±0.78			4.44±0.96			4.6±0.69			4.17±0.88			4.42±1.01			4.4±0.6		
	Male	4.5±0.58	2.326	0.02	4.4±0.66	1.443	0.149	4.52±0.6	2.539	0.011	4.5±0.63	2.531	0.012	4.55±0.59	1.753	0.08	4.51±0.63	2.24	0.025
	Female	4.39±0.64			4.32±0.71			4.39±0.71			4.37±0.7			4.46±0.69			4.39±0.69		
Only child	Yes	4.5±0.61	1.218	0.223	4.38±0.68	0.118	0.906	4.54±0.62	1.935	0.053	4.51±0.65	1.727	0.085	4.54±0.63	0.625	0.532	4.5±0.65	0.886	0.376
	No	4.44±0.6			4.37±0.68			4.44±0.65			4.42±0.66			4.51±0.63			4.45±0.66		
Fracture site	Upper limb	4.5±0.59	1.961	0.05	4.38±0.71	0.239	0.811	4.51±0.64	2.015	0.044	4.5±0.66	2.245	0.025	4.57±0.61	2.502	0.013	4.5±0.64	1.752	0.08
	Lower limb	4.4±0.62			4.37±0.61			4.41±0.64			4.38±0.65			4.44±0.65			4.41±0.68		
Gender of parents	Male	4.56±0.55	2.726	0.007	4.41±0.73	0.808	0.42	4.57±0.59	2.293	0.022	4.56±0.63	2.47	0.014	4.63±0.57	2.967	0.003	4.6±0.6	3.331	0.001
	Female	4.43±0.62			4.36±0.66			4.44±0.65			4.42±0.67			4.48±0.64			4.42±0.67		

4.5 Multiple regression analysis

4.5.1 Assignment table of this research

Hospital is an unordered multiple-categorical variable, so Xinhua Hospital is used as a control to assign dummy variables. The assignment results are shown as per Table 4.8.

Table 4.8 Assignment table

Item	Value assignment
Hospital	Xinhua Hospital (Z1=0; Z2=0; Z3=0; Z4=0; Z5=0; Z6=0; Z7=0) Anhui Provincial Children's Hospital (Z1=1; Z2=0; Z3=0; Z4=0; Z5=0; Z6=0; Z7=0) Hainan Children's Hospital (Z1=0; Z2=1; Z3=0; Z4=0; Z5=0; Z6=0; Z7=0) Hunan Children's Hospital (Z1=0; Z2=0; Z3=1; Z4=0; Z5=0; Z6=0; Z7=0) Luzhou Hospital of TCM (Z1=0; Z2=0; Z3=0; Z4=1; Z5=0; Z6=0; Z7=0) Shenzhen Children's Hospital (Z1=0; Z2=0; Z3=0; Z4=0; Z5=1; Z6=0; Z7=0) Shenyang Children's Hospital (Z1=0; Z2=0; Z3=0; Z4=0; Z5=0; Z6=1; Z7=0) Tianjin Hospital (Z1=0; Z2=0; Z3=0; Z4=0; Z5=0; Z6=0; Z7=1)
Professional title	Nurse=1 Nurse practitioner=2 Nurse-in-charge=3 Associate chief nurse and above=4
Age	20-30=1 31-40=2 Over 41=3
Working years	Within one year=1 Two to four years=2 Over five years=3
Educational background	Junior high and below=1 Senior high=2 Undergraduate=3 Postgraduate and above=4
Professional title	Nurse=1 Nurse practitioner=2 Nurse-in-charge=3 Associate chief nurse and above =4
Age of children	One to three years old=1 Four to six years old=2 Seven to twelve years old=3 Thirteen to eighteen years old=4
Gender of children	Male=1 Female=2
Only child	Yes=1 No=2
Fracture site	Upper limb=1 Lower limb=2
Confidence	Not very optimistic=1 Neutral=2 Full of confidence=3

Item	Value assignment
Gender of parents	Father=1 Mother=2

4.5.2 Multivariate regression analysis of each dimension of nurses

4.5.2.1 Multivariate regression analysis of overall score of nurse service perception

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the overall score of nurse service perception as the dependent variable, the regression model was established, and the test results of each parameter of the model are as follows. Anhui Provincial Children's Hospital, Shenzhen Children's Hospital, Shenyang Children's Hospital, and professional title have a statistically significant effect on the overall score of service perception (p<0.05). The regression coefficients of Anhui Provincial Children's Hospital and Shenzhen Children's Hospital are -0.496 and -0.621 respectively. The regression coefficient of Shenyang Children's Hospital is 0.425. In other words, compared with Xinhua Hospital, nurses from Anhui Provincial Children's Hospital and Shenzhen Children's Hospital tend to give low overall scores of service perception, while nurses from Shenyang Children's Hospital tend to give high overall scores of service perception. The regression coefficient of professional title is -0.193. In other words, nurses with higher professional titles give lower overall scores of service perception. The details are presented as per Table 4.9.

Table 4.9 Analysis of the influencing factors of the overall score of nurse service perception

Indicator	Unstandardized coefficients		Standardized coefficient	t	p
	B	SE	Beta		
(Constant)	4.772	0.098		48.899	0.000
Anhui Provincial Children's Hospital	-0.496	0.171	-0.210	-2.901	**0.004**
Hainan Children's Hospital	-0.130	0.137	-0.074	-0.952	0.343
Hunan Children's Hospital	-0.117	0.197	-0.041	-0.591	0.555
Luzhou Hospital of TCM	-0.094	0.140	-0.047	-0.674	0.501
Shenzhen Children's Hospital	-0.621	0.140	-0.322	-4.449	**0.000**
Shenyang Children's Hospital	0.425	0.165	0.197	2.581	**0.011**
Tianjin Hospital	0.004	0.099	0.003	0.039	0.969
Professional title	-0.193	0.050	-0.300	-3.819	**0.000**

4.5.2.2 Multivariate regression analysis of tangibles of nurses

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the score of tangibles of nurses as the dependent variable, the regression model was established, and the test results of each parameter

of the model are as follows. Anhui Provincial Children's Hospital, Shenzhen Children's Hospital, Shenyang Children's Hospital, and professional title have a statistically significant effect on the score of tangibles (p<0.05). The regression coefficients of Anhui Provincial Children's Hospital and Shenzhen Children's Hospital are -0.846 and -0.746 respectively, and the regression coefficient of Shenyang Children's Hospital is 0.715. In other words, compared with Xinhua Hospital, nurses from Anhui Provincial Children's Hospital and Shenzhen Children's Hospital tend to give low scores in tangibles, while nurses from Shenyang Children's Hospital are more likely to give high scores in tangibles. The regression coefficient of professional title is - 0.315, that is, the higher the professional titles of nurses, the lower scores they give in tangibles. The details are presented as per Table 4.10.

Table 4.10 Analysis of the influencing factors of tangibles of nurses

Indicator	Unstandardized coefficients		Standardized coefficient	t	P
	B	SE	Beta		
(Constant)	4.765	0.140		34.079	0.000
Anhui Provincial Children's Hospital	-0.846	0.227	-0.265	-3.724	**0.000**
Hainan Children's Hospital	0.118	0.184	0.050	0.642	0.522
Hunan Children's Hospital	-0.133	0.263	-0.034	-0.504	0.615
Luzhou Hospital of TCM	-0.236	0.185	-0.088	-1.274	0.205
Shenzhen Children's Hospital	-0.746	0.187	-0.287	-3.993	**0.000**
Shenyang Children's Hospital	0.715	0.221	0.246	3.229	**0.002**
Tianjin Hospital	-0.023	0.133	-0.013	-0.176	0.861
Age	0.039	0.115	0.033	0.341	0.734
Professional title	-0.315	0.095	-0.363	-3.320	**0.001**

4.5.2.3 Multivariate regression analysis of reliability of nurses

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the score of reliability of nurses as the dependent variable, the regression model was established, and the test results of each parameter of the model are as follows. Anhui Provincial Children's Hospital, Shenzhen Children's Hospital, Shenyang Children's Hospital, and professional title have a statistically significant effect on the score of reliability (p<0.05). The regression coefficients of Anhui Provincial Children's Hospital and Shenzhen Children's Hospital are -0.521 and -0.691 respectively, and the regression coefficient of Shenyang Children's Hospital is 0.388. In other words, compared with Xinhua Hospital, nurses from Anhui Provincial Children's Hospital and Shenzhen Children's Hospital tend to give low scores in reliability, while nurses from Shenyang Children's Hospital are more likely to give high scores in reliability. The regression coefficient of professional title is - 0.143, that is, the higher the professional titles of nurses, the lower scores they give in reliability. The details are presented as per Table 4.11.

Table 4.11 Analysis of the influencing factors of reliability of nurses

Indicator	Unstandardized coefficients		Standardized coefficient	t	P
	B	SE	Beta		
(Constant)	5.249	0.441		11.910	0.000
Anhui Provincial Children's Hospital	-0.521	0.194	-0.201	-2.688	**0.008**
Hainan Children's Hospital	-0.227	0.155	-0.117	-1.463	0.145
Hunan Children's Hospital	-0.110	0.226	-0.035	-0.486	0.627
Luzhou Hospital of TCM	-0.237	0.159	-0.108	-1.496	0.137
Shenzhen Children's Hospital	-0.691	0.158	-0.327	-4.361	**0.000**
Shenyang Children's Hospital	0.388	0.187	0.164	2.081	**0.039**
Tianjin Hospital	-0.111	0.113	-0.077	-0.987	0.325
Educational background	-0.195	0.151	-0.092	-1.290	0.199
Professional title	-0.143	0.057	-0.204	-2.494	**0.014**

4.5.2.4 Multivariate regression analysis of responsiveness of nurses

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the score of responsiveness of nurses as the dependent variable, the regression model was established, and the test results of each parameter of the model are as follows. Shenzhen Children's Hospital and professional title have a statistically significant effect on the score of responsiveness (p<0.05). The regression coefficient of Shenzhen Children's Hospital is -0.531. In other words, compared with Xinhua Hospital, nurses from Shenzhen Children's Hospital tend to give low scores in responsiveness. The regression coefficient of professional title is - 0.153, that is, the higher the professional titles of nurses, the lower scores they give in responsiveness. The details are presented as per Table 4.12.

Table 4.12 Analysis of the influencing factors of responsiveness of nurses

Indicator	Unstandardized coefficients		Standardized coefficient	t	P
	B	SE	Beta		
(Constant)	4.728	0.113		41.672	0.000
Anhui Provincial Children's Hospital	-0.392	0.199	-0.152	-1.969	0.051
Hainan Children's Hospital	-0.175	0.159	-0.091	-1.101	0.273
Hunan Children's Hospital	-0.213	0.230	-0.068	-0.928	0.355
Luzhou Hospital of TCM	-0.045	0.163	-0.021	-0.279	0.781
Shenzhen Children's Hospital	-0.531	0.162	-0.253	-3.276	**0.001**
Shenyang Children's Hospital	0.354	0.191	0.151	1.851	0.066
Tianjin Hospital	0.112	0.116	0.078	0.966	0.336
Professional title	-0.153	0.059	-0.219	-2.609	**0.010**

4.5.2.5 Multivariate regression analysis of assurance of nurses

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the score of assurance of nurses as the

dependent variable, the regression model was established, and the test results of each parameter of the model are as follows. Shenzhen Children's Hospital, Shenyang Children's Hospital, and professional title have a statistically significant effect on the score of assurance (p<0.05). The regression coefficient of Shenzhen Children's Hospital is -0.723, and the regression coefficient of Shenyang Children's Hospital is 0.389. In other words, compared with Xinhua Hospital, nurses from Shenzhen Children's Hospital tend to give low scores in assurance, while nurses from Shenyang Children's Hospital are more likely to give high scores in assurance. The regression coefficient of professional title is - 0.196, that is, the higher the professional titles of nurses, the lower scores they give in reliability. The details are presented as per Table 4.13.

Table 4.13 Analysis of the influencing factors of assurance of nurses

Indicator	Unstandardized coefficients		Standardized coefficient	t	P
	B	SE	Beta		
(Constant)	4.819	0.108		44.770	0.000
Anhui Provincial Children's Hospital	-0.345	0.189	-0.134	-1.825	0.070
Hainan Children's Hospital	-0.122	0.151	-0.064	-0.810	0.419
Hunan Children's Hospital	0.074	0.218	0.024	0.341	0.734
Luzhou Hospital of TCM	0.014	0.154	0.006	0.089	0.929
Shenzhen Children's Hospital	-0.723	0.154	-0.346	-4.698	**0.000**
Shenyang Children's Hospital	0.389	0.182	0.167	2.142	**0.034**
Tianjin Hospital	0.030	0.110	0.021	0.272	0.786
Professional title	-0.196	0.056	-0.283	-3.526	**0.001**

4.5.2.6 Multivariate regression analysis of empathy of nurses

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the score of empathy of nurses as the dependent variable, the regression model was established, and the test results of each parameter of the model are as follows. Anhui Provincial Children's Hospital, Shenzhen Children's Hospital, Shenyang Children's Hospital, and professional title have a statistically significant effect on the score of empathy (p<0.05). The regression coefficients of Anhui Provincial Children's Hospital and Shenzhen Children's Hospital are -0.450 and -0.443 respectively, and the regression coefficient of Shenyang Children's Hospital is 0.392. In other words, compared with Xinhua Hospital, nurses from Anhui Provincial Children's Hospital and Shenzhen Children's Hospital tend to give low scores in empathy, while nurses from Shenyang Children's Hospital are more likely to give high scores in empathy. The regression coefficient of professional title is - 0.204, that is, the higher the professional titles of nurses, the lower scores they give in empathy. The details are presented as per Table 4.14.

Table 4.14 Analysis of the influencing factors of empathy of nurses

Indicator	Unstandardized coefficients		Standardized coefficient	t	P
	B	SE	Beta		
(Constant)	4.837	0.114		42.366	0.000
Anhui Provincial Children's Hospital	-0.450	0.200	-0.172	-2.245	**0.026**
Hainan Children's Hospital	-0.133	0.160	-0.068	-0.830	0.408
Hunan Children's Hospital	-0.230	0.231	-0.072	-0.993	0.322
Luzhou Hospital of TCM	0.000	0.164	0.000	0.000	1.000
Shenzhen Children's Hospital	-0.443	0.163	-0.208	-2.713	**0.007**
Shenyang Children's Hospital	0.392	0.193	0.165	2.036	**0.043**
Tianjin Hospital	0.033	0.116	0.023	0.288	0.774
Professional title	-0.204	0.059	-0.288	-3.453	**0.001**

4.5.3 Multivariate regression analysis of each dimension of parents

4.5.3.1 Multivariate regression analysis of overall score of parent service perception

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the overall score of parent service perception as the dependent variable, the regression model was established, and the test results of each parameter of the model are as follows. Anhui Provincial Children's Hospital, Shenzhen Children's Hospital, Shenyang Children's Hospital, Tianjin Hospital, age of children, confidence and gender of parents have a statistically significant effect on the overall score of service perception (p<0.05). The regression coefficients of Anhui Provincial Children's Hospital and Shenzhen Children's Hospital are -0.421 and -0.396 respectively. In other words, compared with Xinhua Hospital, parents of children in Anhui Provincial Children's Hospital and Shenzhen Children's Hospital tend to give low overall scores of service perception. The regression coefficients of Shenyang Children's Hospital and Tianjin Hospital are 0.512 and 0.229 respectively. In other words, compared with Xinhua Hospital, parents of children in Shenyang Children's Hospital and Tianjin Hospital tend to give high overall scores of nursing service perception. The regression coefficient of age of children is 0.073. In other words, the older the children, the higher the overall score of nursing service perception for parents. The regression coefficient of confidence is 0.294. In other words, the stronger the confidence, the higher the overall score of nursing service perception for parents. The regression coefficient of gender of parents is -0.120. In other words, fathers are more likely to give high overall score of nursing serving perception compared with mothers. The details are presented as per Table 4.15.

Table 4.15 Analysis of influencing factors of overall score of parent service perception

Indicator	Unstandardized coefficients		Standardized coefficient	t	*p*
	B	SE	Beta		
(Constant)	3.675	0.285		12.906	0.000
Anhui Provincial Children's Hospital	-0.421	0.200	-0.080	-2.105	**0.036**
Hainan Children's Hospital	0.139	0.142	0.040	0.978	0.328
Hunan Children's Hospital	-0.005	0.071	-0.004	-0.066	0.947
Luzhou Hospital of TCM	0.439	0.408	0.039	1.075	0.283
Shenzhen Children's Hospital	-0.396	0.192	-0.079	-2.067	**0.039**
Shenyang Children's Hospital	0.512	0.146	0.140	3.517	**0.000**
Tianjin Hospital	0.229	0.077	0.163	2.974	**0.003**
Age of children	0.073	0.028	0.103	2.577	**0.010**
Age of parents	0.042	0.037	0.044	1.147	0.252
Confidence	0.294	0.073	0.149	4.030	**0.000**
Gender of children	-0.084	0.047	-0.066	-1.787	0.074
Fracture site	-0.053	0.048	-0.042	-1.101	0.271
Gender of parents	-0.120	0.051	-0.089	-2.381	**0.018**

4.5.3.2 Multivariate regression analysis of tangibles of parents

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the score of tangibles of parents as the dependent variable, the regression model was established, and the test results of each parameter of the model are as follows. Shenyang Children's Hospital, age of children, and confidence have a statistically significant effect on the score of tangibles (p<0.05). The regression coefficient of Shenyang Children's Hospital is 0.496. In other words, compared with Xinhua Hospital, parents of children in Shenyang Children's Hospital tend to give high scores for tangibles. The regression coefficient of age of children is 0.092. In other words, the older the children, the higher the score of tangibles for parents. The regression coefficient of confidence is 0.252. In other words, the stronger the confidence, the higher the score of tangibles for parents. The details are presented as per Table 4.16.

Table 4.16 Analysis of the influencing factors of tangibles of parents

Indicator	Unstandardized coefficients		Standardized coefficient	t	*p*
	B	SE	Beta		
(Constant)	3.357	0.278		12.089	<0.001
Anhui Provincial Children's Hospital	-0.077	0.234	-0.013	-0.331	0.741
Hainan Children's Hospital	-0.004	0.164	-0.001	-0.023	0.982
Hunan Children's Hospital	0.018	0.082	0.013	0.216	0.829
Luzhou Hospital of TCM	0.37	0.476	0.03	0.776	0.438
Shenzhen Children's Hospital	-0.309	0.223	-0.055	-1.39	0.165
Shenyang Children's Hospital	0.496	0.17	0.12	2.918	**0.004**
Tianjin Hospital	0.171	0.089	0.108	1.911	0.056
Age of children	0.092	0.031	0.114	2.918	**0.004**

Indicator	Unstandardized coefficients		Standardized coefficient	t	*p*
	B	SE	Beta		
Confidence	0.252	0.085	0.113	2.979	**0.003**

4.5.3.3 Multivariate regression analysis of reliability of parents

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the score of reliability of parents as the dependent variable, the regression model was established, and the test results of each parameter of the model are as follows. Anhui Provincial Children's Hospital, Shenzhen Children's Hospital, Shenyang Children's Hospital, Tianjin Hospital, age of children, confidence and gender of parents have a statistically significant effect on the score of reliability (p<0.05). The regression coefficients of Anhui Provincial Children's Hospital and Shenzhen Children's Hospital are -1.330 and -0.062 respectively. In other words, compared with Xinhua Hospital, parents of children in Anhui Provincial Children's Hospital and Shenzhen Children's Hospital tend to give low scores for reliability. The regression coefficients of Shenyang Children's Hospital and Tianjin Hospital are 0.411 and 0.184 respectively. In other words, compared with Xinhua Hospital, parents of children in Shenyang Children's Hospital and Tianjin Hospital tend to give high scores for reliability. The regression coefficient of age of children is 0.073. In other words, the older the children, the higher the score for reliability. The regression coefficient of confidence is 0.291. In other words, the stronger the confidence, the higher the score for reliability. The regression coefficient of gender of parents is -0.116. In other words, fathers are more likely to give high scores for reliability compared with mothers. The details are presented as per Table 4.17.

Table 4.17 Analysis of the influencing factors of reliability of parents

Indicator	Unstandardized coefficients		Standardized coefficient	t	*p*
	B	SE	Beta		
(Constant)	3.828	0.289		13.226	0.000
Anhui Provincial Children's Hospital	-1.330	0.203	-0.238	-6.542	**0.000**
Hainan Children's Hospital	0.091	0.144	0.025	0.630	0.529
Hunan Children's Hospital	-0.062	0.072	-0.049	-0.866	0.387
Luzhou Hospital of TCM	0.360	0.415	0.031	0.868	0.386
Shenzhen Children's Hospital	-1.127	0.195	-0.213	-5.791	**0.000**
Shenyang Children's Hospital	0.411	0.148	0.106	2.780	**0.006**
Tianjin Hospital	0.184	0.078	0.124	2.349	**0.019**
Age of children	0.059	0.029	0.079	2.055	**0.040**
Age of parents	0.037	0.037	0.037	0.984	0.326
Confidence	0.291	0.074	0.139	3.933	**0.000**
Gender of children	-0.094	0.048	-0.070	-1.959	0.051
Fracture site	-0.064	0.049	-0.048	-1.309	0.191

Indicator	Unstandardized coefficients		Standardized coefficient	t	*p*
	B	SE	Beta		
Gender of parents	-0.116	0.051	-0.081	-2.257	**0.024**

4.5.3.4 Multivariate regression analysis of responsiveness of parents

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the score of responsiveness of parents as the dependent variable, the regression model was established, and the test results of each parameter of the model are as follows. Anhui Provincial Children's Hospital, Shenzhen Children's Hospital, Shenyang Children's Hospital, Tianjin Hospital, age of children, confidence, gender of children and gender of parents have a statistically significant effect on the score of responsiveness (p<0.05). The regression coefficients of Anhui Provincial Children's Hospital and Shenzhen Children's Hospital are -1.055 and -1.044 respectively. In other words, compared with Xinhua Hospital, parents of children in Anhui Provincial Children's Hospital and Shenzhen Children's Hospital tend to give low scores for responsiveness. The regression coefficients of Shenyang Children's Hospital and Tianjin Hospital are 0.522 and 0.256 respectively. In other words, compared with Xinhua Hospital, parents of children in Shenyang Children's Hospital and Tianjin Hospital tend to give high scores for responsiveness. The regression coefficient of age of children is 0.059. In other words, the older the children, the higher the score for responsiveness. The regression coefficient of confidence is 0.340. In other words, the stronger the confidence, the higher the score for responsiveness. The regression coefficient of gender of children is -0.100. In other words, parents of male children are more likely to give high scores for responsiveness compared with parents of female children. The regression coefficient of gender of parents is -0.126. In other words, fathers are more likely to give high scores for responsiveness compared with mothers. The details are presented as per Table 4.18.

Table 4.18 Analysis of the influencing factors of responsiveness of parents

Indicator	Unstandardized coefficients		Standardized coefficient	t	*p*
	B	SE	Beta		
(Constant)	3.644	0.300		12.163	0.000
Anhui Provincial Children's Hospital	-1.055	0.210	-0.183	-5.011	**0.000**
Hainan Children's Hospital	0.160	0.149	0.042	1.077	0.282
Hunan Children's Hospital	-0.018	0.075	-0.014	-0.241	0.810
Luzhou Hospital of TCM	0.254	0.430	0.021	0.592	0.554
Shenzhen Children's Hospital	-1.044	0.202	-0.191	-5.181	**0.000**
Shenyang Children's Hospital	0.522	0.153	0.131	3.406	**0.001**
Tianjin Hospital	0.256	0.081	0.167	3.158	**0.002**

Indicator	Unstandardized coefficients		Standardized coefficient	t	*p*
	B	SE	Beta		
Age of children	0.059	0.030	0.076	1.972	**0.049**
Age of parents	0.042	0.039	0.040	1.075	0.283
Confidence	0.340	0.077	0.158	4.430	**0.000**
Gender of children	-0.100	0.049	-0.072	-2.014	**0.044**
Fracture site	-0.072	0.050	-0.052	-1.423	0.155
Gender of parents	-0.126	0.053	-0.085	-2.373	**0.018**

4.5.3.5 Multivariate regression analysis of assurance of parents

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the score of assurance of parents as the dependent variable, the regression model was established, and the test results of each parameter of the model are as follows. Shenyang Children's Hospital, Tianjin Hospital, age of children, confidence and gender of parents have a statistically significant effect on the score of assurance (p<0.05). The regression coefficients of Shenyang Children's Hospital and Tianjin Hospital are 0.484 and 0.219 respectively. In other words, compared with Xinhua Hospital, parents of children in Shenyang Children's Hospital and Tianjin Hospital tend to give high scores for assurance. The regression coefficient of age of children is 0.094. In other words, the older the children, the higher the score for assurance. The regression coefficient of confidence is 0.312. In other words, the stronger the confidence, the higher the score for assurance. The regression coefficient of gender of parents is -0.133. In other words, fathers are more likely to give high scores for assurance compared with mothers. The details are presented as per Table 4.19.

Table 4.19 Analysis of the influencing factors of assurance of parents

Indicator	Unstandardized coefficients		Standardized coefficient	t	*p*
	B	SE	Beta		
(Constant)	3.554	0.288		12.337	0.000
Anhui Provincial Children's Hospital	0.210	0.209	0.038	1.005	0.315
Hainan Children's Hospital	0.151	0.148	0.042	1.018	0.309
Hunan Children's Hospital	-0.009	0.074	-0.007	-0.122	0.903
Luzhou Hospital of TCM	0.600	0.428	0.052	1.403	0.161
Shenzhen Children's Hospital	0.233	0.201	0.045	1.164	0.245
Shenyang Children's Hospital	0.484	0.152	0.127	3.174	**0.002**
Tianjin Hospital	0.219	0.081	0.150	2.714	**0.007**
Age of children	0.094	0.029	0.127	3.220	**0.001**
Age of parents	0.044	0.039	0.044	1.134	0.257
Confidence	0.312	0.076	0.152	4.083	**0.000**
Fracture site	-0.078	0.050	-0.060	-1.563	0.118
Gender of parents	-0.133	0.053	-0.094	-2.514	**0.012**

4.5.3.6 Multivariate regression analysis of empathy of parents

The indicators with statistical significance in univariate analysis were included into the multiple linear regression model as independent variables. With the score of empathy of parents as the dependent variable, the regression model was established, and the test results of each parameter of the model are as follows. Shenyang Children's Hospital, Tianjin Hospital, age of children, confidence and gender of parents have a statistically significant effect on the score of empathy (p<0.05). The regression coefficients of Shenyang Children's Hospital and Tianjin Hospital are 0.639 and 0.283 respectively. In other words, compared with Xinhua Hospital, parents of children in Shenyang Children's Hospital and Tianjin Hospital tend to give high scores for empathy. The regression coefficient of age of children is 0.081. In other words, the older the children, the higher the score for empathy. The regression coefficient of confidence is 0.277. In other words, the stronger the confidence, the higher the score for empathy. The regression coefficient of gender of parents is -0.163. In other words, fathers are more likely to give high scores for empathy compared with mothers. The details are presented as per Table 4.20.

Table 4.20 Analysis of the influencing factors of empathy of parents

Indicator	Unstandardized coefficients		Standardized coefficient	t	p
	B	SE	Beta		
(Constant)	3.651	0.305		11.955	0.000
Anhui Provincial Children's Hospital	0.272	0.219	0.048	1.240	0.216
Hainan Children's Hospital	0.254	0.155	0.067	1.636	0.102
Hunan Children's Hospital	0.039	0.077	0.030	0.510	0.610
Luzhou Hospital of TCM	0.552	0.447	0.046	1.234	0.218
Shenzhen Children's Hospital	0.269	0.210	0.050	1.284	0.200
Shenyang Children's Hospital	0.639	0.159	0.161	4.012	**0.000**
Tianjin Hospital	0.283	0.084	0.186	3.356	**0.001**
Age of children	0.081	0.031	0.105	2.635	**0.009**
Age of parents	0.047	0.040	0.045	1.157	0.248
Confidence	0.277	0.080	0.129	3.486	**0.001**
Fracture site	-0.094	0.051	-0.068	-1.821	0.069
Gender of parents	-0.163	0.055	-0.111	-2.958	**0.003**

4.6 Correlation analysis

Nurses and parents in the same hospital were matched for correlation analysis. According to the results, nurses and parents are positively correlated in terms of Q1, Q2, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, responsiveness, reliability and overall score (p<0.05, r=0.709~0.908), and the highest score of positive correlation occurs in the dimension of responsiveness, with r=0.904. Scatter plots were drawn for the indicators with statistical significance in the correlation

analysis, with nurses as the horizontal axis and parents as the vertical axis. The details are presented as per Table 4.21.

Table 4.21 Correlation analysis of nurses and parents

Indicator	r	P
Q1	0.756*	**0.03**
Q2	0.709*	**0.049**
Q3	0.677	0.065
Q4	0.639	0.088
Q5	0.805*	**0.016**
Q6	0.759*	**0.029**
Q7	0.772*	**0.025**
Q8	0.789*	**0.02**
Q9	0.908**	**0.002**
Q10	0.804*	**0.016**
Q11	0.841**	**0.009**
Q12	0.755*	**0.03**
Q13	0.422	0.298
Q14	0.525	0.182
Q15	0.115	0.787
Q16	0.034	0.936
Q17	0.423	0.296
Q18	0.401	0.325
Q19	0.451	0.263
Q20	0.097	0.819
Q21	0.356	0.387
Tangibles	0.733*	**0.039**
Reliability	0.864**	**0.006**
Responsiveness	0.904**	**0.002**
Assurance	0.154	0.716
Empathy	0.382	0.35
Overall score	0.902**	**0.002**

Note: * correlation at the level of 0.05. ** correlation at the level of 0.01.

A scatter plot, also known as scatter chart, scatter diagram, or scattergraph, is a type of mathematical chart which displays a set of data, as a collection of individual points, using two variables on the two Cartesian coordinates. Each point represents one data, showing the value of both the variables for that particular data. Scatter plot is one of the seven basic tools used in quality control. It is also used in finding out the future trends by studying past data.

The use of scatter plots is when there is a huge data set and the requirement is to obtain the relationship between two variables, if any exists. Unlike line graphs, here we get a scattered set of points which are used to get ‘best fit line’ or ‘trendline’. Closer the points to this line, stronger the correlation between the two variables.

The scatter plot of the overall score of nursing service perception by nurses and parents is shown as per Figure 4.1, and the scatter plot of tangibles for nurses and parents is shown as per Figure 4.2.

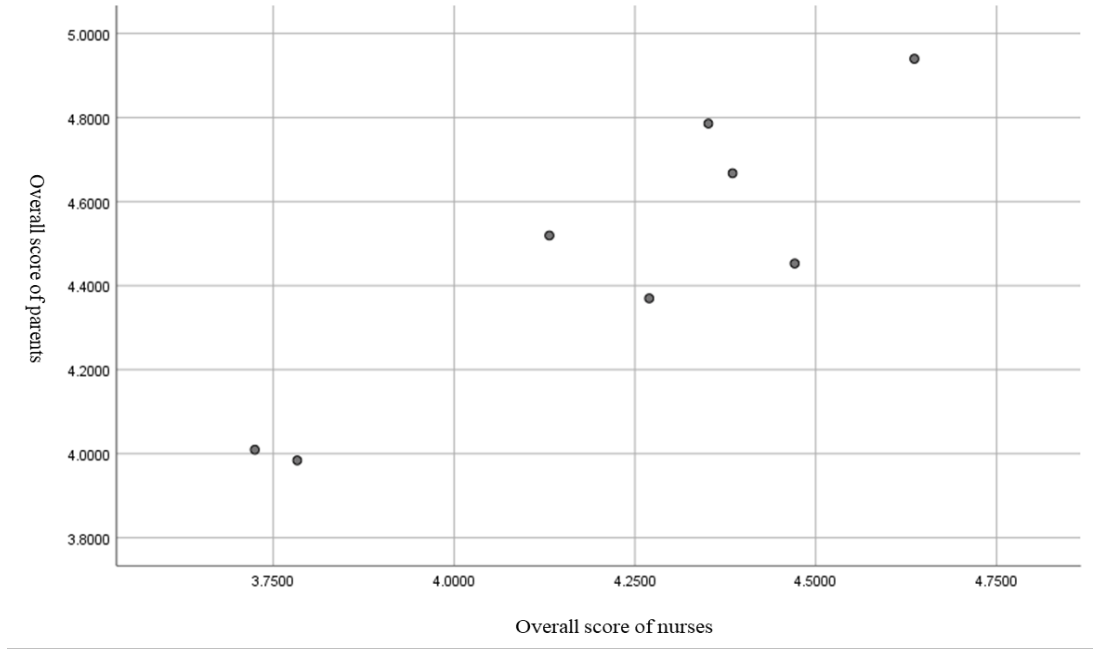


Figure 4.1 Scatter plot of the overall score of nursing service perception by nurses and parents

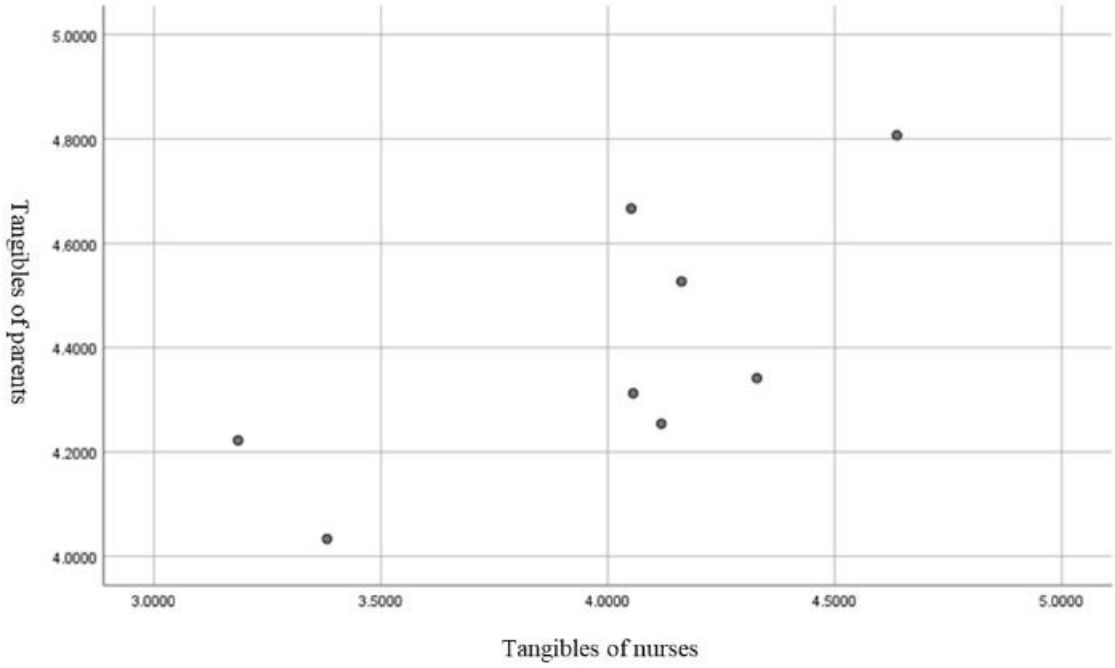


Figure 4.2 Scatter plot of tangibles for nurses and parents

4.7 Discussion

Data collection of the questionnaire in this study has been affected by the COVID-19 epidemic prevention and control measures. Due to the quarantine and lockdown policy, the children have less opportunities to play outdoors, leading to a reduction in the incidence of limb fractures, which exerts a certain impact on the number of questionnaires collected from parents of children.

Similarly, the reduction in the number of children patients also leads to a corresponding reduction in the number of nurses caring for them. As a matter of fact, many nursing staff have been devoted to the anti-epidemic affairs, which also exerts a certain impact on the number of questionnaires collected from nurses. Therefore, when discussing the differences between hospitals, the hospitals with the lowest number of questionnaires collected from the nursing staff and the parents will be excluded from the discussion, and the two hospitals are Hunan Children's Hospital and Luzhou Hospital of Traditional Chinese Medicine respectively.

4.7.1 Differences between nurses and parents in their perceptions of nursing service

The research results indicate that there is a statistical difference between the nurses and parents in their scores of the perceived nursing service. The perceived nursing service of nurses scored 4.32, while the perceived nursing service of parents scored 4.46, showing that the perceptions of nursing service of the parents are higher than those of the nurses. The results of this study differ slightly from those of other studies. M. A. Lee (2005) compared the perceived healthcare service of customers and service providers; Kim and Lee (2005) used a self-designed questionnaire based on the SERVQUAL scale to compare the perceived healthcare service of patients and nurses in four general hospitals. Both studies showed that the perceptions of patients as clients are different from the perceptions of nurses as service providers, and both the expectations and perceptions of the nurses are higher than those of the patients. It is commonly recognized that the perceptions of nursing service by the nurses and the parents are different. However, in this study, it is found that the perceptions of nursing service by the nurses are lower than those of the parents, while the other two studies reach the opposite conclusion. This may be attributed to the particularity of the respondents of this study. In pediatrics, nurses have to take greater risk and responsibility, and the parents of the children tend to have higher expectations of nursing service, thus leading to this result. The results therefore also suggest that in pediatrics, the parents tend to have higher requirements and pediatric nurses need to be given more attention, which is in line with results in previous research. Ji (2005) found that inappropriate communication, excessive medical jargons and inadequate explanations can exacerbate misunderstandings or dissatisfaction between nurses and patients in pediatric wards. Li (2018) also reported that pediatrics is exceptional among all hospital departments. Many parents argue with the nursing staff because they cannot tolerate their children crying during treatment, which increases the difficulty of pediatric care and places higher demands on the nursing staff.

Previous studies indicate that children with limb fractures are generally difficult to control and are prone to negative effects such as uncooperativeness and pain during treatment and care, leading to reduced patient satisfaction and increased nursing disputes. Fractures in children are a difficult problem in orthopedics. It is difficult to control in two main ways: (1) it is difficult for medical staff to control the children; and (2) it is difficult for the children themselves to control their own physical behaviors. As a result, pediatric orthopedic patients often develop negative emotions during treatment, such as irritability, writhing, crying and fear. More importantly, if the timing of treatment is delayed, the rate of bone healing will be delayed, which can produce detrimental effects (Jiang, 2017). Therefore, the treatment of such special patients requires special nursing methods. All these factors may have contributed to the differences between the parents and the nurses and the lower score of the nurses in the perception of nursing service. In the future, we should pay more attention to the perceptions of pediatric nurses in nursing service, as they need to not only care for the children, but also gain the trust and understanding of the parents.

Previous studies have shown that the healthcare service of the nurses is a major factor influencing the nurse-patient relationship and plays an important role in the whole nursing process. The nurse's behavior plays a decisive role in the establishment of the nurse-patient relationship. Therefore, the development of the nurse-patient relationship depends to a large extent on the nurses. In addition, medical ethics and humanistic education should be strengthened, as every action of the medical staff directly or indirectly affects the physical and mental health of the patient and thus affects the outcome of the treatment (Wang & Yu, 2017). The behavior of pediatric nurses plays a very important role in establishing a good nurse-patient relationship, and paying more attention to pediatric nurses is also a management measure to reduce medical disputes.

4.7.2 Differences between nurses of hospitals in different regions in their perceptions of nursing service

The results of this study show that the perceptions of nurses of hospitals in different regions differ in all dimensions, which resonates with the researcher. The researcher was once sent by the National Health Commission to Yunnan to support its development of nursing care for six months, during which she fully felt that the level and perception of nursing service varied greatly from one region to another. The hospital with the lowest total perception score by the nurses in this study is Shenzhen Children's Hospital. As a coastal developed region, Shenzhen

has abundant opportunities to keep abreast of the up-to-date nursing knowledge, so nurses in Shenzhen are so well-informed in nursing that they tend to see deficiencies, leading to lower perception scores.

4.7.3 Differences between nurses with different professional titles in their perceptions of nursing service

The results of this study show that the perceptions of nurses with different professional titles differ in all dimensions. There is slight difference in the perception of nursing service between nurses and nurse practitioners, but for nurse practitioners, nurses-in-charge, associate chief nurses and above, the higher the professional title, the lower the score of perceived nursing service. Both nurses and nurse practitioners are relatively young, so the difference between them is not significant. However, as nurses gradually obtain higher titles, their nursing knowledge becomes more enriched, their nursing experience becomes more sufficient and their thinking becomes more critical, so it will be easier for them to identify problems and deficiencies, and that explains why their score is relatively low. Therefore, we should give full play to the advantages of nurses with high professional titles, pay attention to the problems they find, and address the clinical needs in a timely manner.

4.7.4 Differences between nurses with different ages in their perceptions of tangibles

The results of this study show that the perceptions of tangibles by nurses with different ages are different, and the older the nurses, the lower their scores of tangibles, with the nurses aged over 41 having the lowest score. The questionnaire items related to nurses' perception of tangibles are mainly Q2 (The wards have advanced nursing service equipment) and Q3 (The layout/facilities of the wards reflect the hospital's philosophy of nursing service). The researcher has been engaged in pediatric nursing for many years and is aware of the fact that the workload of pediatric nurses is very heavy, and the physical strength of the nurses decreases as they grow old. Therefore, it is extremely important to take advantage of advanced nursing equipment and reasonable layout to reduce unnecessary wastage of physical strength. The nursing managers also need to listen fully to the needs of relatively old nurses to help them cope with their work.

4.7.5 Differences between nurses with different educational backgrounds in their perceptions of reliability

The level of education indicates the degree of literacy of the nurses, which refers to the years and status of education. The degree of education of the nurses largely determines their ideals, sentiments, values, moral standards, educational abilities and education styles, which directly affects the ability and quality of their nursing service. The results of this study show that there are differences in the perception of reliability between nurses with different educational backgrounds, and the higher the level of education, the lower the perception of reliability. This indicates that as nurses with higher education level have a more comprehensive knowledge of the disease and child care issues, they tend to feel that a lot of work has not been done, so their score of reliability is relatively low. There is also another explanation. Nurses with higher education level are less proficient in practical nursing work, and are much slower than nurses with lower education level in terms of efficiency and speed, so that many of their tasks cannot be completed in time, which is also a reason for low score in reliability. Therefore, personalized training and guidance should be given to nurses with different levels of education. For nurses with low levels of education, theoretical training and training in nursing knowledge should be strengthened; for nurses with high levels of education, more training in skills should be offered.

4.7.6 Differences between parents of hospitals in different regions in their perceptions of nursing service

The results of this study show that there are differences in the perceptions of nursing service by parents of hospitals in different regions. The parents of children in the Anhui Provincial Children's Hospital have the lowest overall score in perceptions of nursing service. According to the researcher's communication with the parents of children with fractures, they tend to search online or go to large hospitals to consult fracture treatment therapies. In addition, large cities have convenient transportation, favorable medical conditions and well-developed Internet connectivity, which makes it easier for parents to be informed of the conditions their children and can boost their confidence in treatment. However, due to unfamiliarity with the environment of large hospitals, parents may be afraid to communicate with the medical professionals, thus affecting the effectiveness of health education and the level of nursing care support. Therefore, it is important to pay more attention to the parents of the children, and establish a good patient-care relationship by encouraging the nurses to take the initiative to talk to the parents and eliminate their sense of unfamiliarity as soon as possible.

4.7.7 Differences between parents with different ages of children in their perceptions of nursing service

The results of this study show that the perceptions of parents with different ages of children differ in all dimensions, and the younger the child, the lower the perceptions of nursing service by the parents. This result is consistent with the researcher's years of clinical experience in pediatrics. The younger the child, the more care responsibilities the parents have and the less experienced the parents are in parenting. In this case, they need more care and help from the nurses, and they are also more worried about the prognosis and recovery of the child. The slightest negligence in nursing care may be the trigger for a dispute. In addition, the younger the child, the more guilt and compensation the parents feel, so the parents will have higher demands on nursing care, which lead to their low perception of nursing service.

4.7.8 Differences between parents of different ages in their perceptions of nursing service

The results of this study show that there are differences in the perceptions of nursing service by parents of different ages in terms of the total score, reliability, responsiveness, assurance and empathy, and the younger the parents, the lower the perception of nursing service. This is in line with the researcher's years of clinical experience in pediatrics. Younger parents often have less experience in taking care of the children and dealing with unfamiliar environments and emergencies, so they strongly expect the nurses to be reliable, responsive and assuring, as well as empathetic. The more demanding they are, the lower their perception of nursing service will be.

4.7.9 Differences between parents with or without confidence in treatment in their perceptions of nursing service

The results of this study show that there are differences in the perceptions of nursing service by parents with or without confidence in the treatment. The parents who are full of confidence have the highest overall score of 4.50 (p<0.05) on the perception of nursing service. Whether parents are confident in the treatment is directly related to whether they trust the nursing service, and in most case, clinical disputes between nurses and patients are caused by distrust. This is why it is important to give the parents confidence in the treatment, and possible approaches include presentation of successful cases and mutual communication between parents of children who have already undergone surgery. If allowed, hospitals can arrange for patients and families to learn, communicate and share common problems together through planned parent education

classes. The hospitals can also print various leaflets for free distribution to effectively alleviate the anxiety of the parents, guide the children to receive treatment and rehabilitation exercises after discharge, provide continuous care, and increase the children's compliance with functional exercises, so as to achieve enhanced recovery after surgery (Zhao et al., 2017). Previous studies have also shown that the medical staff should enhance therapeutic communication during the treatment process. The Chinese Handbook of Nursing states that enhancing communication with patients about their illness is beneficial to their treatment and recovery, and that this is one of the psychotherapeutic approaches. It aims to help patients overcome psychological barriers in the face of the existing facts and help them regain their confidence and actively cooperate with clinical treatment (L. Chen, 2014). Therefore, it is important for nurses to effectively convey confidence to the parents so that they can actively cooperate with the treatment.

4.7.10 Differences between parents whose children have different fracture sites in their perceptions of nursing service

The results of this study show that there are differences in the perceptions of nursing service by parents whose children have different fracture sites in terms of total score, reliability, responsiveness, assurance and empathy, and the perception of nursing service is lower for parents whose children have lower limb fractures. This is in line with the researcher's clinical experience in pediatrics. Lower limb fractures bring more inconvenience to the patient's life. Due to the inability to walk, the children need to be cared for when they need to use the toilet or turn around. When the nurses offer these nursing services, the children often feel pain and are therefore uncooperative, so the parents strongly expect the nurses to provide reliable and responsive services as well as have the empathy to better understand the needs. Therefore, in the future, it is important to be anticipatory and give more assistance in the care of children with lower limb fractures.

4.7.11 Differences between parents of different genders in their perceptions of nursing service

The results of this study show that there are differences in the perceptions of nursing service by parents of different genders, and compared with mothers, fathers have higher overall score in the total score of perceived nursing service (p<0.05). This is closely related to the traditional Chinese culture, in which women take on more responsibility for the care of their children. In addition, children tend to have a natural dependence on their mothers. Therefore, the nurses

should pay more attention to the needs of mothers and give more help to them.

4.7.12 Positive correlation between the perceptions of tangibles by the nurses and the parents

The results of this study indicate a positive correlation between the nurses' perception of tangibles and the parents' perception of tangibles. The item Q1 (The health education publicity materials in the wards are adapted to the needs of the work) has statistical significance (p<0.05). This result is consistent with the results of previous studies. Hospitals should strengthen health education for parents of children with limb fractures, improve their understanding of the disease, and increase their confidence that their children will be properly cared for, thus indirectly conveying the positive attitude to the children and improving their psychological state and compliance. As a result, it enables hospitals to successfully carry out clinical care, improve the quality of life of children with fractures and shorten the number of hospital days (Xiao, 2019).

The treatment and rehabilitation of fractures is a relatively long process, and survey results show that the needs for health education among parents of children are common, but at different stages of the disease, the needs for knowledge are focused on different aspects (Zhang, 2009). For example, the needs for knowledge on treatment methods and effects at admission account for 98.2%, the needs for knowledge on the patient's condition account for 96.3%, the needs for knowledge on the use of medication account for 92.7%, the needs for knowledge on the hospitalization costs account for 87.3%, and the needs for knowledge on the doctors and nurses account for 86.4%. Traditionally, we tend to focus on the rules and regulations of the hospital and the environment of the wards and ignore what the parents want to know most. As a result, the parents are anxious and nervous, repeatedly asking about the condition of their child, constantly enquiring about the qualifications of the medical staff, expecting their child to be treated and cared by experienced medical staff. They also ask the nurses to always keep an eye on their child, observe the condition, and ask the doctor to examine the child because of crying, advance the surgery and other unreasonable requests (Liu & Zhou, 2011). In this case, the parents are in a state of irritability and if the answer of the nursing staff is unsatisfactory or if they show a little impatience, it is easy to cause nurse-patient conflict. Therefore, the hospitals should increase the number of targeted health education materials, so that the parents can get access to the most important information they want to know when they are admitted to the hospital. Knowledge about the disease, treatment methods and effects, and successful cases can be put into the publicity materials to help the parents build confidence in defeating the disease

and eliminate their panic. By winning trust of the parents, they will actively combat with the disease and their satisfaction with the medical care of their children and compliance with treatment will be significantly increased.

For nurses, it is common in clinical work that when performing basic or specialist operations, they have to answer questions from the children or their family members. In nursing management, it is found in the "causal analysis" of nursing errors that each error is the result of multiple factors triggering and influencing each other. Among them, the interference of different factors is one of the important causes. According to Deng et al. (2013), interference factors accounted for 14.14% of the incidence of nursing errors. Adequate health education materials can provide all the relevant knowledge on disease education, functional exercise methods, pre-operative and post-operative diet, changes in decubitus and position, and prognosis and rehabilitation. This allows the parents to receive the knowledge they are most eager to obtain when they are first admitted to the hospital, preventing them from asking repeated questions due to lack of understanding and uncertainty, and ensuring that the continuity of nursing service is not interrupted.

4.7.13 Positive correlation between the perceptions of reliability by the nurses and the parents

The results of this study indicate a positive correlation between the nurses' perception of reliability and the parents' perception of reliability. The medical staff in pediatrics have to take on more responsibility, because children are not miniature versions of adults and they have their own characteristics. The rapidly changing conditions and weak expressive skills of children require that the medical staff in pediatric must have a strong sense of responsibility, risk anticipation ability, communication skills and the ability to promote health education to and coordinate with families, as well as more patience and compassion. This requires nursing managers to give nurses a lot of training and rehearsal to be reliable in their work. This is consistent with previous research findings that the ability of an institution to provide safe and high-quality pediatric medical care depends on the expertise and training of its pediatric nurses (Coats et al., 2018). During hospitalization, the nursing staff should accurately grasp the psychology of the parents, adopt various approaches to promote disease knowledge, guide the scientific nursing care, build a communication platform and teach relaxation techniques to relieve parents' anxiety, satisfy the desire to participate in recovery, enhance confidence in treatment, cooperate with healthcare professionals in treatment and promote recovery of the

children. The nursing staff should focus on meeting the emotional needs of the children and their parents, helping the parents to adjust to a positive state and scientifically participating in the children's rehabilitation exercises. It is an effective supporting approach to treatment as well as an effective guarantee for the early recovery of the children.

4.7.14 Positive correlation between the perceptions of responsiveness by the nurses and the parents

The results of this study indicate a positive correlation between the nurses' perception of responsiveness and the parents' perception of responsiveness, which is consistent with the findings of previous studies. Parental attitudes towards illness directly affect the coordination of treatment and nursing care for children and can influence the ultimate treatment efficacy and subsequent recovery of pediatric patients. Previous studies have shown that sometimes when there are not enough nurses to meet the needs of pediatric patients, non-pediatric professionals should only be involved if they have demonstrated their ability to carry out the basic nursing activities required to care for pediatric patients. If qualified pediatric staff are not available in the area, children may need to be transferred to an institution that can better meet their needs. Qualified staff should undergo baseline and annual assessments that include specific ages and psychosocial competencies as well as key pediatric skills (Thrasher et al., 2018). It is evident from previous studies that pediatric nurses are in short supply and in many cases the responsiveness depends on the adequacy of the pediatric nurse workforce.

It Is found that a positive parental state of mind can promote the children's recovery and psychological well-being (Harrison, 2010). The family-centered model of care has become a tenet of Western pediatric care and is included in clinical practice guidelines. It emphasizes the need to focus on the role of the family and the responsibility and goal of healthcare professionals are not only limited to promotion of children's recovery, but also their healthy emotional and psychological development (American Nurses Association, 2003; Committee on Hospital Care and Institute for Patient and Family-Centered Care, 2012). However, the recognition of family-centered services among the nursing staff in developing countries is significantly lower (Zhu et al., 2015). It is proved that the implementation of a family-centered model of care in pediatric medical wards can reduce the length of stay of children. It is more conducive to the children's physical and mental health, and can increase the satisfaction of their families (Yi et al., 2013). On this basis, the family-centered treatment can alleviate the anxiety of the parents, and play an important role in promoting the children's physical and psychological recovery. Almost all

treatment and care for the children is decided and completed by their family members, so the nursing philosophy has also gradually changed to a family-centered care model. As the family members play an important role in the children's recovery, a large part of the nursing work should focus on communication and exchange with the family members to gain their trust and understanding and invite them to jointly participate in care of the children, which will also facilitate the children's recovery.

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Chapter 5: Conclusion and Outlook

5.1 Research conclusion

The subjects of this study are nurses and parents of children in pediatric orthopedic wards. The verbal communication skills, psychological stress response, and skeletal growth and developmental characteristics of the children as well as the cognitive ability and compliance of their parents exert a great influence on the service process studied in this research, but they are notably missing in relevant studies in the past, so inclusion of these factors is an important feature of this study. The final findings of the study are also applicable to adult patients who are able to cooperate with medical staff in nursing care, and can be radiated to patients with dementia and aphasia, coma, and other critical illnesses. This study focuses on the differences between the different participants in the pediatric orthopedic inpatient service process. With reference to the SERVQUAL model, we focus on analyzing the differences in the perceptions of nursing service by the two groups pf nurses and parents among the different participants, rather than treating them as a “single group” with no differences, which is an effective approach to identify management problems in the medical service delivery. In addition to solving the fragmented problems found at several important links in the process of medical service delivery, we are able to summarize the complete requirements necessary for the design of desirable medical service processes with wide applicability, so as to strike a balance between the needs of both internal customers (nurses) and external customers (parents). On this basis, we are exploring to promote this model in the national medical system to improve the quality of medical services in general.

5.1.1 Differences in perceptions of nursing service between nurses and parents of children in the pediatric orthopedic inpatient process

In this study, differences were found in the perception of nursing service between nurses and parents of children involved in the care of children with limb fractures in the pediatric orthopedic inpatient process, and the parents had higher scores than the nurses in their perceptions of nursing service, suggesting that managers should pay more attention to the perceptions and needs of pediatric nurses in their management.

5.1.2 Factors leading to differences in nurses' perceptions of nursing service in the pediatric orthopedic inpatient process

In the survey of nurses involved in the care of children patients with limb fractures, it was found that the nurses' perceptions of nursing service differed according to the location of their hospital, their professional title, age, and educational background. The results of the study showed that the higher the professional title, the lower the nurses' perception of nursing care; the older the age, the lower the nurses' perception of nursing tangibles; the higher the educational background, the lower the nurses' perception of nursing reliability. These all suggest that nursing managers need to take geographical factors into consideration in the management of nurses in hospitals in different regions, and more attention should be given to nurses with higher professional titles, older age, and higher educational background.

5.1.3 Factors leading to differences in parents' perceptions of nursing service in the pediatric orthopedic inpatient process

In the survey of parents involved in the care of children patients with limb fractures, it was found that the parents' perceptions of nursing service differed according to the location of hospitals, ages of the children, ages of the parents, whether the parents have confidence in the treatment, fracture sites, and the gender of parents. The results of the study showed that the younger the age of the children, the lower the parents' perception of nursing care; the younger the age of parents, the lower the parents' perception of nursing care; the higher the confidence in treatment, the higher the parents' perception of nursing care; parents whose children have lower limb fractures have lower perception of nursing care; and fathers have higher perception of nursing care compared to mothers. These all suggest that managers should pay more attention to parents from different regions, parents of young children, young parents, parents of children who are not confident in treatment, parents of children with lower limb fractures, and mothers of children patients.

5.1.4 Perceptions of nursing service by nurses and parents are mutually influenced

In this study, it was found that the perceptions of nursing service by the nurses and parents involved in the care of children with limb fractures are mutually influenced and they are positively related in terms of tangibles, reliability, and responsiveness. As for tangibles, more attention can be paid to identify whether the health education promotional materials are adequate. Nursing managers can increase the adequacy of health education materials in

tangibles to provide the parents with their most desired knowledge and ensure the continuity of nursing care without interruptions. As for reliability, the managers can strengthen the training and practice of nurses and education of nursing knowledge for the patients. As for responsiveness, the mangers can promote measures such as family-centered care.

5.2 Suggestions for nursing managers

Through this study, it is hoped that the nursing managers can provide professional services to the nurses and parents of children at the level of emotional psychology and social resources to alleviate their negative emotions and enhance the service effectiveness of the medical staff, integrate available resources to promote the degree of adaptation of the children to the hospital and improve the effectiveness of treatment and recovery of the children, thus reducing the perceived differences between the nurses and the parents of children and making efforts to create a harmonious nurse-patient relationship.

5.2.1 Nursing managers should focus on nurses' happiness index

At present, most of the hospital management in China is "patient-centered", and many policies are formulated from the patients' point of view, with little regard to what nurses think and what they can do. Especially in China, the number of nurses is extremely insufficient, and they are often overworked due to the shortage of nursing staff. The increasing number of doctor-patient conflicts lead to a sense of insecurity felt by the medical staff, let alone the sense of happiness. How can a medical professional without a sense of happiness give a sense of happiness and security to their patients? Therefore, hospital managers should think more about how to create a sense of happiness at work for the medical staff.

As a nursing manager for many years, I hope to lead my team to provide high-quality nursing service to the patients. But how to get high-quality nursing services? The traditional practice of many hospitals is to increase frequencies of inspection, strengthen training of basic theory, basic knowledge and basic skills, and strengthen theoretical assessment. In addition to making no mistakes in the nursing care in face of various medical emergencies of patients, the nurses have to go through strict internal assessments, which makes them feel exhausted and highly stressed. In this case, the nurses are even not satisfied with their own living conditions, and it would be impossible to require them to provide high-quality services to the patients. I believe whether the nurses can provide high-quality services to the patients depends on their state as human beings. They must be willing to do so, rather than being coerced to make it

through various administrative orders and rules and regulations.

At present, some hospitals at home and abroad have started to implement "no punishment" measures, encouraging people to report problems at work in a timely manner and solve the problems under the assistance of the nursing managers. The nursing managers should create a safe and harmonious working environment for the nurses so that they are not afraid of and resistant to the nursing managers. In the context of tense doctor-patient relationship in China, the nursing managers need to think about how to reduce the pressure on the nursing staff and fully mobilize their motivation. I believe that improving the working enthusiasm of employees is more effective than any inspection or punishment measures, and it is the core issue of nursing management.

A person's energy is limited, and if the nursing managers consume a lot of nurses' energies elsewhere, they will inevitably put less energy into caring for patients. This is why hospitals have always advocated giving time back to the patients and giving the nurses back to the patients.

If the nurses can devote more time and energy to work in the wards and care of the patients, I believe that the doctor-patient conflicts will also be reduced, and the doctor-patient relationship will become more harmonious. Currently, many patients believe that as they do not often see nurses in the wards, the nurses are considered to be apathetic and indifferent to the patients. In fact, the patients do not know that in addition to their daily work in the wards, the nurses have to spend much time dealing with various examinations, assessments, and training.

Although it may be a long process to change the current status quo of nursing management, I hope that hospital administrators and nursing managers can recognize the problem and take the first step towards reform, which will make us a step closer to the success.

5.2.3 Nursing managers need to focus more on the perceptions and needs of pediatric nurses

For nurses in pediatrics, children are not miniatures of adults and they have their own characteristics. Children's rapidly changing conditions and weak expressive skills require pediatric health care workers to have a strong sense of responsibility, strong ability to anticipate risks, communication skills, and the ability to provide health education to families, as well as more patience and love. This means that pediatric nurses take more risk and responsibility in their work, and parents of children will have higher demands on the nursing care. As a nursing manager, it is important to first equip the pediatric department with sufficient manpower to

ensure the smooth operation of clinical service, and give pediatric nurses more training on aspects such as business skills, risk anticipation, and communication skills. The researcher once went to the Children's Hospital of Pittsburgh in the United States for further training and found that in the United States, the younger the children, the higher the requirements for nurses, and this is something that nursing managers in China can learn from in the future.

5.2.4 Nursing managers should provide a family-centered model of nursing care to the parents

Fractures in children are mostly medical emergencies, and instantaneous accidents change the daily life patterns and emotions of the parents of the children (Y. Y. Chen, 2014). The parents of children with fractures are in poor psychological condition, so the nursing staff should take appropriate nursing countermeasures to make the family members actively cooperate with them. When the children are admitted to the hospital, the medical staff should fully understand the mood of the parents and promptly inform the parents of what they want to know in a detailed and comprehensive manner, which can enable them to quickly understand the unfamiliar environment in a short period of time. In addition, the nursing staff should actively communicate with the children and parents to eliminate their panic and enhance their treatment compliance.

The philosophy of "family-centered" treatment focuses on the children and their parents. Having a favorable doctor-patient and nurse-patient relationship is a prerequisite for smooth delivery of medical service, and rational use of family-centered treatment is conducive to shortening the distance between the doctors and the patients. Meeting the psychological needs of the parents is conducive to building a doctor-patient relationship featuring mutual trust, increasing the compliance and initiative of pediatric parents to medical services to ensure the effectiveness of treatment, and avoiding doctor-patient conflicts. The family-centered nursing model meets the expectation of parents, enhances treatment compliance, and effectively promotes the recovery of children, which has clinical significance.

A survey in the United Kingdom has shown that on average about 25% of children suffer from accidental trauma each year, of which 10% to 25% are limb fractures (Rennie et al., 2007). In China, it is estimated that 70% of pediatric orthopedic inpatients are patients of limb fractures (Liang & Li, 2009). The conditions of children patients are special, because they are prone to crying after a sudden acute injury and cannot express themselves correctly, which makes communication difficult, so the parents often have painful, angry and irrational emotions. In

addition, the unfamiliar environment and asymmetric information about the disease after hospitalization can aggravate the parents' anxiety, leading to emotional instability and uncooperative treatment, and pediatrics even becomes a severely afflicted area for poor doctor-patient relationship (Yin & Zhong, 2012). It has been proved that hospitalization for illness is a negative life event for both the children themselves and their relatives, and it is a relatively strong source of psychological stress which can lead to corresponding psychological reactions of the children's relatives during hospitalization (Fu, 2012). Negative emotions are common among parents of children with fractures (Zhao et al., 2014).

The parents' attitude toward the disease directly affects the treatment cooperation and nursing care of the children and influences the final outcome and prognosis of the children (Brochhausen et al., 2012). A positive parental psychological state can promote the recovery of the children and their psychological health (Harrison, 2010). The family-centered care model has become a tenet of Western pediatric care and is included in the relevant clinical guidelines, which emphasize the role of family in care and require that the responsibility and goal of the medical staff is to promote not only the children's recovery, but also the healthy emotional and psychological development of them (Committee on Hospital Care and Institute for Patient and Family-Centered Care, 2012). However, the nursing staff in developing countries have a significantly low level of recognition on family-centered services (Zhu et al., 2015). Studies have shown that implementing a family-centered care model in pediatric internal medicine wards can shorten the length of stay of the children, promote their physical and mental health, and improve the satisfaction of their families (Yi et al., 2013). On this basis, the family-centered treatment philosophy can alleviate the anxiety of parents and plays an important role in promoting the physical and psychological recovery of children. The nursing managers should pay attention to family-centered care and promote it in the clinical service.

5.3 Suggestions for hospital administrators

This study shows that there is a difference in the perception of nursing services between nurses and parents, and this difference in perception is to some extent a trigger for doctor-patient conflict. Perception is actually a subjective feeling and a reflection in the psychological level, so hospital managers should not only think about how to reduce the differences of perceptions between nurses and parents on the surface; instead, they should think about how to solve such problems from a more profound perspective. For example, they should think about how to improve the perceptions of nurses and parents, how to make nurses and parents understand each

other through training and education, and how to reduce the perceived differences at the psychological level. As a director of a hospital, the researcher has thought about how to solve such problems in an in-depth manner and listed her suggestions for hospital administrators, hoping to make her own efforts to promote doctor-patient relationship.

5.3.1 Introduction of medical social worker mechanism in hospitals has a positive effect on supporting services for hospitalized children

When the researcher was studying at the Children's Hospital of Pittsburgh in the United States, she found that the hospital's social worker department helped patients solve many problems and also helped health care workers save a lot of time and made a great deal of contributions to doctor-patient friendship. Therefore, it is recommended that hospitals in China introduce medical social worker mechanism to provide positive supporting services for hospitalized children.

Medical social workers can assist medical staff in dealing with psychological and emotional distress to children and their families, assist children and their families to adapt to the hospital environment as soon as possible, promote communication between doctors and patients and the transmission of medical information, motivate patients to actively cooperate with treatment and enhance their confidence in recovery, assist the children and their families to deal with other relationships in the hospital, assist them in facing and solving the suffering caused by diseases, and promote their adaptation to life.

The medical social workers attach Importance to the Individual feelings of the children and give them and their families all-round support through listening, talking, caring and accompanying to help them recover and rebuild their self-confidence. They continuously identify, analyze and solve problems in the communication process, help the children and their families make final decisions, identify crisis events of the children and their families in a timely manner and make reasonable assessments and treatments. Through assessment, medical social workers are able to identify the next stage or further service needs of the children and their families, and coordinate available internal and external resources. Medical social workers handle the relationship between the children and their families and medical and nursing staff in their daily work, help the patients gradually recover their health status and stimulate or enhance their personal potential.

In addition, the service targets of the medical social workers also include medical and nursing staff in the hospital. In their busy work schedule, high pressure, fighting against illness

and treatment of patients' diseases, the medical and nursing staff also need an effective service and care that can help them effectively regulate their emotions and restore their physical and mental health.

Under the situation of extreme shortage of medical and nursing staff and the serious conflict between doctors and patients, medical social workers are like a drop of lubricating oil between the medical and nursing staff and the patients, and hospital administrators should make full use of medical social workers to serve the medical and nursing staff and the patients.

5.3.2 Organization of classes for parents of children patients

Many doctor-patient conflicts are caused by the asymmetry of medical information and inconsistency of medical knowledge and cognition. Therefore, it is suggested that the hospital should organize medical staff to introduce the knowledge of various diseases, health care and rehabilitation exercises to parents of children on a regular basis, or invite medical staff from other departments to give lectures to parents. Through planned parent education classes, parents can learn, exchange and share their concerns about common problems, such as post-operative care knowledge, reasonable diet, and rehabilitation and exercise. Various leaflets can be printed and distributed for free, so as to effectively relieve the parents' anxiety and encourage them to cooperate with the medical staff in guiding and caring for their children to receive treatment and rehabilitation exercises.

Feedback will be collected after each parent class to fully understand the most important knowledge that the parents want to know so as to make timely adjustments to the class contents, which enables the parents to quickly understand the unfamiliar environment in a short period of time, and understand the disease knowledge, treatment methods and effects of the children's condition. For their common psychological problems, positive and effective lectures can help them establish confidence in overcoming the disease, eliminate panic, enhance trust of the parents, and actively seek treatment. In this way, the parents are significantly more satisfied with the nursing care, and the treatment compliance is also enhanced.

In addition, we can also introduce the concept of group therapy. Apart from lectures given by the medical and nursing staff, parents of children who have been successfully recovered can be invited to share their experience, their journey of heart, and how they overcame some difficulties, including their gratitude to the medical and nursing staff. It can help build confidence in other parents. Parents who share a common experience can easily develop trust and empathy, which is sometimes much more effective than even a lecture given by the medical

staff.

Families of hospitalized children are often thought to need only financial support, but they also need psychological support. The parenting class helps parents understand the basic information of the disease, alleviates the fear and anxiety caused by the ignorance or misunderstanding of the disease, helps parents express their anxiety reasonably, guides the parents to master the correct way of emotional guidance and adjustment, helps the parents understand and adapt to the hospital rules and regulations, and integrate the resources available to facilitate parents' adaptation to the hospital and create a more harmonious doctor-patient relationship.

5.3.3 Training to help the medical staff with emotional management and helping skills

In medical treatment, the medical staff cannot serve their patients well if they cannot adjust their emotions well. The patients have always been positioned as the vulnerable groups in hospitals, but medical staff's needs for social support has been neglected for a long time. It is very important to help the medical staff learn stress management skills and interpersonal communication skills to help them control their emotions and relieve stress. In this way, they can be conscious of their own stressful emotions and make timely adjustments and self-intervention. The medical industry is a high-risk and low-return industry, and patients entrust their lives to the medical staff when they enter the hospital. The duty of the medical staff is to remove their physical pain and relieve the pressure on their minds. In order to work more efficiently, the medical staff need improvement of communication skills, psychological relaxation and spiritual growth to better adapt to the new situation and improve the quality and effectiveness of services.

5.3.3.1 Improve the mood of the parents

It is known in this study that fracture is an accidental injury characterized with suddenness and unpredictability, which can easily lead to panic and anxiety among the children and their parents. In this case, the parents are more concerned about the information related to the treatment of their children's injury and hoped to hear verbal reassurance from the medical professionals, such as "it will not affect the child's future quality of life". If the nurses introduce the treatment plan of the fracture to the parents in detail at the first time of admission, using a combination of pictures and text, it can give the parents a more intuitive feeling and enable them to fully understand the treatment plan, which will increase their cooperation and significantly reduce their anxiety and concern. When the parents have knowledge about the trauma of their children,

their worries and fears will be significantly reduced. As a result, they can take care of the children more carefully and comfort the children with a positive attitude to relieve their fear. In clinical treatment, we often see that when the parents are in a very nervous state, the children will immediately feel the mood. When they see their parents fidgeting in an unfamiliar environment and suffer from the pain caused by the trauma itself, the children will be more afraid. The younger children will be more likely to cry and scream, and even resist cooperation with various treatments, which will bring great resistance to the nursing care and is also not conducive to the children's recovery. Therefore, it is very important in clinical nursing to improve the mood of the parents to make them actively cooperate with the treatment, and the nursing managers should help the nurses to identify the root of the problem.

5.3.3.2 Strive to create a harmonious nurse-patient relationship

A good nurse-patient relationship is the foundation for the establishment of trust between nurses and patients. As the main implementers of nursing care, nurses are more likely to play their subjective initiative in the clinical service and fully mobilize their available resources to solve problems, which can effectively promote the nurse-patient relationship. In the mid-night shifts, the number of nurses is reduced compared to the day shifts, and the admission of such children with accidental traumatic fractures is a very big challenge for the nurses. Since China has been implementing the one child policy for a long time, when a child comes to the clinic with an injury, often in addition to the parents of the child, many other family members such as the grandparents will also come along with them. The needs of these family members are also diversified, and they will frequently resort to the nurses to ask a variety of questions, which invariably increases the workload of the nurses. If the nurses do not give a desirable explanation to them due to the heavy workload, the family members will think that the nurses are impatient. The hospital administrators can request the publicity department to design various kinds of promotional materials for fracture, such as the flow chart of fracture treatment, and post them in each ward so that they can be seen everywhere. The hospital administrators can also effectively use the official account of WeChat to release knowledge on treatment and nursing care with illustrations and texts, and even make animated films and microfilms, so that when the nurses are busy with work and cannot meet all the needs of the parents, they can Introduce these videos to the parents to ask them to learn by themselves, in which way the relationship between the nurses and the patients can be easily harmonized. In addition, the nurses are required to give full play to their own initiative to understand the needs of the children and their parents and give feedback to them in a timely manner. If the parents can feel the care from the

nurses, they will be more grateful, the nurse-patient relationship will be more harmonious, and the difference in perceptions between the nurses and the parents will be reduced.

5.3.3.3 Help the nurses to improve their communication skills

The nursing care often requires constant interaction and communication between the nurses and the parents, and the skills of communication and interaction include empathy and listening and the combination of verbal and nonverbal communication skills. During their work, nurses often need to calm down and carefully explain the treatment and nursing care of fractures to the parents, and respond to the questions raised by the parents in a timely manner. First, the nurses need to spend energy to understand the knowledge related to the disease, which helps them to improve their professional skills; second, the interaction with the parents also improves their ability to communicate with others. In the clinic service, nurses often encounter the situation in which the fractures of the children are caused by negligence of the parents, and the nurses can obviously feel the guilt and compensation psychology of the parents. These parents tend to be highly demanding on the nurses. However, if the nurses obtain trust from the parents through good communication, the parents will inform the nurse of their guilt, and at this time, the nurses do not need to comfort them with too many words, and it is the good listening that makes the parents feel the concern from the nurses. In fact, at this time, the parents just need to talk, and the nurses just need to listen. The nurses may not be adept at using such communication skills, but after systematic training, they will find that sometimes silence is better than sound. The hospital administrators need to provide regular and consistent communication skills training for the nurses, because there is an old Chinese saying that “treatment accounts for thirty percent, and nursing care accounts for seventy percent”. The nurses play an important role in the treatment and rehabilitation of the children, and they are also the persons with the most contact of the parents, so the communication skills of the nurses are very important. Good communication is also an important factor in reducing the difference between the perceptions of the nurses and the parents.

5.3.3.4 Help the nurses to improve their mood

It is also helpful for the nurses to master some psychological knowledge. For example, they can change their cognition and carry out relaxation training to relieve their unfavorable mood. The hospitals can invite special persons to train nurses on psychological counseling skills, or hold lectures by psychology experts, so that nurses can fully learn some knowledge and skills of psychology. In the training, the trainer can guide the nurses to try to change their past

perceptions of the parents, try to exchange roles with the parents, and try to think what they would most desperately want to know if their children encountered an accidental trauma. The nurse will then be able to empathize with the parents and understand their anxiety. The nurses can also learn some relaxation training, which can not only help themselves, but also guide the parents to carry out relaxation training, and guide the parents to help their children to carry out relaxation training. When the children are emotionally stable and can actively cooperate with the treatment, the parents will admire the nurses' professionalism and appreciate their love and effort, which will lead to a good nurse-patient relationship.

5.3.3.5 Paying attention to the psychological health of the parents can facilitate recovery of the children

The mental and physical health of the parents will give their children good psychological support and cooperation with the treatment, which will be beneficial to the children's recovery. On the contrary, negative stress not only affects their own mental and physical health, but also increases the children's psychological burden, which will affect the compliance with medical advice and affect the treatment effect. It has been proved that preoperative parental anxiety can cause anxiety in the children, which affects not only their cooperation during surgery, but also the children's mood after surgery and even during the entire hospital stay (Yang et al., 2004). The nurses can give psychological comfort and support to the parents of the children and exert a positive psychological impact on them, which in turn promotes the children's recovery. The hospitalization and surgery itself is a negative life event and a serious psychological stressor for the parents, and the potential risks of surgery, the brief separation from the children, concerns about the children's prognosis, and the need to bear high cost of surgery bring both mental and financial stresses to the parents (Liu et al., 2001). Therefore, it is important to focus on the psychological health of the caregivers in addition to the disease treatment and care.

5.3.3.5 Nurses can also benefit as implementers

As the primary clinical caregivers of the children, the nurses have the most contact with the children and their parents, so as the implementers of psychological comfort, the nurses will also witness an improvement of their professional competence. When the nurses improve their communication skills and their mood, it will coincide with the theory of "growing with the injured" in the positive psychology (Tedeschi & Calhoun, 2004). When the nurses guide the parents, they need impart more professional knowledge so as to be recognized by the parents, which can motivate the nurses to take an initiative in learning knowledge about the disease and

improve their professional competence. The systematic training related to helping skills obtained by the nurses can be applied to patients of other diseases and practical life to benefit more people.

5.3.4 Touch the employees and improve their professional dedication

The work of the medical and nursing staff in the hospital is highly intensive, requiring a high sense of responsibility. In such a highly intensive job, how can the medical and nursing staff still keep smiling and maintain a happy mood. The most effective way is to touch the staff, because only when they are touched will they work proactively.

"Touching employees" should be a basic requirement for all managers. Instead of touching ten patients a day, a manager would rather touch five medical staff a day, because the five medical staff who are touched will definitely touch more than ten patients. Only by asking the managers to touch their employees, can it be logically consistent to ask the front-line medical staff to "touch the patients". The problem of service quality is not in the service itself. The service process can be infinitely perfect, and the service standards can be infinitely strict – but what can we achieve? The problem of service is essentially related to the motivation for the service providers. Kinship service cannot be prepared or trained; instead, it is conveyed – the nurses convey their kinship received from others to the patients, and this is kinship service.

Then what should we do to touch the employees? For example, when the employees are sick, the leaders should show care for them in a timely manner, and when the employees make a little progress in their work, the leaders should notice it and give timely encouragement. The leaders should remember the birthdays of the employees, and send them birthday wishes. The ultimate goal is to let employees feel love and care in the collective at all times.

5.4 Research outlook

5.4.1 Social promotion and its sustainability

This study will have a certain effect on promoting the service quality of medical institutions and optimizing the treatment process. The final findings of this study can also be applied to adult patients who can cooperate with the medical staff, and may radiate dementia and aphasia patients, coma patients and other critical patients. The experience of this study is highly replicable and can be promoted to other departments and hospitals through various dissemination channels, which is a research exploration for doctor-patient friendship.

5.4.2 Qualitative studies can be conducted

This study investigated the differences in perceptions of nursing care between nurses and parents involved in the care of children with limb fractures in the pediatric orthopedic inpatient process, providing a practical basis for indirectly improvement of the quality of care for the children and the exploration of doctor-patient friendliness. However, as this study was conducted in pediatric orthopedics only, there were biases in the sample size and results. In addition, further follow-up evaluation is needed because of the limited time to collect the sample data. In future studies, qualitative studies can be conducted to understand the needs of the nurses and the parents, with a view to improving the satisfaction of the parents of children with fractures with the clinical work of the medical staff and laying a good foundation for the establishment of a harmonious nurse-patient and doctor-patient relationship.

5.4.3 Intervention studies can be conducted

This study is mainly a survey investigation, and in the future studies can be conducted to explore results under intervention in clinical treatment. A control group and experimental group can be set to understand the effectiveness of the intervention through comparison of data before and after intervention, so as to propose more guidelines for hospital management in the future.

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Annex A: Pediatric Orthopedic Nursing Service Perception Questionnaire (For Nurses)

Dear nursing colleagues,

Thank you for sparing time to participate in this survey as part of our research project on "nursing service perception". Your answers will have a positive effect on improving quality of the nursing service and recovery of the children.

Your answers, be they right or wrong, are of extraordinary significance to our research as long as they reflect your actual situation and thoughts. We will keep your answers strictly confidential in accordance with the Statistical Law of the People's Republic of China. We would like to extend our heartfelt gratitude for your cooperation and support. If you agree, please continue to fill out the following questionnaire.

First, we would like to know your views on the environment of the wards.

( ) 1. The health education publicity materials in the wards are sufficient.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 2. Nursing service equipment in the wards is advanced.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 3. The layout design/facilities of the wards can reflect the nursing service concept of the hospital?

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

The following items are the key contents of this survey. We need your feedback on the real situation you perceive in nursing work and whether it meets the needs of you and the children. Thanks again for your patience and cooperation.

( ) 4. The medical staff can finish all the medical treatment and nursing care within scheduled time.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 5. When a patient has a problem, the nurses show sincere concern and offer assistance.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 6. Generally speaking, the nurses work in a reliable manner.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 7. The nurses provide care within the promised scheduled time.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 8. The nurses keep accurate records.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 9. The nurses tell patients exactly when the nursing care will be performed.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 10. The nurses are on call all the time if there are no special circumstances.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 11. The nurses are always willing to help patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 12. The nurses are never too busy to respond to patients' requests.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 13. In general, the nurses are trustworthy.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 14. Patients feel safe while receiving nursing care.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 15. The nurses are courteous with patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 16. Nursing responsibilities receive the attention and support of the hospital administration.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 17. The nurses give personalized attention to patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 18. The nurses understand the patients' emotions, attentively listen and give comfort to patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 19. The nurses understand the specific needs of patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 20. The nurses have the patients' best interests at heart.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 21. Nursing service time meets the individual needs of patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

Finally, in order to ensure the integrity of this survey, we hope you can provide some basic information about yourself.

Age: _____ Length of nursing service: _____

Educational background: _____ A. Junior high school and below B. Senior high school C.

Undergraduate D. Postgraduate and above

Professional title: _____ A. Nurse B. Nurse practitioner C. Nurse-in-charge D. Associate chief nurse and above

Thank you again for your cooperation! We wish you all the best!

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Annex B: Pediatric Orthopedic Care Service Perception Questionnaire (For Parents)

Dear parents,

Thank you for sparing time to participate in this survey as part of our research project on "nursing service perception". Your answers will have a positive effect on improving quality of the nursing service and recovery of the children.

Your answers, be they right or wrong, are of extraordinary significance to our research as long as they reflect your actual situation and thoughts. We will keep your answers strictly confidential in accordance with the Statistical Law of the People's Republic of China. We would like to extend our heartfelt gratitude for your cooperation and support. If you agree, please continue to fill out the following questionnaire.

Before we start the questionnaire, we would like to know about your child's admission.

Child age: _____ Child gender: _____

Whether the child is the only child: _____ The child was diagnosed as: _____

Fracture site: Upper limb: _____ Lower limb: _____

First, we would like to know your views on the environment of the wards.

( ) 1. The health education publicity materials in the wards are sufficient.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 2. Nursing service equipment in the wards is advanced.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 3. The layout design/facilities of the wards can reflect the nursing service concept of the hospital?

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

The following items are the key contents of this survey. We need your feedback on nurses in the wards and whether the needs of you and your children are met. Thanks again for your patience and cooperation.

( ) 4. The medical staff can finish all the medical treatment and nursing care within scheduled time.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 5. When a patient has a problem, the nurses show sincere concern and offer assistance.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 6. Generally speaking, the nurses work in a reliable manner.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 7. The nurses provide care within the promised scheduled time.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 8. The nurses keep accurate records.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 9. The nurses tell patients exactly when the nursing care will be performed.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 10. The nurses are on call all the time if there are no special circumstances.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 11. The nurses are always willing to help patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 12. The nurses are never too busy to respond to patients' requests.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 13. In general, the nurses are trustworthy.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 14. Patients feel safe while receiving nursing care.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 15. The nurses are courteous with patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 16. Nursing responsibilities receive the attention and support of the hospital administration.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 17. The nurses give personalized attention to patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( )18. The nurses understand the patients' emotions, attentively listen and give comfort to patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 19. The nurses understand the specific needs of patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 20. The nurses have the patients' best interests at heart.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

( ) 21. Nursing service time meets the individual needs of patients.

A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

Finally, in order to ensure the integrity of this survey, we hope you can provide some basic information about yourself.

Age: _____

You are the child's: _____ A. Father B. Mother C. Others

Educational background: _____ A. Junior high school and below B. Senior high school C. Undergraduate D. Postgraduate and above

( ) Are you confident about your child's recovery?

A. Full of confidence B. Neutral C. Not very optimistic

Thank you again for your cooperation! We wish you all the best!