Improving the performance of hospitals

An architectural analysis of patient journeys in China

Dejian Peng

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A+BE | Architecture and the Built Environment | TU Delft BK

22#07

Design | Sirene Ontwerpers, Véro Crickx

Keywords | patient journey, process, patients' satisfaction, performance

ISBN 978-94-6366-535-3
ISSN 2212-3202

This dissertation is open access at https://doi.org/10.7480/abe.2022.07

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An architectural analysis of patient journeys in China

Dissertation

for the purpose of obtaining the degree of doctor
at Delft University of Technology
by the authority of the Rector Magnificus, prof.dr.ir. T.H.J.J. van der Hagen
chair of the Board for Doctorates
to be defended publicly on
Friday, 6 May 2022 at 15:00 o'clock

by

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The doctoral research has been carried out in the context of an agreement on joint doctoral supervision between South China University of Technology, China and Delft University of Technology, the Netherlands.

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Acknowledgements

During my Ph.D. journey, I was privileged to have the support of knowledgeable, inspiring and warm-hearted promoters, colleagues, friends and family. I would like to express my explicit gratitude to them.

First and foremost, I would like to express my sincere gratitude to my promoters: Prof. Cor Wagenaar (TUD), Prof. Peter Luscuere (TUD), and Prof. Chunyang Zhang (SCUT). They inspired me with their in-depth knowledge of the health and healthcare facilities design domain, and brought me to the frontier of academy and engineering. Moreover, they encouraged me to step out of my comfort zone, learned more from the top hospital architects, consultants and managers they introduced to me. The experience of studying in the Netherlands is extremely precious in my life. Thank you for answering my stupid questions again and again. My gratitude to all of you is beyond words that can be expressed!

I would also like to thank Prof. Assellbergs (TUD), Prof. Elst (TUD), Dr. Aarts (TU/e), and Prof. Steffensen (TUB), and Dr. Turrin (TUD). They are gratefully acknowledged for being members of the doctoral committee. Thanks for your sincere comments.

In addition, I would like to thank members of Health@BK Team: Luc Willekens and Clarine van Oel. It was my pleasure to join the weekly meeting. We had wonderful discussions about my thesis. Thanks a lot to Guru Manja from CEAN Consulting. His ideas are ahead of time and very inspiring.

Furthermore, I wish to thank all my dear colleagues from the faculty and friends, such as Ding Yang, Wang Pan, Wei Dai, Yinying Gan, Xiao Guo, Li Lv, Kaiyi Zhu, Sitong Luo, Xialu Wang, Penglin Zhu, Yufang Zhang, Tian Wang, Anxiao Zhang, Fatma Tanis, Óscar Andrade Castro, etc. Thank you for the numerous brainstorming discussions and the fun we had together. It is my honor to have kind-hearted people around who struggle with the same typical Ph.D. frustrations. Thank you all for the guidance to make me acquainted with the academic world. A special word of thanks to my roommates Tianshi Lu and Guanqun Yu. I can still remember our weekly-shared dinners and the delicious foods you cook.

I am greatly indebted to my family: my parents and grandma. It is you all who always stand behind me and give me the encouragements when I suffered in difficult times. Thank you for your continuous tolerance when I am in bad mood. You don't hesitate to give me encouragement and selfless love. The love that you give me will always be the driving force of my life.

I am very blessed to play with my three-years-old son Ethan. You are so cute and always healing my heart. I don't know how many books you might write in your lifetime, but this book would be the first publication that mentions you. Go and enjoy your life!

Last, but certainly not the least, I am proud and very grateful to spend my life with my extraordinary wife Yatu Li. Dear Yatu, thanks for your unconditional support and love the entire time. You are my life coach and soul mate. My life would be very dull without you. I still remember the days we traveled around Europe. I suppose, we soon can close this chapter and go back to normal. Oh, I forgot that you will become a Ph.D. candidate this September! OK, let's keep moving and fight.

Finally, I would like to thank China Scholarship Council, for providing financial support when I study in the Netherlands. To my dear motherland.

Dejian Peng
Guangzhou, April 4, 2022

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List of Abbreviations

ABPM	Ambulatory blood pressure monitoring
ALOS	Average Length of Stay
AMC	Academic Medical Center
AMU	Acute medical unit
ASC	Architectural Society of China
ATM	Automated teller machine
A.M. Consulting	Ark Marketing Consulting
BMAH	Beijing Municipal Administration of Hospitals
BWH	Brigham and Women's Hospital
CABP	China Architecture & Building Press
CDC	Center for Disease Control and Prevention
CFDA	China Food and Drug Administration
CHAC	Community Health Association of China
CHSI	Center for Health Statistics and Information
CMA	Community Health Association of China
CPCCC	Communist Party of China Central Committee
CSSD	central sterile supply department
CT	Computed Tomography
DBC	Diagnosis Treatment Combinations (Diagnose Behandeling Combinatie)
DCG	Dynamic electrocardiography
DRG	Diagnosis-Related Group
DSA	Digital Subtraction Angiography
EBD	Evidence Based Design
ECG	Electrocardiography
ECT	Emission Computed Tomography
ECU	Emergency care unit
ED	emergency department
EEG	Electroencephalography
EHCI	Euro Health Consumer Index

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EHIG	Evergrande Health Industry Group
EICU	Emergency Intensive Care Unit
EMG	Electromyography
EMR	Electronic Medical Record
ENT	Ears Nose and Throat
GDP	Gross Domestic Product
GOSC	General Office of the State Council
GP	General Practitioner
HKU-SZH	The University of Hongkong-Shenzhen Hospital
HSC	Health Supervision Center
HEO	Health Emergency Office
H5N1	Influenza A Virus Subtype H5N1
IOSC	Information Office of the State Council
MCH	Maternal and Child Health
MERS	Middle East Respiratory Syndromes
MHRSSB	Municipal Human Resources and Social Security Bureau
MOCA	Ministry of Civil Affairs
MOF	Ministry of Finance
MOH	Ministry of Health
MOHRSS	Ministry of Human Resources and Social Security
MOHURDt	Ministry of Housing and Urban-Rural Developmen
MPA	Medical Products Administration
MRI	Magnetic Resonance Imaging
NCD	Noncommunicable Disease
NDRC	National Development and Reform Commission
NHC	National Health Commission
NHFPC	National Health and Family Planning Commission
NHSA	National Healthcare Security Administration
NPCF	Dutch Patient Consumer Federation
NPHCC	National Patriotic Health Campaign Commission
NRCMS	New Rural Cooperative Medical Scheme
O2O	Online to Offline
OECD	Organization for Economic Cooperation and Development
PACS	Picture Archiving and Communication System
PHSM	Public Hospital Administration of Shenzhen Municipality
QIPP	Quality, Innovation, Productivity and Prevention program
SAIC	State Administration for Industry and Commerce
SAMR	State Administration for Market Regulation
SARS	Severe Acute Respiratory Syndromes

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SAT	State Administration of Taxation
SATCM	State Administration of Traditional Chinese Medicine
SCUT	South China University of Technology
SHDC	Shanghai Hospital Development Center
SMEA	Shanghai Medical Ethos Association
TAT	Turn Around Time
TCM	Traditional Chinese Medicine
TECG	Treadmill electrocardiography
TNO	Dutch Institute of Applied Science and Technology
UEBMI	Urban Employees' Basic Medical Insurance
UMCG	University Medical Center Groningen
UMCR	Radboud University Nijmegen Medical Center
UMCU	University Medical Center Utrecht
URBMI	Urban Residents' Basic Medical Insurance
URRBMI	Urban and Rural Resident Basic Medical Insurance
UVMC	VU University Medical Center
VWS	Ministry of Health, Welfare and Sport, Netherlands
WHO	World Health Organization
ZBC	Independent treatment centers (Zelfstandig Behandel Centrum)

Abstract

Nowadays, we are faced with serious challenges in public health worldwide. However, the challenges cannot be solved only in the domain of architecture, medical science or management. A successful hospital building is more than a nice building or an efficient healing machine. Patient journey is such a concept that tries to explore the possibility to solve the problems in hospitals in the domain of hospital architecture and hospital management. In this context, the research proposes a study of patient journey in hospitals from the perspective of architecture on basis of the outcomes achieved in management. Patient journeys are transferred from both clinical and administrative processes to special patterns. Moreover, in such a visual way, both the efficiency and effectiveness of hospitals and patients' satisfaction during the journeys in hospitals are analyzed with case studies of China and the Netherlands. The system of spatialized patient journeys helps architects and hospital managers broaden their understanding of hospital. And the comparison results from case studies are useful for hospitals in China to improve performance and patients' satisfaction.

KEYWORDS patient journey, process, patients' satisfaction, performance

1 Introduction

Today we face unprecedented global challenges in public health such as demographic ageing, rapid urbanization, and the globalized marketing of unhealthy products (WHO, 2017:2). Although it is an impossible mission to tackle these challenges by focusing on one single domain, whether it be medical science, public health system, hospital management, or architecture, hospitals do play a crucial role in overcoming them. Hospitals have undergone a lot of changes over the decades; so have the evaluation criteria of a good hospital building. A good hospital building is not just a giant healing machine, and there is definitely more than meets the eye. It should promote positive patient experiences and reduce complaints. One of the ways to achieve these goals is to improve the patient journey, a concept to be explained in more detail in chapter 3. The patient journey is defined by the spatial trajectories a patient needs to follow in a hospital building, which, in turn, are determined by the sequence of the interactions with the medical and nursing staff and other hospital services. Minimizing the distances between the places patients have to visit, the time they have to wait, and the number of visits can greatly improve patient satisfaction and the efficiency of hospitals from medical and financial perspectives. Part of this thesis compares China with the Netherlands. Although there are fundamental differences between the Dutch and Chinese healthcare systems, the most important being the lack of gatekeeping mechanisms in China (which leads to a massive influx of patients who do not need hospital care), the Netherlands does represent a state of the art healthcare system that can inspire innovations in China, especially with respect to patient journeys in hospitals. Recent trends in Chinese hospitals (i.e. the widely-applied information technology), on the other hand, may be useful in the Dutch setting as well.

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1.1 Problem statement

1.1.1 Increasing demands of health care

There are increasing healthcare demands worldwide, which is partly due to the ageing population. According to the World Health Organization (WHO), China has become an ageing society since 1999 (Meng *et al.*, 2015:2). By the end of 2014, more than 15% of the population in China was over 60 years old, and it is estimated to be 25% by 2025 and over 33% by 2050 (Zhuang, 2015:3-4). In some well-developed regions, the ageing population has become a serious issue. For example, in Shanghai, over 14% of its population was over 65 years old in 2017 (Table 1.1) (Statistics Shanghai, 2018: website; Kroneman *et al.*, 2016: 4).

TABLE 1.1 The comparison of ageing degrees in some well-developed regions worldwide

	Shanghai (2017)	Beijing (2017)	Hongkong (2016)	Tokyo (2016)	London (2016)	Netherlands (2014)
Ageing Degree (%)	14.3	10.9	15.9	22.2	11.1	17.7

(Data source: Statistics Shanghai Official Website, Kroneman et al., 2016: 4)

An ageing society has more demand on aged care and medical resources, such as rehabilitation and elderly care (GOSC, 2015: website).

In order to slow the ageing process, China's population policy has eased gradually since 2010. In 2011, China lifted the "one-family-one-child" policy which had lasted for over 30 years; it allowed couples from one-child families to have a second child. Then in 2013, the restriction was further eased so that couples with either the husband or wife from a one-child family would be allowed a second child. All couples are allowed a second child since 2015 (Figure 1.1). Faced with a population that is shrinking and ageing, Chinese policymakers are attempting to engineer a baby boom after more than three decades of the family planning regime. If the plan works, health demands in the field of obstetrics and gynecology, pediatrics, and reproductive health would explode in the short term.

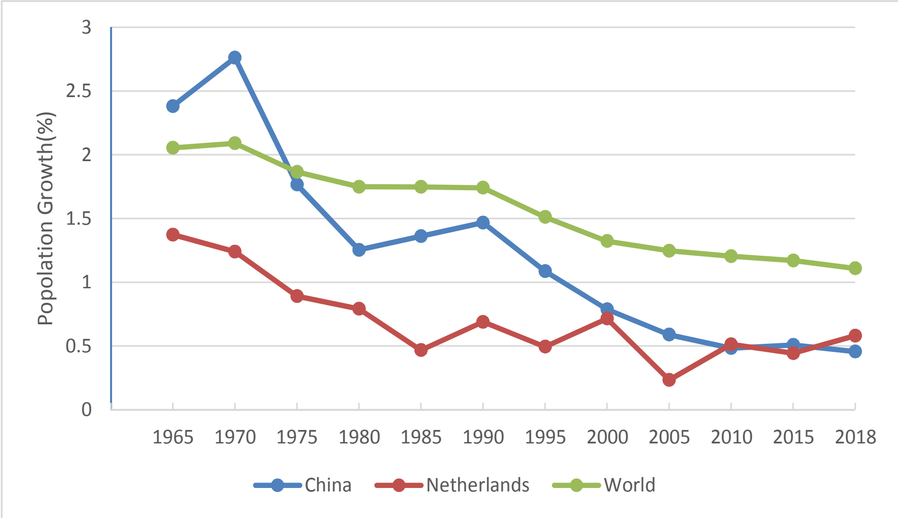

FIG. 1.1 Population Growths in China, the Netherlands, and the world
(Data source: World Bank, World Development Indicators)

1.1.2 Exploding costs in health care

Health expenditure has been growing year by year all over the world. The WHO stated that the total health spending kept on growing between 2000 and 2016. In 2016, the world spent US$7.5 trillion on health, which made up almost 10% of global gross domestic product (GDP). In addition, the average growth rate of health expenditure in various countries was higher than the growth rate of their GDPs (WHO, 2018:6) (Figure 1.2). Apparently, the rising economic burden of health care is not only a national but a global problem. However, on a more positive note, it also proves that most of the countries, regardless of their economic status, are willing to spend more on their people's healthcare.

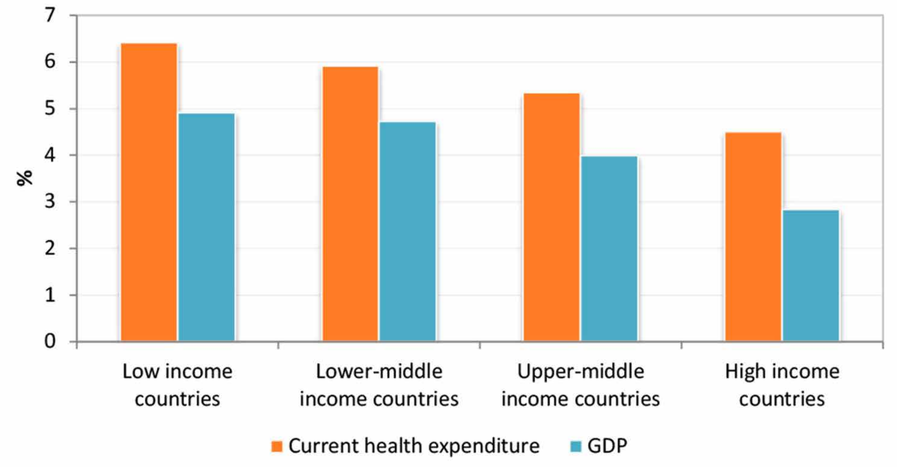

FIG. 1.2 Average of real growth rate by country income group, 2000-2016
(Data source: WHO, 2018:6)

Likewise, China's health expenditure has skyrocketed with the rapid development of its economy in recent years (Figure 1.3). According to the data of 5th Chinese National Health Service Survey in 2013, the item most complained about in the healthcare system was the medical expense of hospitalization. Nearly half of the urban residents and around one third of the rural residents were not satisfied with their medical bills (Figure 1.4). Furthermore, the proportion of government contribution to healthcare is not large enough. Individuals have to pay nearly 60% of their health bills in 2000 (NHFPC, 2015:91). Despite some regional reforms, the national social security system reimburses citizens mainly based on medical bills instead of disease types and individual circumstances, which is likely to cause excessive treatments and a waste of health resources (Meng *et al.*, 2015:100-101).

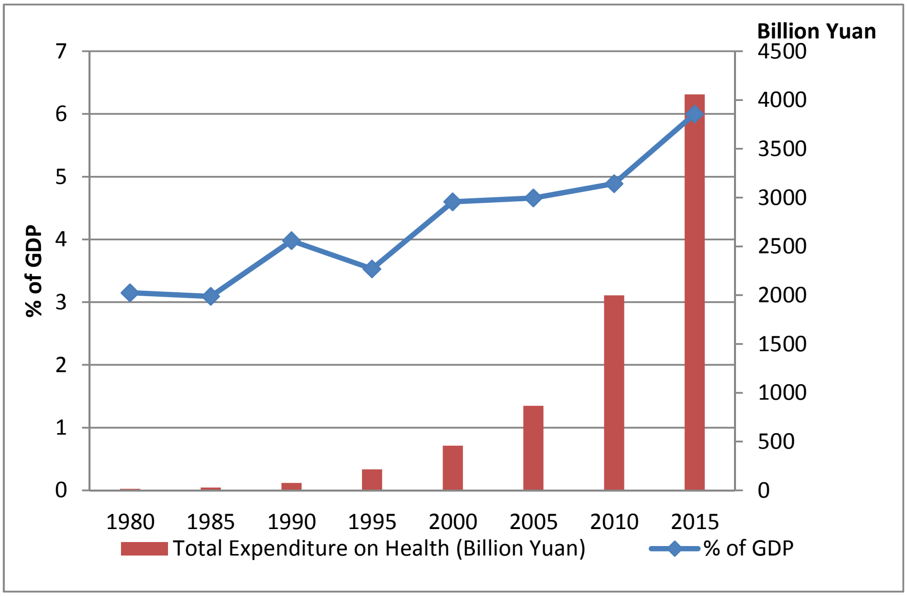

FIG. 1.3 Total expenditure on health in China
(Data source: NHFPC, 2015:91; NHFPC, 2017:website)

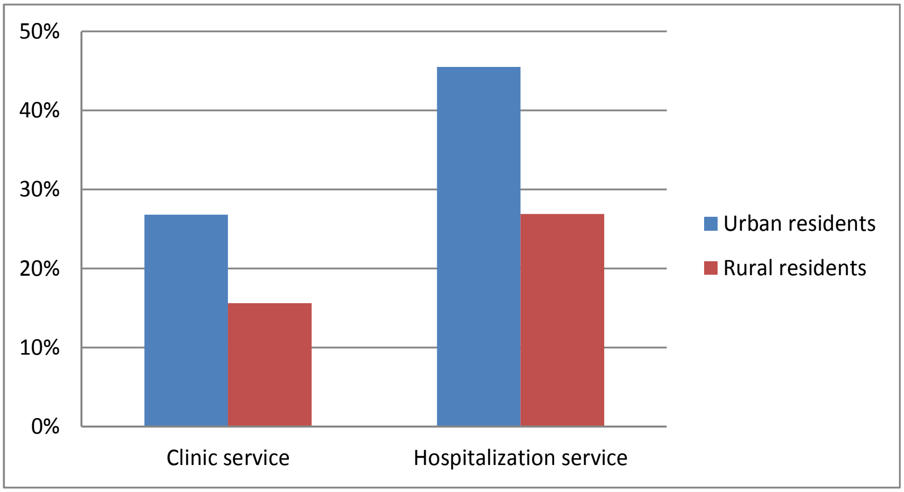

FIG. 1.4 Dissatisfaction Rate on medical expense
(Data source: Xu & Meng, 2014:105)

1.1.3 Lack of quality in health care

Patients in China suffer from endless waiting, jumping through administrative hoops, unnecessary visits to doctors, excessive noise, and overcrowding. These negative experiences are not uncommon and are often the main reasons patients complain. A special term is coined to describe the challenging situation: “difficult access to quality medical services” (Meng *et al.*, 2015: xxii). The negative patient experiences lead to not only low patient satisfaction, but also adverse impacts on medical outcomes (Kane *et al.*, 1997: 714).

This thesis aims to address the issue of rising medical costs caused by increasing healthcare demand due to a rapidly ageing society and the lack of quality medical services. It will do so by exploring the possibilities of improved patient journeys in hospitals.

1.2 Theoretical context

1.2.1 Evidence-based design (EBD)

Evidence-based design originates from evidence-based medicine, where physicians and hospital managers make decisions based on the best practices (Hamilton and Shepley, 2010:3). In the realm of EBD, it is thought as “the process for the conscientious, explicit, and judicious use of current best evidence from research and practice in making critical decisions, together with an informed client, about the design of each individual and unique project” (Hamilton and Watkins, 2008:9). Briefly, this theory is goal-oriented on the basis of a hypothesis that “better design will lead to a better outcome” (Hamilton & Shepley, 2010:3). It bridges the gap between the knowledge of architectural design and science, which lends architects and hospital managers a platform to collaborate.

EBD was first applied in quantitative research on how the views from a patient's room window affect the recovery from surgery (Ulrich,1984:420-421). Since that time, the research in the field of EBD has been growing. For instance, it has been proven that single patient rooms, a healing garden, access to natural daylight, and positive distractions such as music and art contribute to better patient experiences as well as better clinical outcomes; these concepts have begun to influence the way a hospital is planned, designed, and built (McCullough, 2010:58-60).

EBD is applied in this research on patient journeys. First of all, the research follows the result-oriented principle of EBD, looking for best practices concerning the performance of hospitals where architectural design matters. Secondly, the case studies in this research are data-driven, using first-hand medical data as evidence authorized by hospitals.

1.2.2 Lean Thinking in healthcare

Lean Thinking is a process improvement methodology in the realm of management, which was pioneered as the Toyota Production System in the manufacturing industry. (Scoville and Little, 2014:7). Lean Thinking has been introduced to healthcare since the 1990s, aiming at measurably better performance. (Graban, 2016:1). The concept takes the value from the customer's perspective as a starting point and defines eight types of wastes that should be eliminated within the process (Kim *et al.*, 2006:194). Lean Thinking has helped hospitals improve on the aspects of safety and quality, waiting time and length of stay, flow, satisfaction, and financial status (Graban, 2016:6-7). A lot of case studies have analyzed Lean Thinking in A) Manufacturing-like case studies dealing with the physical flows of materials in hospital departments; B) Managerial and support case studies dealing with the flow of information within the organization; C) Patient flow case studies dealing with the way patients move within the hospital/healthcare system; D) Organizational case studies dealing with strategic and cultural plans of management to implement Lean Thinking (Brandao, 2009:124-125).

Drawing from the research findings in hospital management with Lean Thinking, this research on patient journey aims to identify inefficient processes in transportation, waiting, and over processing.

1.3 Research outline

1.3.1 Research objectives

The objective of this research is to develop a common approach to obtaining the knowledge of patient journey. It focuses on the daily operation and architectural design process of hospitals from a geographical perspective so that both care providers and architects can find evidence to support their daily work and design practice. It makes care providers and architects aware of a way to prevent bottlenecks of space and process, as well as enhance hospital performance and patient experience in the decision-making and daily operation.

As a matter of fact, a large amount of research has been done related to patient journey by care providers from the perspective of management. However, most of the existing research is based on the premise that hospital construction has been completed. If the patient journey is considered in the planning and design stage, it might be easier and more efficient to achieve the same performance goals. To some extent, care providers can share their knowledge on the patient journey with architects. The status quo is that architects and care providers lack common understanding and experience in collaboration, even though both sides declare that they put patients at the center. Therefore, it will be beneficial for care providers and architects to join hands so the knowledge of patient journey is engineered into the architectural landscape (i.e. the mapping), where the fields of expertise of care providers and architects interact and complement each other's.

This research assists both architects and care providers in the shared pursuit of high hospital performance in decision making, design, and management stages. It explores a new perspective of hospital architecture to reconcile the knowledge gaps between care providers and architects.

1.3.2 Research scope

1.3.2.1 The breadth of the research

In a broader sense, an integrated patient journey includes both the clinical journey and how this impacts the patient emotionally, functionally, and socially over the lifetime. On a micro level, a patient journey could start from an illness and finish with recovery. This research exclusively focuses on the patient journey taking place in hospitals. With this in mind, the research on the patient journey will refer to the medical data collected within the hospitals, combined with the knowledge of hospital architecture, which is measurable and comparable within a healthcare system and between healthcare systems. In the conclusion, however, the discussion will not be limited to hospitals, it reaches further to the previous and next steps on cure and care outside hospitals to achieve a better outcome.

1.3.2.2 The depth of the research

In general, hospital treatment falls into three categories: outpatient care, inpatient care, and acute care. This research discusses the patient journeys of the three groups of patients separately. In regard to outpatient care, the research centers on one-time visits to hospitals without the need of staying overnight. When it comes to inpatient care, the research concentrates on the whole length of patients' stay in hospitals, where patients are treated for several days. Similar to the research on outpatient care, the research on acute care focuses on one-time visits to hospitals, the duration of which are usually longer than a day if they are required to stay in the observation units overnight.

1.3.2.3 The representativeness of cases in the research

In order to precisely reflect the latest achievements in medical science, building technology, social science, and psychology, all the selected hospitals in the case study have been built in recent years. More importantly, it is worth noting that the concepts and ideas underpinning their design and construction were relatively advanced. As such, the findings in the case study are instructive for the improvement of other contemporary hospital buildings.

1.3.2.4 Comparison with the Netherlands

In order to find the best practices of the patient journeys, this research chooses to compare the practices in the Netherlands to those in China, since the Dutch healthcare system is one of the best in Europe.

1.3.3 Research questions and methodology

According to the problem analysis and research objectives above, the main research question is formulated as follows: (Figure 1.5)

How can the performance of hospital buildings be improved by providing better patient journeys in China?

In order to answer this main question, the following sub-questions have been formulated:

1. What are the current situation and general trends of the healthcare system and hospitals in China?
2. What is meant by the concept of patient journey?
3. How do patient journeys work in Chinese hospitals?
4. What is patients' experience during their journeys?
5. How can the concept of patient journey impact hospital architecture?
6. How can the concept of patient journey be applied in cases?
7. What are the best practices of patient journey in the Netherlands?
8. What is the improvement of hospital architecture from the perspective of patient journey?

This research employs both qualitative and quantitative approaches in analyzing different aspects of patient journey. On the one hand, qualitative approaches like literature study, observation, and expert interview are used in conducting background research, constructing research framework, and evaluating both processes and the building environment in hospitals. On the other hand, when we examine hospital performance from the perspectives of patients' satisfaction and health outcomes, quantitative approaches like medical data collection and semantic analysis are used.

Step 1: Literature review based on government publications and related papers offers a brief introduction of the healthcare system and the hospital operating system in China. Complementary literature study on the healthcare situation in China identifies the main concerns and challenges facing the health services. Health data are compared between China and other countries to help readers gain an insight into the healthcare situation in China.

Step 2: In order to distinguish different definitions and approaches of "patient journey", a wide range of topics have been researched in the beginning, including but not limited to architecture design and hospital management. As the research moves along, the scope gradually narrows down to architecture design and hospital management.

Step 3: In order to make patient journeys visible and measurable, pathways of patients are recorded through observation and literature study in China and the Netherlands. Based on the observations, experts have been interviewed to examine and verify the clinical procedures and administrative processes that govern the day-to-day running of hospitals.

Step 4: Patient needs and interactions between patients and hospital staff are semantically analyzed; patients' comments are documented and reviewed in patient satisfaction surveys. In the case studies, a questionnaire for patients in China has been carried out as per Chinese laws and regulations of South China University of Technology (SCUT).

Step 5: Hospital building specs in China and the Netherlands are collected, including layouts and floor plans, as material for case study analysis. Interviews have been conducted with some hospital consultants and architects in an effort to identify what measures are taken to improve hospital performance at the design stage and how they translate into the final decision-making process.

Step 6: A cross-case comparison between hospitals in China and the Netherlands is made in order to find the best practices of hospital design in China on the aspects of patient center design, performance, and innovations.

Step 7: By the means of scenario planning, the new trends of patient journey and hospital architecture are discussed to tackle the uncertainty of future changes.

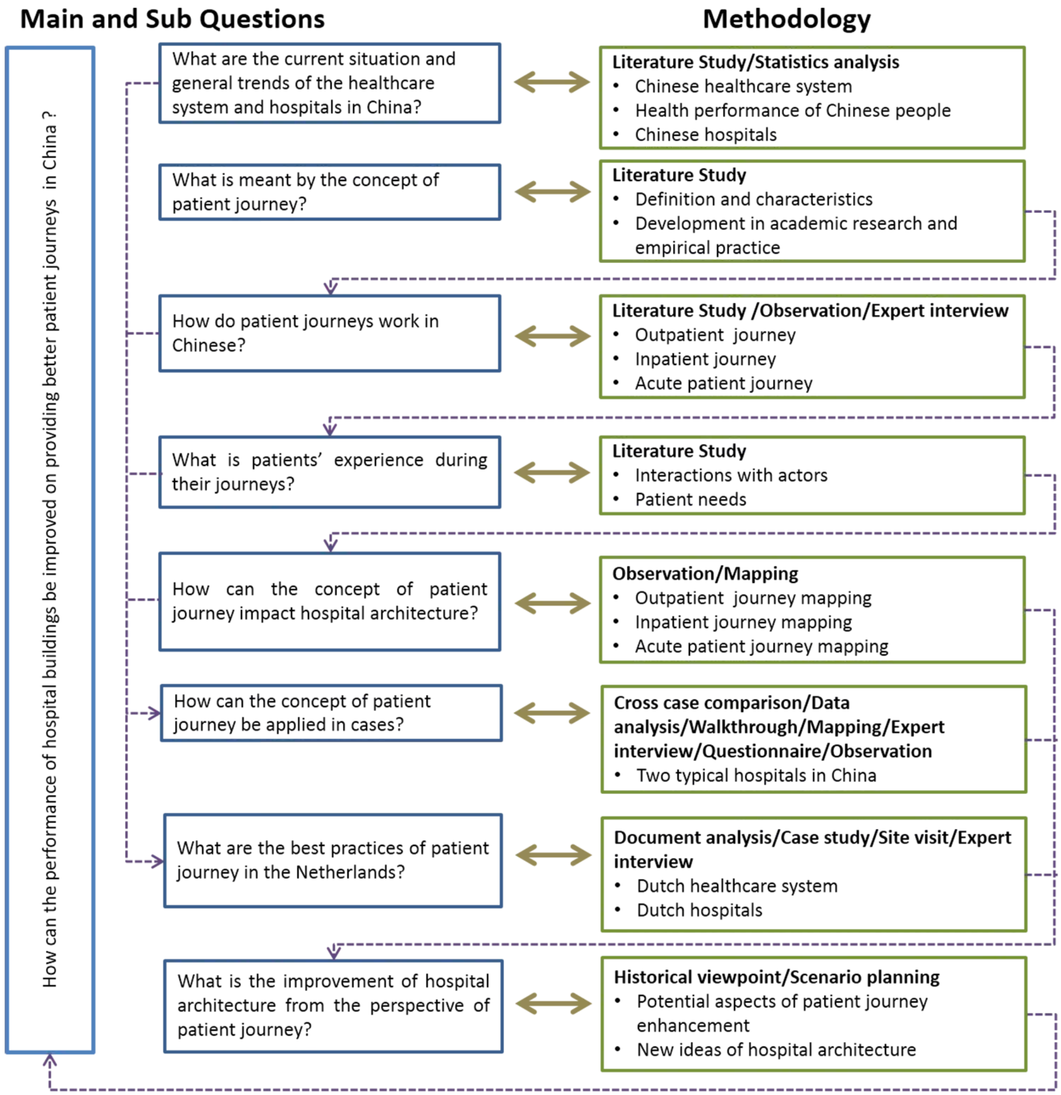

FIG. 1.5 The relationship between questions and methodology

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1.3.4 Thesis structure

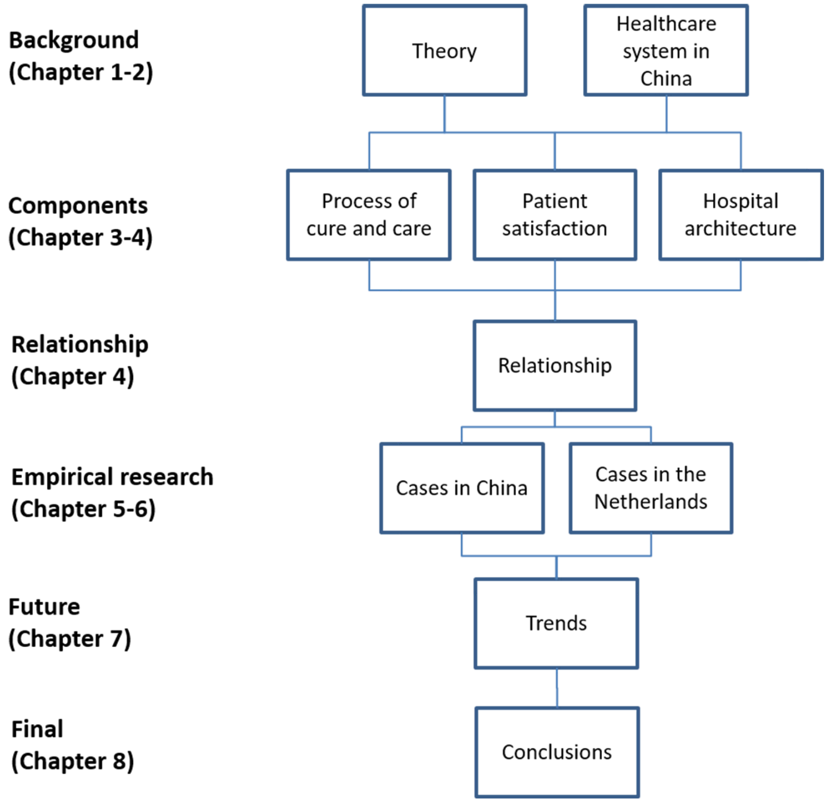

FIG. 1.6 Thesis outline

2 Healthcare Performance in China

Question

– What are the current situation and general trends of the healthcare system and hospitals in China?

Purpose

This chapter discusses the performance of the Chinese healthcare system and hospitals. To this end, it begins with a brief introduction of the healthcare system and its operating mechanism. Then it outlines the current performance level of the healthcare system, combined with a statistical analysis of the health situation of Chinese people. Following that, it zooms in on the two obstacles that have a negative impact on the performance of hospitals in China, which are an overwhelmingly large number of patient visits and the enormous scale of hospitals. Finally, it touches on four current trends in the healthcare system and hospitals in China. This chapter forms the background research of the whole thesis.

Approaches

1. Literature reviews of the Chinese healthcare system and policies on hospitals;
2. Statistics analysis of the data from the WHO, the OECD, the World Bank, and the Chinese Government.

Findings

1. The performance of the healthcare system in China;
2. The performance of the hospitals in China;
3. New trends in the healthcare system and hospitals in China.

2.1 Performance of the Chinese healthcare system

The healthcare system in China is composed of the medical care system, the public health service system, the medical security system, and the pharmaceutical supply system. The medical care system refers to a medical service network that comprises various kinds of healthcare facilities and focuses on medical interventions. The public health service system works in the field of disease prevention, education of public health, etc. The medical security system ensures that people can afford healthcare. The pharmaceutical supply system includes the production, circulation, price control, procurement, dispatching, and utilization of pharmacy (IOSC, 2012:4-5). These four sub-systems operate independently but have impacts on one another. The first three sub-systems fall into the research scope of this thesis and will be introduced in this chapter.

The development of the sub-systems shares the same characteristics and the same principles below between 2015-2020 (GOSC, 2015: website).

- Concentrate on the fulfillment of health needs and the solution of main health problems;
- Pursue the balance of fairness and efficiency;
- Strike a balance between governmental administration and market mechanism;
- Boost the overall performance of the integrated system;
- Stick to the classified mechanism of the administration of health resources.

2.1.1 Medical care system

2.1.1.1 Institutional framework of healthcare facilities

The medical care system puts in place a network of healthcare facilities in both urban areas and rural areas. It is composed of two independent subsystems owing to the dual structure of urban-rural in China (Xi, 2007:46).

In rural areas, the medical care system refers to a three-tier network that comprises county hospitals, township hospitals, and village clinics. County hospitals play the leading role. In urban areas, it involves a medical service network of various types of hospitals and community healthcare centers (NHFPC, 2016:4). Community healthcare centers are widely distributed, serving 30,000 to 100,000 inhabitants. It mainly provides outpatient treatments of common diseases, chronic diseases, and home care services (GOSC, 2006: website). Most of the healthcare facilities in both urban areas and rural areas are organized and run by governments on different levels, while other healthcare facilities are owned by state-run enterprises, public institutions, or private funds (Figure 2.1).

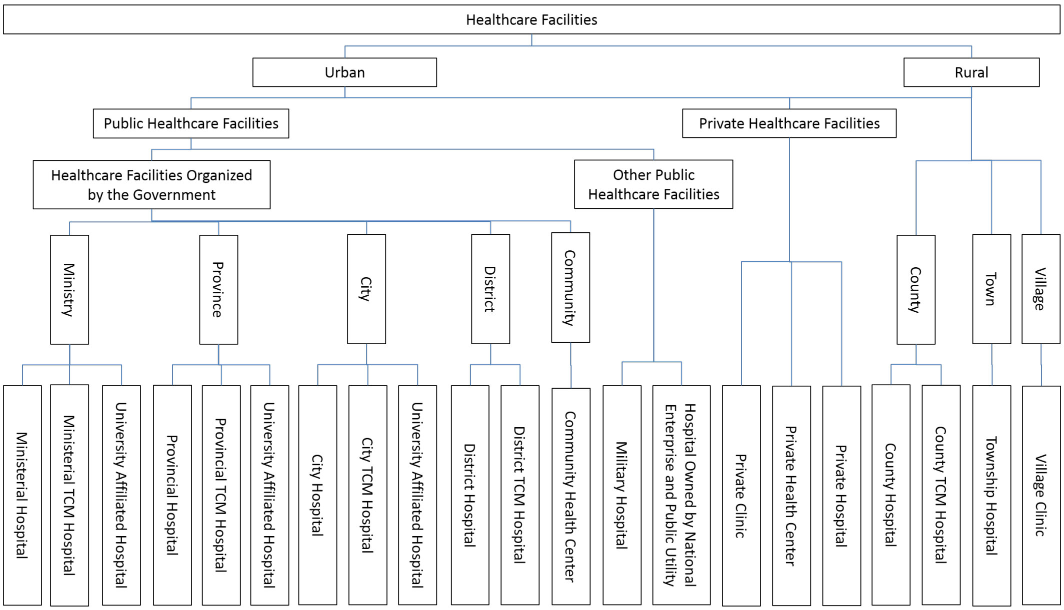

FIG. 2.1 Institutional Framework of Healthcare Facilities in China
(National Medical Health Service System Plan (2015-2020) and Guiding Principle of Healthcare Facilities Planning (2009 Edition))

All the healthcare facilities with more than 20 inpatient beds have been ranked into three levels based on the number of inpatient beds (Table 2.1). Furthermore, community health centers and secondary hospitals are divided into three grades, and tertiary hospitals come in four grades, determined by medical technology and equipment, the level of hospital management, and medical quality. In practice, however, the community health centers are not graded. And no hospitals in China have achieved the $3A^{+}$ grade, which, in theory, would be the highest-level hospitals in China.

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TABLE 2.1 Three Levels and Ten Grades of Healthcare Facilities

Levels	Inpatient beds	Grades	Location
Lv. 1: Community health center	20-100 beds	1A, 1B, 1C	Communities, villages, towns
Lv. 2: Secondary hospital	101-500 beds	2A, 2B, 2C	Districts and counties
Lv. 3: Tertiary hospital	More than 500 beds	3A+, 3A, 3B, 3C	Counties, cities, provinces, and ministry

(Draw according to Rules to be in charge of hospitals by grade1989)

The development of Tradition Chinese Medicine (TCM) hospitals

Tradition Chinese Medicine (TCM) is thought to have positive effects on treatment and disease prevention, so it plays an essential role in the Chinese medical care system. In rural areas, there is a TCM network including county TCM hospitals, TCM departments in township hospitals, and village clinics. In urban areas, TCM hospitals, TCM departments in general hospitals, community health centers, and TCM clinics make up the TCM network. Since 2012, over 66.5% of the township hospital, 57.5% of the village clinics, and 75.6% of the community health centers provide TCM services (IOSC, 2012:17). These include herbal treatments, acupuncture, and massage services. The major difference between a TCM hospital and a general hospital is that a TCM hospital has a larger outpatient department and pharmacy, but a smaller hot floor (Table 2.2).

TABLE 2.2 Construction area ratio of different functions in a general hospital and a TCM hospital

Function	Built-area Ratio	
	A general hospital	A TCM hospital (500 beds)
Emergency Department	3-5%	3.3%
Outpatient Department	12-15%	19%
Inpatient Department	37-41%	35.7%
Hot floor	25-27%	16%
Chinese Medicine Pharmacy	-	8%
Logistics	8-12%	9%
Office	3-4%	3.8%
Canteen, dormitory	3-5%	5.2%

(Data source: Construction Standard of General Hospital (Revised version for comments), 2018:4, and Construction Standard of Traditional Chinese Medicine Hospital, 2008:3)

The development of private healthcare facilities

Private healthcare facilities are owned by for-profit or nonprofit companies, mainly including private clinics, private health centers, and private hospitals (Meng *et al.*, 2015:32). Private hospitals, for example, have outnumbered public hospitals since 2015, but the number of patient visits was only one-sixth of that to public hospitals in 2017. However, private hospitals have a higher growth rate than public ones (Table 2.3) (NHC, 2018: website; iTrust Research Group, 2018:4-5). Private hospitals usually have a smaller scale, over 96% of them have less than 100 inpatient beds. Additionally, a smaller number of healthcare professionals work in private healthcare facilities (Table 2.4) (World Bank Group *et al.*, 2016:97,102).

TABLE 2.3 Comparison between private hospitals and public hospitals in 2017

The type of hospitals	Number of hospitals	Number of inpatient beds	Number of outpatients (million)	Number of inpatients (million)
Private hospitals	18,759	1,489,338	490	33.21
Public hospitals	12,297	4,631,146	2,950	155.95

(Data source: Statistical Bulletin on the Development of Health in China,2018: website)

TABLE 2.4 Percent of healthcare professionals in private healthcare facilities by type in 2016

The type of healthcare professionals	Total number	% Private
Physician	2,616,000	18.5
Nurse	2,497,000	13.7
Pharmacist	377,000	13.6
Technician	364,000	11.8
Village Physician	1,094,000	37.3

(Data source: Healthy China: Deepening Health Reform in China, Building High-Quality and Value-Based Service Delivery,2018:102)

Even though the central government has introduced policies and regulations to encourage private investment in establishing healthcare facilities, especially non-profit ones, there are no clear policies in place that envisage a larger role in the national healthcare system (Meng *et al.*, 2015:32). As a result, there are constraints on the development of private healthcare facilities, including A) Restrictions on reimbursements of the basic medical insurance; B) Difficulty in recruiting qualified healthcare professionals caused by a virtual monopoly on healthcare professionals in public healthcare facilities (World Bank Group *et al.*, 2016:9-10,101).

2.1.1.2 Governance

The medical care system is administrated by over ten ministries of the Chinese central government and local governments (Figure 2.2).

Health Commissions (HCs)

The National Health Commission (NHC), until March 2018 known as the National Health and Family Planning Commission (NHFPC), is responsible for the development of national health programs and national health special planning, as well as administrating ministerial hospitals. Provincial HCs are tasked with making regional health development plans, establishing standards for allocating healthcare resources, and the distribution of healthcare facilities according to population density, medical care demands, and transport situation. They administrate provincial hospitals and special health facilities. City HCs and County HCs look after the planning of healthcare services and facilities on a regional level. It is also their responsibility to watch over both public and private healthcare facilities in their area (GOSC, 2015: website; NHC, 2018: website).

Administrations of Traditional Chinese Medicine (ATCMs)

China values the development of traditional Chinese medicine and the indigenous medical practices of ethnic minorities. Therefore, an independent department named Administration of Traditional Chinese Medicine (ATCM), founded as an affiliated agency of the HC, is exclusively responsible for the compilation of TCM development plans, policies, and related standards and regulations, such as the *Development Planning of Traditional Chinese Medicine (2015-2020)* and *Regulations of the People's Republic of China on Traditional Chinese Medicine.* In addition, ATCM administrates TCM hospitals and TCM departments in general hospitals (SATCM, n.d.: website). In many cases, the ATCMs and the HCs collaborate in defining TCM protocols and TCM hospital administration.

Departments of Education

University medical centers, as the affiliates of the universities, are governed by the Departments of Education on different levels in general, especially in the fields of administration and teaching. The medical services are administrated by the HCs (GOSC,2000: website).

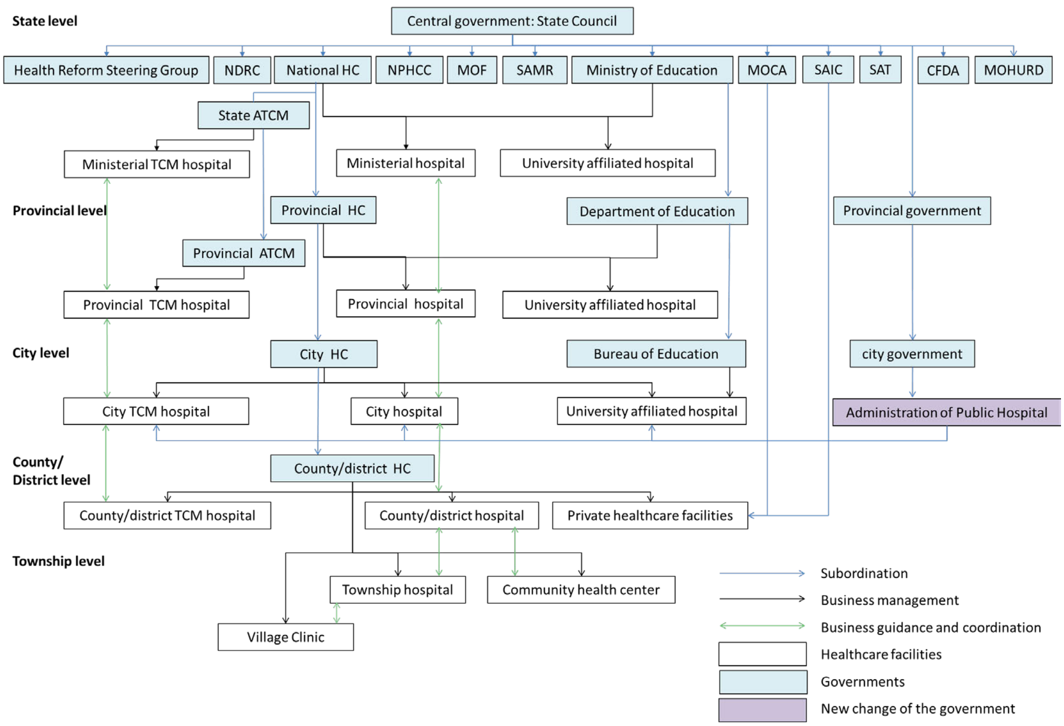

FIG. 2.2 Governance structure of the medical care system
(Adapted from Meng et al., 2015:14)

Departments of Housing and Urban-Rural Development

The Ministry of Housing and Urban-Rural Development (MOHURD) sets all the construction standards related to healthcare facilities. Until now, it has published *Construction Standard of General Hospital*, *Construction Standard of Traditional Chinese Medicine Hospital*, *Architectural and Design Code for General Hospital* etc. Take *Construction Standard of General Hospital* as an example. It is authorized by MOHURD but developed mainly by the NHC, along with a number of state-owned design institutes, universities, and major public hospitals. The *Standard* regulates the scale, construction area, site area, and construction standards of general hospitals, which form the basic set of requirements on the construction of all government-funded general hospitals. It provides guidance on the construction standards of private general hospitals as well. In this *Standard*, the total construction area is based on the number of inpatient beds in major general hospitals (Table 2.5). Not only are the functional zones formulated, but also the public areas.

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TABLE 2.5 The standard of construction area in a general hospital

Number of inpatient beds	<200	200-399	400-599	600-899	900-1199	>1200
Construction area (m^2 per bed)	110	110	115	114	113	112

(Data source: Construction Standard of General Hospital (Revised version for comments), 2018:4)

In addition, there is also the Health Reform Steering Group of the State Council, the National Patriotic Health Campaign Commission (NPHCC), the China Food and Drug Administration (CFDA), National Development and Reform Commission (NDRC), the Ministry of Finance (MOF), the Ministry of Civil Affairs (MOCA), the State Administration for Market Regulation (SAMR), the State Administration for Industry and Commerce (SAIC), and the State Administration of Taxation (SAT), which are also involved in the governance of the medical care system. (Meng *et al.*, 2015:32). MOCA is responsible for the registration of private healthcare facilities. If foreign investment is involved, the registration of private healthcare facilities would need the additional approval of SAIC. (GOSC, 2018: Appendix 2).

2.1.1.3 New change of the governance of public hospitals

At present, most of the public healthcare facilities are subordinate institutions of the HCs or the ATCMs of different levels. However, as a part of the healthcare system reform since 2010, some cities have experimented with the separation of administration and supervision in public hospitals. A new city-level department called the “Administration of Public Hospitals” combines the ownership and the administrative rights of city hospitals, city TCM hospitals, and city university-medical centers which are funded by city governments. The HCs and the ATCMs only play a role in setting regulations on medical services and supervising the operation of hospitals. In other words, the HCs and the ATCMs cannot be the player and the referee at the same time.

The Administrations of Public Hospitals in Beijing, Shenzhen, and Shanghai are designated as role models. Beijing, Shenzhen, and Shanghai are well-developed cities in China that developed their own administrative structures for running their public hospitals (Table 2.6). The Shanghai Hospital Development Center (SHDC) is one step ahead of its counterparts. It administrates 28 city hospitals and 6 ministerial hospitals in Shanghai through an agreement with the NHC (SHDC,2019: website). In doing so, the SHDC makes it easier to optimize the allocation of all the healthcare resources in the region.

TABLE 2.6 Characteristics of the Administrations of Public Hospital

Administration department	Institutional organization	Administrative responsibility	Tasks
Beijing Municipal Administration of Hospitals (BMAH)	An affiliated office of Beijing HC	22 City hospitals	1. Optimize the distribution of healthcare facilities; 2. Explore new ways of financing the construction of healthcare facilities
Public Hospital Administration of Shenzhen Municipality (PHSM)	A subordinated department of Shenzhen Government	14 City hospitals	1. Focus on the construction of new public hospitals; 2. Invite well-known management teams to manage hospitals in Shenzhen
Shanghai Hospital Development Center (SHDC)	A subordinated department of Shanghai Government	28 City hospitals & 6 ministerial hospitals in Shanghai	1. Explore life cycle management in hospitals; 2. Explore innovation on regulations

(The websites of BMAH, PHSM, and SHDC)

2.1.2 Public health service system

The public health service system works in the field of disease prevention and control, health education, maternal and child health, mental health, emergency, blood collection, health supervision, and family planning (IOSC, 2012:4). Public health services are provided by community health centers, township hospitals, and village clinics, with the assistance of specialized public health facilities such as the centers for disease control and prevention (CDC), health education institutions, maternal and child health (MCH) institutions, mental health institutions, public health emergency treatment facilities, blood donation and supply institutions, health inspection authorities, and family planning institutions administrated by the Health Commissions (Meng *et al.*, 2015:133) (Figure 2.3).

The tasks of the public health system are twofold: A) Epidemic surveillance and health emergency. Since the outbreak of SARS in 2003, China has established an effective online reporting system for communicable disease outbreaks and public health emergencies. Until 2015, all the CDCs above the county level, 98% of the hospitals and 94% of the community health centers are able to report epidemics online in real time (CDC, 2015: website). B) Basic public health services provision. All residents can access their health records and receive health education and vaccinations free of charge. The public health system takes a special interest in specific groups such as children, pregnant women, elderly people, and patients with chronic diseases. (MCH & CHAC, 2011:2).

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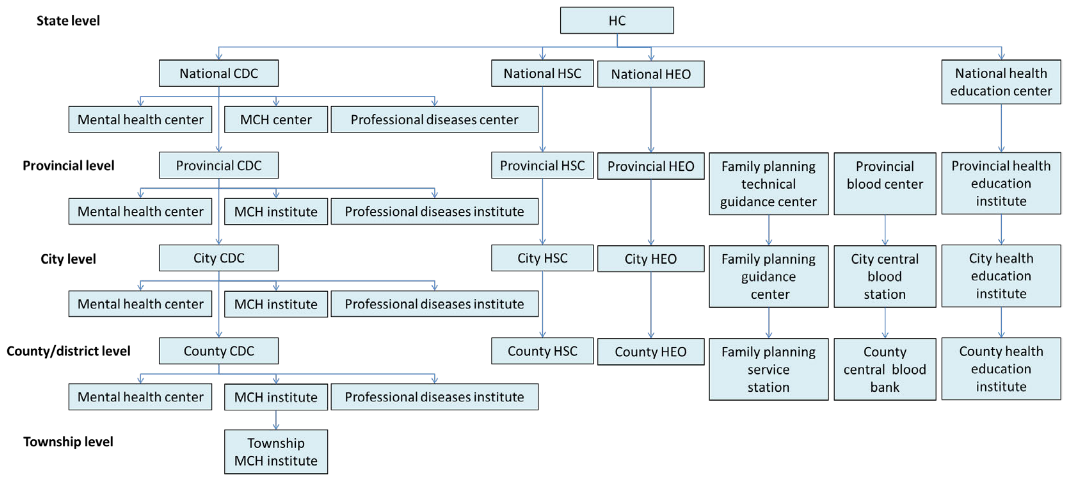

FIG. 2.3 Governance structure of the public health service system
(Adapted from Meng et al., 2015:133)

2.1.3 Medical security system

The medical security system, also known as the health financing system, is one of the five parts of the social security system which is governed by the Ministry of Human Resources and Social Security (MOHRSS)[1] (NHC, 2018a: Article 2, Chapter 1). Basic medical insurance is an essential component of the medical security system, which covers the Urban Employee Basic Medical Insurance Scheme (UEBMI) for employees and retirees in urban areas, the Urban Resident Basic Medical Insurance (URBMI) for unemployed city residents, and the New Rural Cooperative Medical Scheme (NRCMS) for rural residents at the household level (Meng *et al.*, 2015:88) (Table 2.7).

1 The other four parts are endowment insurance, employment injury insurance, unemployment insurance system, and maternity insurance system.

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TABLE 2.7 Basic medical insurance

PART 1	Urban Employee Basic Medical Insurance (UEBMI)	Urban Resident Basic Medical Insurance (URBMI)	New Rural Cooperative Medical Scheme (NRCMS)
Built-up time	1998	2007	2003
Target population	Employees (including retirees) in urban areas	Unemployed residents (including students) in urban areas	Residents in rural areas
Participation way	Mandatory	Voluntary	Voluntary
Contributors	1. Employees 2. Employers	1. Residents 2. Government	1. Families 2. Collectives 3. Government
Coverage	1. Outpatient care 2. Inpatient care 3. Acute patient care 4.Home care	1. Inpatient care 2. Outpatient care (serious diseases) 3. Part of other outpatient care services	1. Inpatient care 2. Outpatient care (serious diseases) 3. Part of other outpatient care services
Payment period	Monthly	Annually	Annually
Insurance accounts	1. Personal account 2. UEBMI pooling fund account	URBMI pooling fund account	NRCMS pooling fund account
Payment standard	10% annual average salary of local employees	Determined by local governments	Determined by local governments
Quit insurance	Personal account can be returnedor inherited	No return	No return

(The official websites of MOHRSS, NHC, and NHSA)

Until 2018, most of the provinces have merged the URBMI and the NRCMS into the Urban and Rural Resident Basic Medical Insurance (URRBMI). At present, the UEBMI and the URRBMI share the same funding pool on the city level. Regardless if they operate as public or private healthcare facilities, only if they fulfill basic requirements can they be accepted as designated healthcare facilities eligible for funding by the medical security system.

However, the basic medical insurance, together with increasing governmental subsidies, covers only part of the cost in healthcare. The share of household out-of-pocket payment is hefty, which is a big burden for individuals (World Bank Group *et al.*, 2016:10-11) (Figure 2.4). In this study, two cases in Guangzhou, one of the four well-developed cities in China, are researched as examples to explain how the medical security system works. Different cities have their own policies and regulations according to the local financial situation, but all of them follow the same general principles nationwide.

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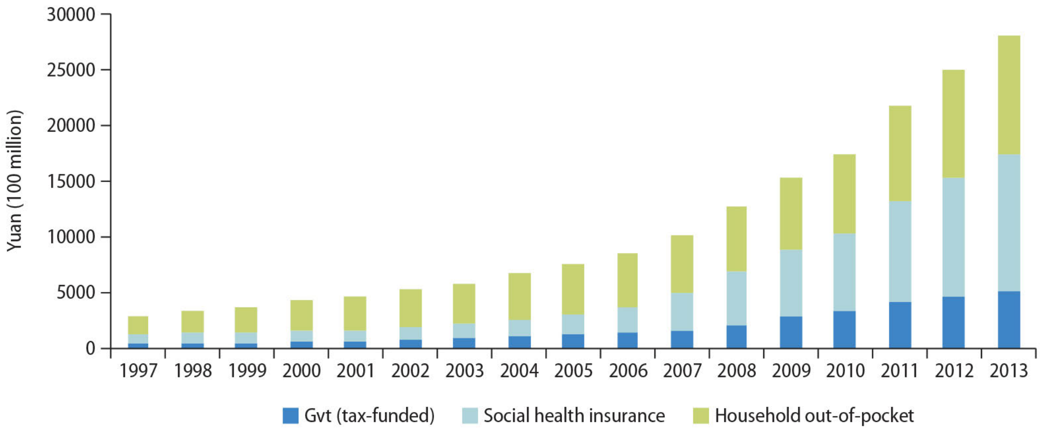

FIG. 2.4 Health expenditure constitution
(Data source: World Bank Group et al., 2016:14)

BOX 2.1 – AS AN EMPLOYEE

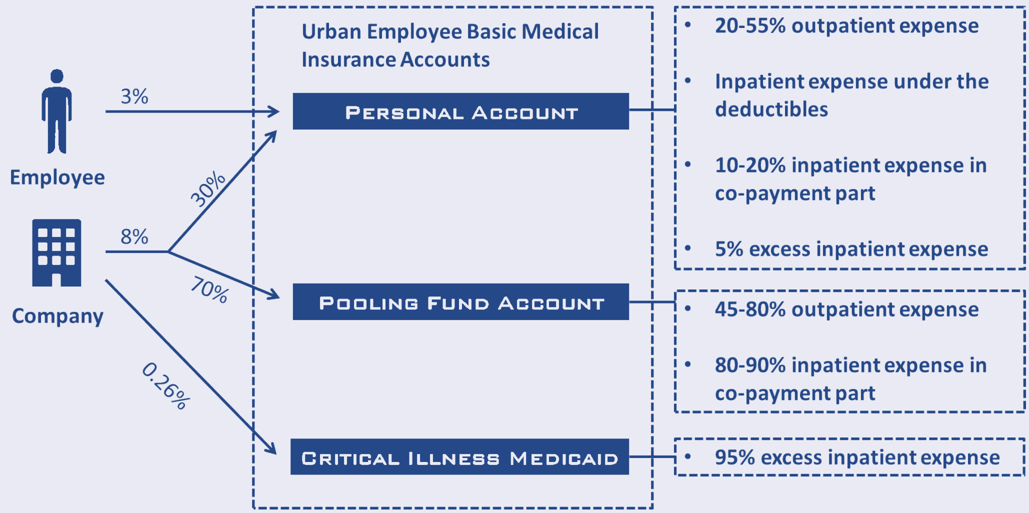

FIG. 2.5 Framework of Urban Employee Basic Medical Insurance (UEBMI)
(Basic MedicalInsurance Act of Guangzhou 2015 & Guideline of Urban Employee Basic Medical Insurance, 2016 first edition)

Step 1: Purchase UEBMI

Both the employee and the company have obligations to purchase UEBMI. There are two accounts in an employee's social security card: one is his personal account, and the other is the pooling fund account. Every month, the employee pays 3% of his income into the insurance, while the company pays another 8%. All the money from the employee (3% of income) and 30% of the company's contribution (8% of income) is deposited into the employee's personal account, and the other 70% from the company is transferred to the pooling fund account of UEBMI. The company is also required to purchase additional insurance called "Critical Illness Medicaid" for the employee, which is 0.26% of the employee's income. If an employee has kept on purchasing UEBMI for more than 15 years, when he/she is retired, he/she could enjoy his/her medical security for free for the rest of his/her life.

Step 2: Choose two designated healthcare facilities for outpatient visits

An employee needs to choose two healthcare facilities on the list of UEBMI, at least one of which has to be a community health center. Only in these two designated healthcare facilities is the employee allowed to use his/her insurance for outpatient diagnoses and treatments. An employee has a chance to change healthcare facilities at the beginning of each year.

Step 3A: See a doctor as an outpatient

When the employee is ill, he/she can go to one of the two designated healthcare facilities to see a doctor. If the employee visits a community health center, 80% of his/her bill would be reimbursed by the pooling fund account, while if he/she goes to a tertiary hospital, only 45% would be reimbursed. The rest of the medical expense can be paid through his/her personal account. There is also a payment ceiling of UEBMI, which is 300 yuan per month.

Step 3B: Hospitalization

If an employee is hospitalized, he/she can go to any healthcare facility on the list of UEBMI. The medical expense for an inpatient can be divided into three parts:

1) There is a deductible in the UEBMI policy. The medical expense under the deductible is paid in whole by the inpatient himself/herself. But the deductible varies based on the level of the healthcare facility. If an employee is hospitalized in a community health center, the deductible is 400 yuan, as opposed to 1,600 yuan in a tertiary hospital.

2) The second part is co-payment, which means the inpatient's medical expense is paid by both his/her personal account and the pooling fund account of UEBMI. 90% of the medical expense in a community center is paid by the pooling fund account, 80% in a tertiary hospital. However, there is a ceiling of payment from the pooling fund account, which was 445,464 yuan per year in 2016, six times an employee's average salary in Guangzhou.

3) If the expenses exceed the co-payment ceiling, 95% of the excess would be paid by the Critical Illness Medicaid, which would cover up to 222,732 yuan per year in 2016, less than three times the average salary of an employee.

Step 3C: Emergency

An employee can go to the Emergency Department (ED) of any hospital nearby. It does not have to be his/her designated healthcare facilities. If he/she has mild symptoms, which are often associated with problems that can be taken care of in an outpatient clinic, the medical expense would be reimbursed by UEBMI according to the outpatient expense claim guidelines. If he/she is kept for observation in the ED, the medical expense would be reimbursed by UEBMI like an inpatient with a ceiling of 1600 yuan per year.

BOX 2.2 – AS A RESIDENT IN URBAN OR RURAL AREAS

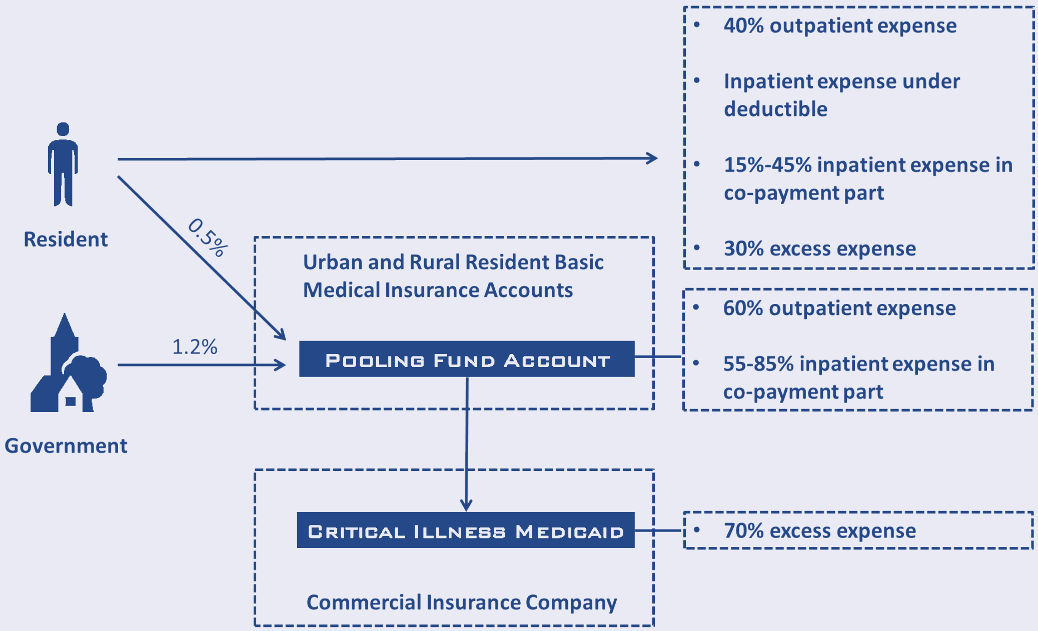

FIG. 2.6 Framework of Urban and Rural Resident Basic Medical Insurance (URRBMI)
(Basic Medical Insurance Act of Guangzhou 2015 & Guideline of Urban and Rural Resident Basic Medical Insurance, 2016 first edition)

Step 1: Purchase URRBMI

When an inhabitant opts for the URRBMI procedure, a pooling fund account (as opposed to a personal account), is set up in his/her social security card. In 2016, he/she would pay 167 yuan for the insurance, which was 0.5% of an inhabitant's average income in Guangzhou at that time.

Step 2: Choose one designated healthcare facility for outpatient visits

An inhabitant needs to choose a community health center on the list of URRBMI. Only in this designated healthcare facility can he/she use his/her insurance to pay for outpatient care service. He/she has a chance to change the designated facility at the start of each year.

Step 3A: See a doctor as an outpatient

Around 60% of the outpatient expenses can be reimbursed by URRBMI, which is 600 yuan maximum per year.

Step 3B: Hospitalization

If an inhabitant is hospitalized, he/she can choose any healthcare facility on the list of URRBMI. As an inpatient, their medical expense includes three parts:

1) There is a ¥300 deductible in a community health center and a ¥1,000 deductible in a tertiary hospital in the URRBMI policy.

2) The expenses that exceed the deductible amount are shared by URRBMI and the inhabitant. 85% gets reimbursed in a community health center but only 55% in a tertiary hospital. The maximum reimbursement given by the pooling fund account was 181,900 yuan per year in 2016, which was six times the average income of a resident in Guangzhou.

3) If the inhabitant's medical expenses exceed the payment ceiling, 70% of the excess part is to be paid by the Critical Illness Medicaid. Even in the co-payment part, if the inhabitant pays over 18,000 yuan in a year out of his/her own pocket, half of the excess part would be paid by the Critical Illness Medicaid, too. However, there is also a maximum payment on Critical Illness Medicaid, which depends on how many years the inhabitant has been purchasing URRBMI.

Step 3C: Emergency

The inhabitant can use any emergency service nearby without considering whether the hospital is his/her designated healthcare facility. If he/she is treated as an outpatient, the medical expenses would be reimbursed by URRBMI just like a regular outpatient visit. If he/she is kept for observation in the ED, the medical expenses would be reimbursed by URRBMI just like hospitalization, though with a ceiling of 1,000 yuan per year.

BOXES COMPARISON

China has established a clear basic medical security system. The type of basic medical insurance an insurance holder opts in determines how he/she gets reimbursed. Employees are usually better protected than residents because the UEBMI is a commercial product while the URRBMI is social welfare. Both the UEBMI and the URRBMI encourage insurance holders to see doctors in community health centers or secondary hospitals by providing lower deductibles and higher ratios of reimbursement (Table 2.8 and Table 2.9).

TABLE 2.8 Comparison of Two Basic Medical Insurance in Guangzhou in 2016

			An employee	An inhabitant
Type of Insurance			UEBMI	URRBMI
Participation way			Mandatory	Voluntary
Outpatient	Designate the healthcare facilities the individual would like to visit in a year		Two community health centers, or One community health center and one general hospital	One community health center
	The ratio of reimbursement	Community health centers	80%	60%
		Hospitals	55%	/
	Payment limit		300 yuan per month	600 yuan per year
Inpatient	Deductibles	Community health centers	400 yuan	300 yuan
		Secondary hospitals	800 yuan	600 yuan
		Tertiary hospitals	1600 yuan	1000 yuan
	Co-payment part	Community health centers	90%	85%
		Secondary hospitals	85%	70%
		Tertiary hospitals	80%	55%
		Payment limit	445,464 yuan	181,900 yuan
	Excess part	Critical illness Medicaid	95%	70%
		Reimbursement ceiling	222,732 yuan	120,000 yuan (who have purchased the URRBMI for less than 2 years) 150,000 yuan (who have purchased the URRBMI for 2 to 5 years) 180,000 yuan (who have purchased the URRBMI for over 5 years)

(Guideline of Urban Employee Basic Medical Insurance (2016 first edition) & Guideline of Urban and Rural Resident Basic Medical Insurance (2016 first edition))

TABLE 2.9 Ideal models of UEBMI & URRBMI reimbursement for inpatients in 2016

	The level of hospitals	Ideal maximum reimbursement per year	Ideal maximum reimbursement ratio (%)
UEBMI	Lv. 1: Community health centers	668,196	91.56%
	Lv. 2: Secondary hospitals	668,196	88.00%
	Lv. 3: Tertiary hospitals	668,196	84.27%
URRBMI	Lv. 1: Community health centers	361,900	76.76%
	Lv. 2: Secondary hospitals	361,900	69.92%
	Lv. 3: Tertiary hospitals	361,900	61.46%

Ideal maximum reimbursement = Maximum reimbursement in Co-payment part + Maximum reimbursement in Critical Illness Medicaid part
*Ideal maximum reimbursement ratio= Reimbursement ceiling / Total medical expense*100%*

2.1.4 Healthcare performance of Chinese people

2.1.4.1 Life expectancy at birth

The health status of Chinese people has substantially improved. Life expectancy at birth increased from 43.7 in 1960 to 76.7 in 2014. In the two decades between 1960 to 1980, life expectancy at birth grew rapidly, surpassing the world average in around 1970 (Figure 2.7). However, in 2018, life expectancy in China was still 5 years lower than in the Netherlands.

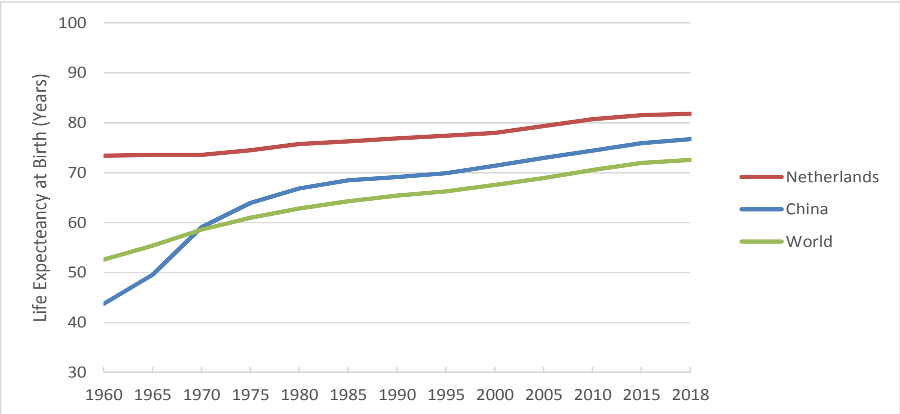

FIG. 2.7 Life Expectancy at Birth
(Data source: World Bank, World Development Indicators)

2.1.4.2 Major health resources

The density of hospital beds, average length of stay (ALOS), the density of physicians, and the density of nurses are four main indicators which reflect the medical capability of a country. In recent years, the density of hospital beds has risen rapidly as the investment of government kept on increasing. At the end of 2017, the amount of hospital beds per thousand in China reached 4.3, which outnumbered the 3.3 beds in the Netherlands (Figure 2.8). Nevertheless, the ALOS in China was nearly twice that of the Netherlands in 2017 (Figure 2.9). Considering the indicators of both the density of hospital beds and the ALOS, the healthcare performance in China needs further improvement. Experiences in the Netherlands and in other countries show demonstration that the reduction of the number of hospital beds combined with shorter ALOS can lower healthcare expenditures and at the same time enhance the quality of cure and care.

The numbers of physicians and nurses & midwives per thousand keep increasing in China, but the number is still small compared to the Netherlands, especially the number of nurses & midwives (Figure 2.10 & 2.11). In 2017, the number of nurses & midwives per thousand was 2.66 in China as opposed to 11.18 in the Netherlands. It indicates a serious shortage of nursing staff in China (Meng *et al.*, 2015:122).

Compared the data in 2007 and 2017 between China and the Netherlands, the indicators of major health resources become better in China except Physician-hospital bed Ratio, which was 1:2.16 in 2017 as opposed to 1:1.55 in 2007. While this ratio was 1:0.91 in the Netherlands in 2017 (Table 2.10). It shows that the growth of the numbers of physicians lagged behind the rapid development of hospital beds. Even though the number of physicians increases, their workload becomes heavier.

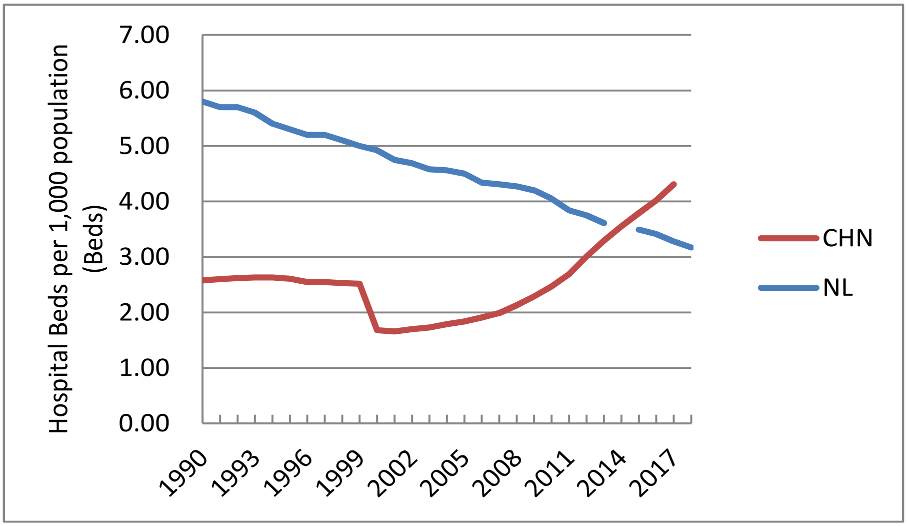

FIG. 2.8 Hospital beds per thousand in China and in the Netherlands
(Data source: World Bank, World Development Indicators)

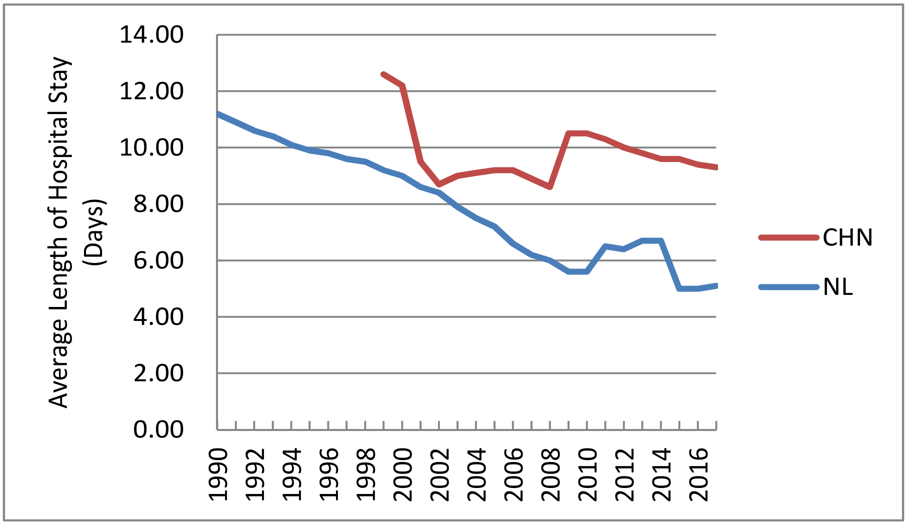

FIG. 2.9 Average length of hospital stay (ALOS) in China and in the Netherlands
(Data source: Statistical Bulletin on the Development of Health in China; OECD Health Statistics)

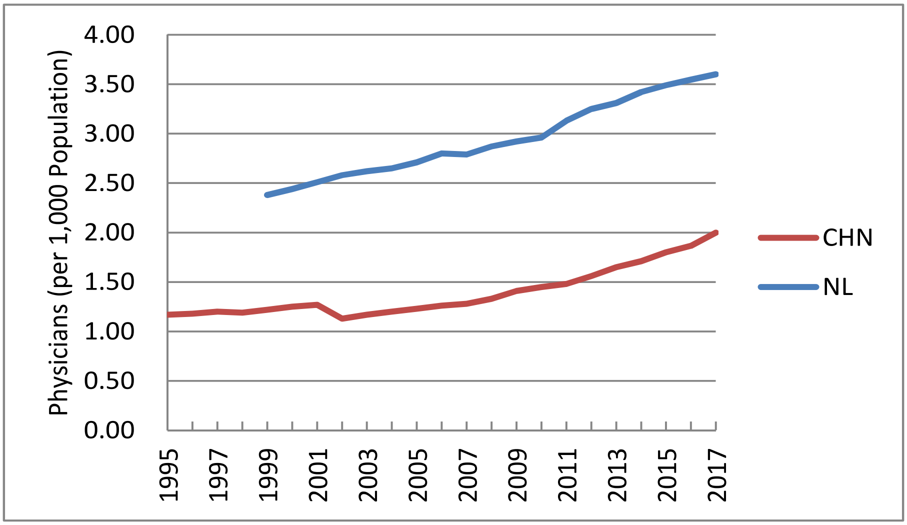

FIG. 2.10 Physicians per thousand in China and in the Netherlands
(Data source: World Bank, World Development Indicators)

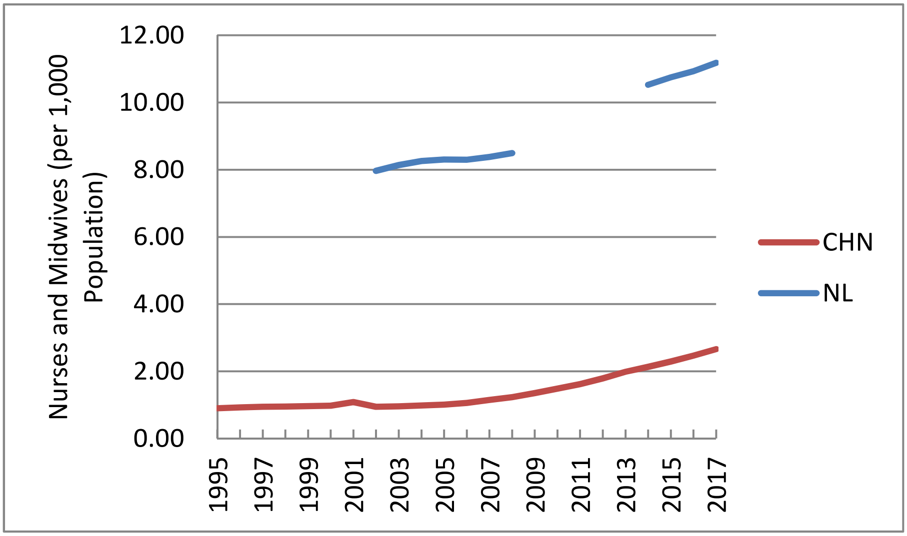

FIG. 2.11 Nurses and Midwives per thousand in China and in the Netherlands
(Data source: World Bank, World Development Indicators)

TABLE 2.10 The comparison of three ratios concerning the number of doctors and nurses between China and the Netherlands in 2007 and 2017

	Year	China	The Netherlands
Physician-nurse ratio	2007	1:0.90	1:3.00
	2017	1:1.33	1:3.11
Physician-hospital bed ratio	2007	1:1.55	1:1.54
	2017	1:2.16	1:0.91
Nurse-hospital bed ratio	2007	1:1.73	1:0.51
	2017	1:1.62	1:0.29

The shortage of physicians and nurses & midwives leads to overwork and poor interactions between medical staff and patients. Moreover, in order to ensure the quality of care, a large number of nursing assistants are employed, and family members of the patients are advised to lend a hand (Wu & Xue, 2005: website).

2.2 Performance of the hospitals

As shown in Section 2.1.1, in both urban and rural areas, China has established an organized institutional framework of healthcare facilities, all of which have been ranked into three levels and ten grades. Only healthcare facilities with more than 100 inpatient beds qualify as hospitals. There are some common problems that influence the performance of hospitals.

2.2.1 The excessive number of patient visits in hospitals

According to the national statistics in 2017, the number of outpatient visits was between 2.3 million and 7.7 million a year in Top 100 hospitals, which equals to 6,300 to 21,000 visits a day (Figure 2.12). As a matter of fact, the excessive number of visits has negative impacts on the performance of the building as well as on patient experience in hospitals, as it leads to overcrowding and noise.

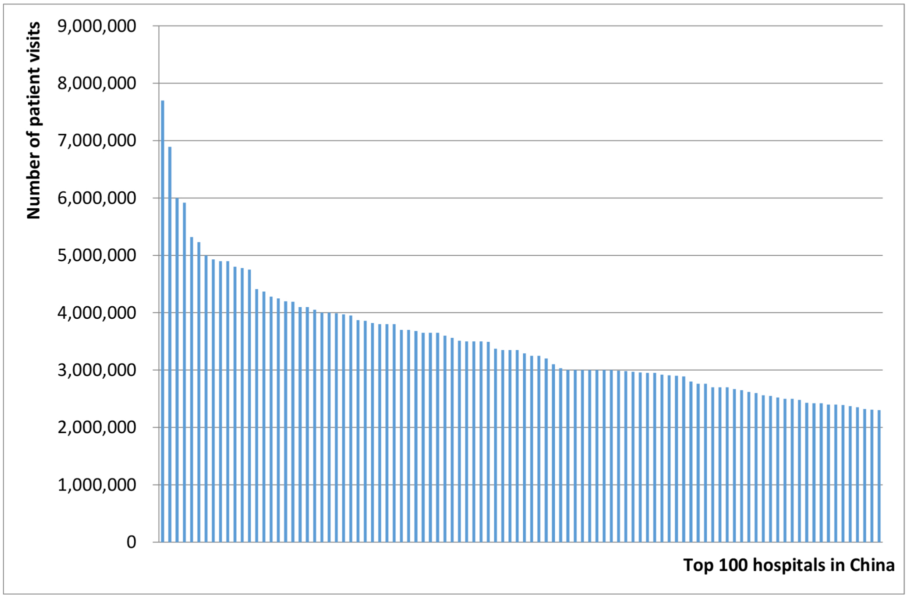

FIG. 2.12 Number of outpatient and acute patient's visit in the Top 100 hospitals in 2017
(Data source: Ouyang,2018: website)

This problem is caused mainly by the imbalance of allocation of medical resources. Due to the lack of gatekeeping procedures, a consequence of the absence of general practitioners (GPs), it is almost impossible to prevent patients from preferring hospitals to other facilities such as health centers. It is up to the patients themselves to decide whether to visit a community health center or a hospital. Although seeing doctors in community health centers has a higher rate of reimbursement than visits to large hospitals, most patients tend to consult specialists in large hospitals that offer a high level of technology. Apparently, they do not need it most of the time. (Meng *et al.*, 2015:137).

The situation outlined above is more common in urban areas than in rural areas. As is demonstrated in Figure 2.13, over 26% of the outpatients and over 46% of the inpatients living in urban areas preferred to have their first diagnoses in municipal or provincial hospitals, while these numbers were 2% and 10.6% in the rural areas (Figure 2.14). It leads to two extremes: on the one hand, large hospitals are overcrowded and specialists are overworked; on the other hand, the business of community health centers is slow and new doctors do not see enough patients.

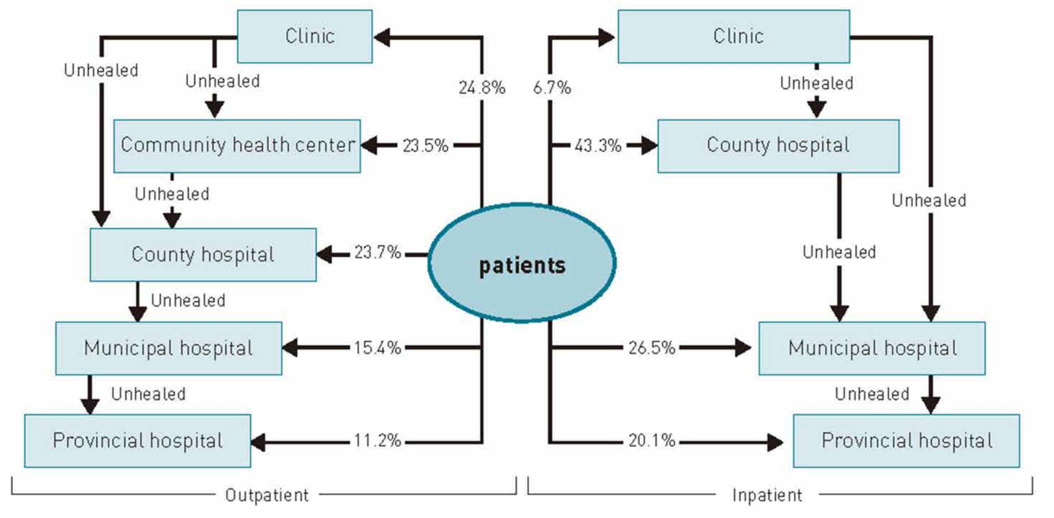

FIG. 2.13 Urban patients' pathways
(Meng et al., 2015:138)

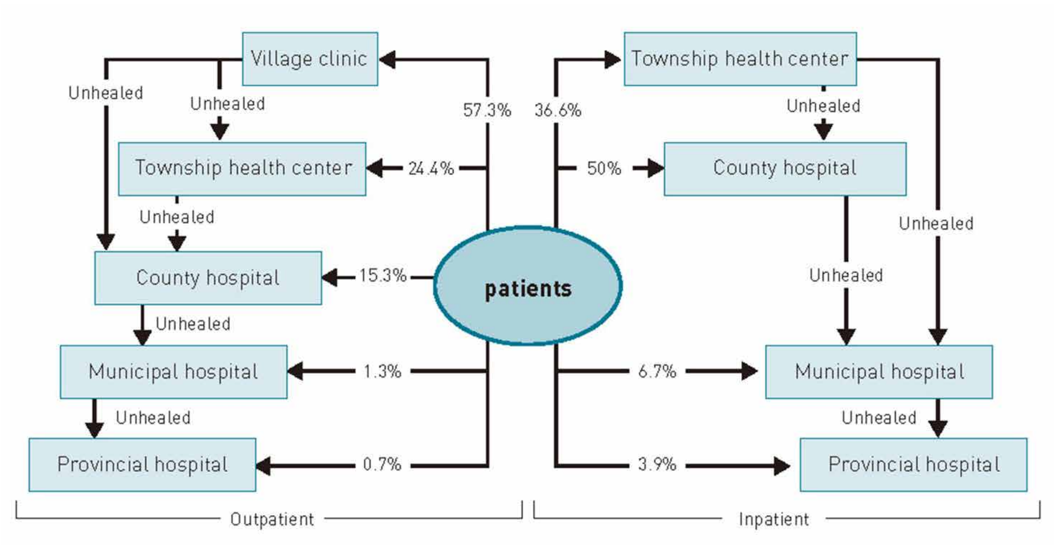

FIG. 2.14 Rural patients' pathways
(Meng et al., 2015:138)

2.2.2 The excessive scale of hospitals

Between 2004 and 2014, the number of hospitals with over 800 inpatient beds quadrupled, increasing from 243 to 1369. The rate of growth was 20% per year on average, which was much higher than other groups of hospitals in China. Zhuang (2015:15-24) believed that the excessive growth of large hospitals was harmful to the institutional framework of healthcare facilities since it was a consequence of unbalanced growth. As evidenced in Figure 2.15, while there was a decrease in the number of secondary hospitals and a major dip in the inpatient services of secondary hospitals and primary care facilities (i.e. community health centers), there was an excessive growth of the number of tertiary hospitals. It proves that the excessive growth of the largest hospitals has stifled the development of healthcare facilities at lower levels.

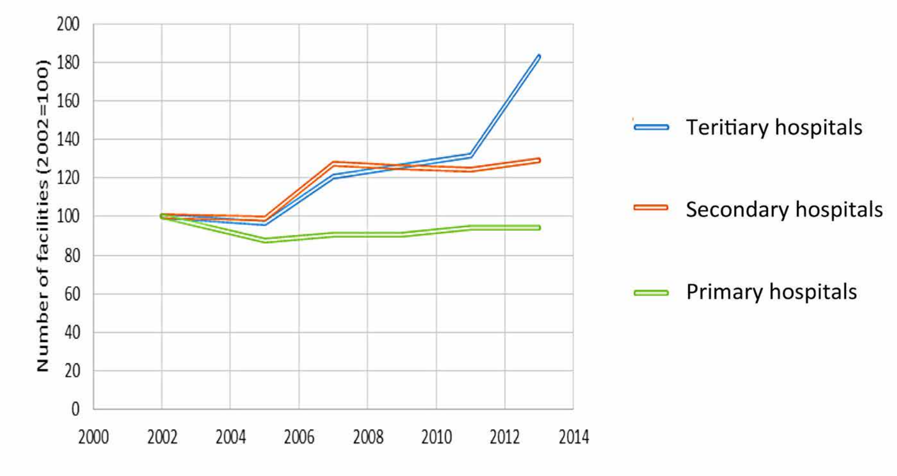

FIG. 2.15 The development tendency of healthcare facilities
(Zhuang, 2015:24)

The motivation for building mega hospitals was the conviction that they can benefit from scale effects. The growing scale of hospitals was favored by some scholars and hospital managers. It was expected that the quality and quantity of medical services would improve if hospitals became bigger (Yan, 1998:8-9; Kuang, 2006:76-78; Kuang *et al.*, 2009:11). However, in practice, the unlimited extension of hospitals caused problems, such as low patient satisfaction with the medical services they offered, insufficient use of the medical devices they harbor, and high costs (Liu & Xu, 2005:40; Song *et al.*, 2005:30). What's more, research demonstrated that secondary hospitals were outperforming tertiary hospitals. (Pang *et al.*, 2008:120).

2.3 Recent trends in the healthcare system

Despite the fact that China faces serious challenges, it has made every effort to rise to the challenges, ranging from primary care, regional reallocation of medical sources, payment reform, and private healthcare.

2.3.1 Easy access to primary care

2.3.1.1 ‘Internet plus’ community health centers

‘Internet plus’ is a popular word in China at the moment. It refers to mobile Internet, cloud computing, and big data (State Council PRC,2015: website). In the healthcare market, there have been some perfect online to offline (O2O) procedures, such as online registration, online payment, and online lab reports. More than that, ‘Internet plus’ community health centers provide services using the technology of automatic health monitoring.

The first ‘Internet plus’ community health center was founded on June 18th, 2016. It is located in Jinbi Garden, a residential community in Guangzhou which was built by the Evergrande Group in 2000. This health center not only offers common medical services but also several wearable devices that record and monitor users’ health data in their personal digital files. Users can check their health information anytime anywhere via a computer or a mobile phone. Through data analysis, doctors from Southern Medical University and the First Affiliated Hospital of Guangzhou Medical University can give patients medical advice through the Internet, or transfer patients to hospitals via the green channel (Ou,2015: website). By now, there are eight ‘Internet plus’ community health centers in seven cities; they cooperate with nearly 30 local tertiary hospitals (Evergrande Health, n.d.: website).

2.3.1.2 First diagnosis by general practitioners in a hospital

Operating the first General Practice Clinic in a public tertiary hospital in Mainland China, the University of Hongkong-Shenzhen Hospital (HKU-SZH) encourages outpatients to see general practitioners before being referred to specialists. Appropriate referrals will be made if further care by specialists is required.

The hospital believes that 85% of the problems can be solved by general practitioners and that initial treatments by general practitioners are not only the most efficient but also the least expensive (HKU-SZH,2019: website). During the period from July 2013 to June 2014, the Family Medicine Clinic treated about 43,000 outpatients with 845 kinds of diseases, playing a vital role in gatekeeping (Lin, 2016:2240).

2.3.2 Medical resource reallocation in regions

Medical resource reallocation in regions is led by top university-affiliated hospitals well-known for their top-notch medical quality. There are some trials on how to extend their high-quality medical services to more patients.

2.3.2.1 Regional hospital unions

Since April 2016, Zhongshan Hospital, as one of the Fudan University-affiliated tertiary general hospitals, has initiated a hospital union which includes Xuhui Central Hospital (a secondary hospital) and several community health centers in the Xuhui District. Unlike other hospital unions before, the HC of the Xuhui District authorized the Zhongshan Hospital to manage the Xuhui Central Hospital. Doctors, medical technology and training are shared, and there is a common standard of medical treatment in the union, so it is very convenient to refer patients to these shared healthcare facilities (Qi & Huang,2016: website) (Figure 2.16). Thanks to the guidance and training of the Zhongshan Hospital, residents in the Xuhui District may easily access high-quality medical services nearby. Almost simultaneously, the Fudan University Affiliated Huashan Hospital has led another hospital union in the Minhang District in the same way.

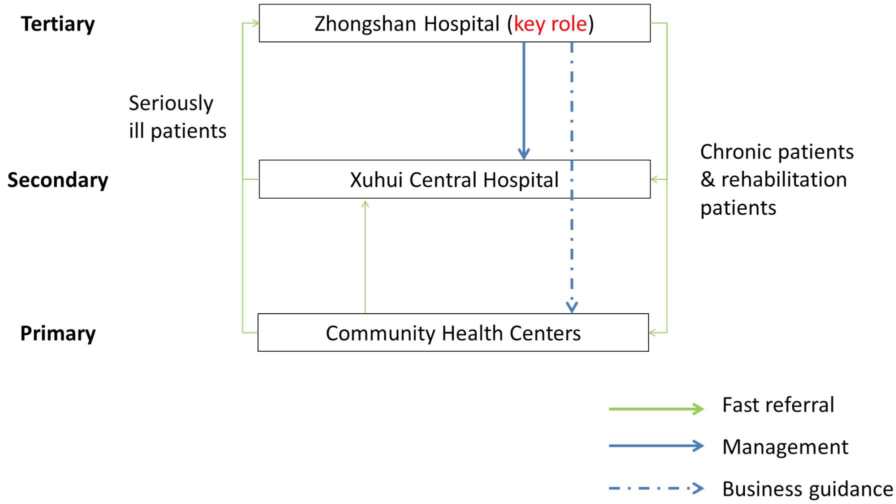

FIG. 2.16 Hospital union in the Xuhui District, Shanghai

2.3.2.2 Hospital union in a specialized department

In Shanghai, the Children's Hospital of Fudan University receives over 9,000 outpatients daily in busy periods. By contrast, far fewer outpatients visit the pediatrics departments of general hospitals. In April 2014, the Fudan Hospital Union in Pediatrics was founded with an eye to lifting the overall medical quality in pediatrics. The union is led by the Children's Hospital of Fudan University, the other 9 members being the Fudan University-affiliated general hospitals providing pediatric care. Over 300 doctors and 1,500 inpatient beds are included in the union. A total of around 3 million outpatients visit the hospital union per year (News Center,2014: website). On the one hand, doctors from the Children's Hospital are sent to other union members to help establish common standards of pediatric practice, while doctors from the general hospitals are sent to Children's Hospital for training. It is convenient for patient referrals among these healthcare facilities (Figure 2.17).

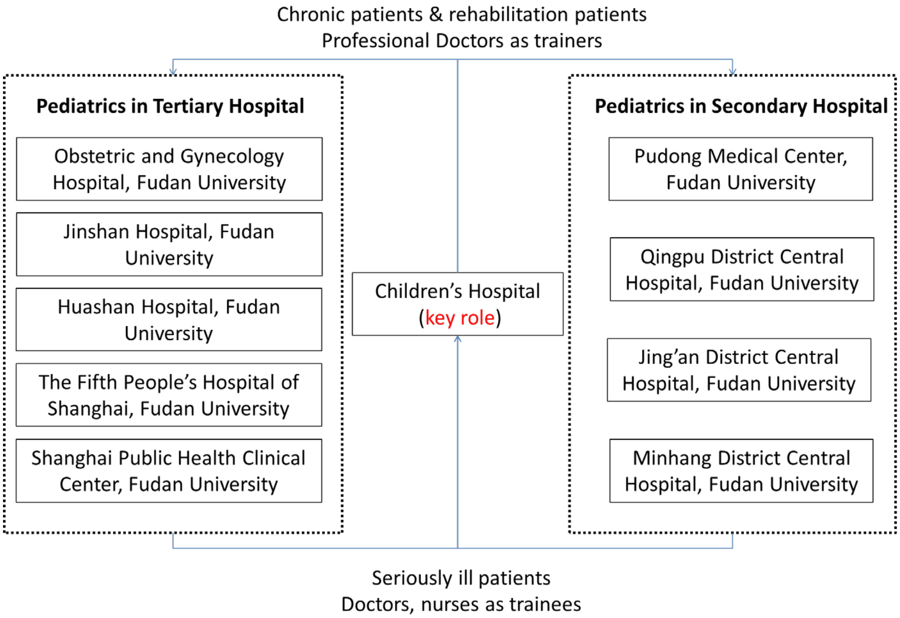

FIG. 2.17 Hospital union in pediatrics

In 2015, the number of outpatient visits rose 2.1% and the number of inpatient discharges rose 3.7% in the union. The growth resulted for the most part from the general hospitals in the union. With the help of the Children's Hospital, the general hospitals have a greater capacity in pediatrics. For example, only 8% of neonates from Qingpu Central Hospital had to be transferred to the Children's Hospital in 2015, while the number was 90% in 2013. Furthermore, the annual average of pediatric patients that transferred from Jinshan Hospital to the Children's Hospital was decreased by over 300 (Song, Shi & Sun,2016: website). The Hospital Unions in Obstetrics & Gynecology and in Hematology have been founded in the same fashion.

2.3.2.3 Doctor groups in a general hospital

In HKU-SZH, it is impossible for patients to choose doctors whether in outpatient clinics or in inpatient wards. Doctors are organized into several groups. Each group includes both senior specialists and junior resident doctors. It gives resident doctors more chances to enhance their skills whilst ensuring medical quality (HKU-SZH,2019a: website).

TOC

2.3.2.4 Online hospitals

Information technology solves the problem of information asymmetry between healthcare facilities and patients. However, there are still large gaps between urban and rural areas in the allocation of medical resources. As the largest Internet company in China, Alibaba Group is trying to establish a complete industrial chain in medical care online. One of the successful cases since the beginning of 2016 is that patients who live in a village in Hubei Province can see doctors from a tertiary hospital in the urban area and get their medicines without leaving the village.

In the Wuhan Central Hospital, patients can make registrations and see doctors on an online platform of AliHealth[2] through their mobile phones, computers, or in a nearby service station of Alibaba (PS: There are many service stations of Alibaba in the rural areas in China. They help residents in rural areas to buy and sell goods online.) After paying via Alipay[3], patients will receive E-prescriptions, with which they can buy medicines at any local pharmacy or in the Tmall Drugstore[4]. If patients need further examinations, they can visit any of the twenty-six county hospitals which are also members of the union led by Wuhan Central Hospital. Lab reports and digital images will be sent to the Wuhan Central Hospital via Wanlicloud[5] (Xia,2016: website; Li,2016: website) (Figure 2.18).

2.3.3 Payment reform

In most Chinese hospitals, patients pay for their treatment based on how many medical services they receive. Patients may be overtreated with excessive drugs and medical tests. However, in HKU-SZH, for certain health issues, there is a package fee of RMB 200, which covers registration, consultation, certain examinations if needed, simple treatments and medications for up to 7 days. Moreover, hospitalization and some surgeries also have payment packages. Overtreatment seems to be prevented in this way (Figure 2.19).

2 AliHealth: An affiliated company of Alibaba Group which focuses on health industry

3 Alipay: An online payment company belonged to Alibaba Group

4 Tmall Drugstore: An online shopping platform belonged to Alibaba Group

5 Wanliclould: A cloud storage company of medical data funded by Alibaba Group

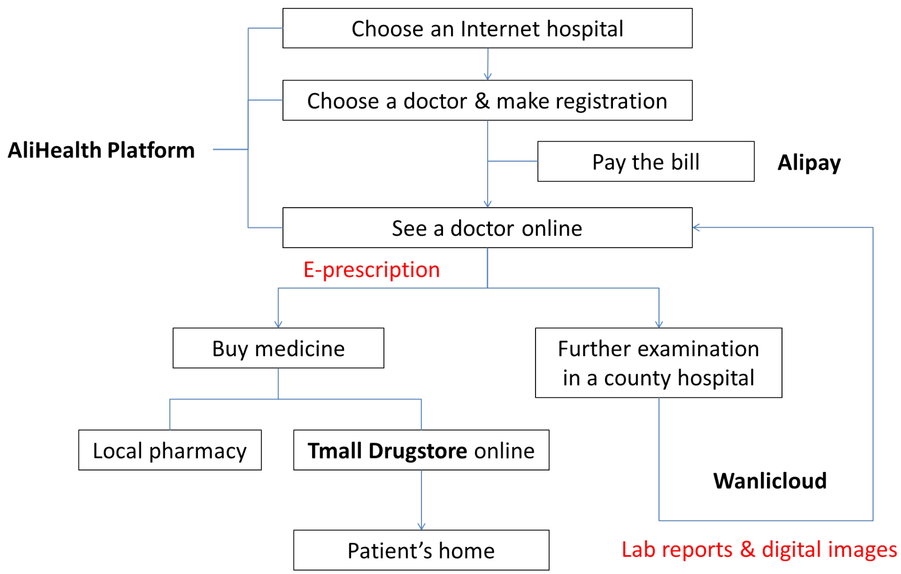

FIG. 2.18 Alibaba's healthcare industry

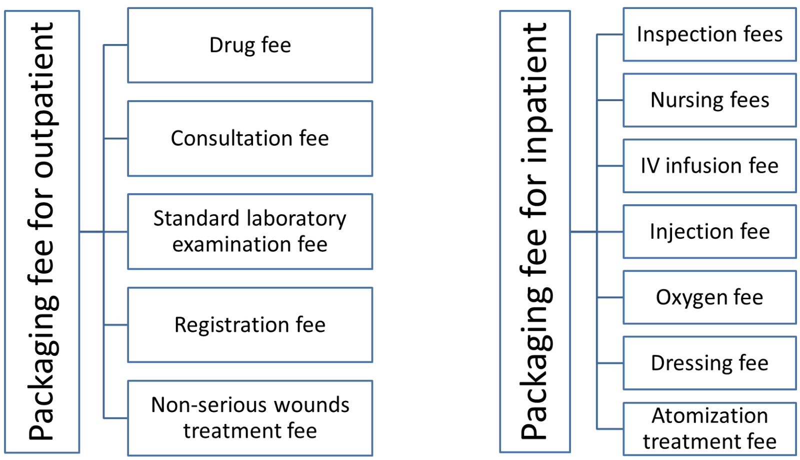

FIG. 2.19 Packaged fee for outpatients and outpatient in HUK-SZH
(HKU-SZH Official Website)

2.3.4 Private hospital development

At present, public hospitals occupy most of the medical resources in China, while private hospitals are small and limited in their medical resources. It is expected that medical services will be differentiated, including not only public healthcare facilities but also private hospitals. According to the *National Medical Health Service System Plan (2015-2020)*, public hospitals are restricted in scale and in providing VIP services. Private capitals are encouraged to invest in the fields of basic healthcare service, VIP service, rehabilitation, and nursing for the aged (GOSC, 2015: website).

In collaboration with Brigham and Women's Hospital (BWH) in USA, Evergrande Group is building an international hospital specializing in tumor treatment in Boao Lecheng International Medical Tourism Pilot Zone, Hainan Province. In the Pilot Zone, the practice limit for overseas doctors is extended to 3 years, and some medicines and medical equipment may be imported duty-free or with tax reduction (General Office of the People's Government of Hainan Province,2016: website).

2.3.5 Discussion

There are three types of trends that influence the healthcare system and hospitals in China.

2.3.5.1 Public hospitals in some developed cities try to optimize medical processes and integrate medical resources.

In the case of HKU-SZH, initial treatments by general practitioners and doctor groups are powerful measures that ensure the rational use of medical resources, and are conducive to training doctors. Besides, the reform of payment is expected to prevent overtreatment. In the case of the Fudan Hospital Union, public medical resources are integrated holistically. Working with secondary hospitals and community health centers, the Fudan hospital, as a tertiary hospital, shares its best practice and enhances the overall medical quality in Shanghai.

These trials are promoted by public policies, which means that the HKU-SZH and the Fudan Hospital do not have to worry about profitability and the ownership of other hospitals in the union. Some of these measures cannot be copied nationwide.

2.3.5.2 Private hospitals face a great development opportunity.

Preferential policies are introduced to encourage the establishment and development of private hospitals. The Evergrande Group's investment in community health centers and international hospitals shows that private capitals are exploring new ways to compete with and complement public hospitals.

2.3.5.3 Internet drives reforms in healthcare.

The Alibaba Group engages in experiments that organize the whole process of medical care online, from patients' registration to the sale of drugs. It is a dramatic and ambitious innovation that may transform the traditional concept of seeing a doctor.

3 Patient Journey: Procedure and Patient

Questions

1. What is meant by the concept of patient journey?
2. How do patient journeys work in Chinese hospitals?
3. What is patients' experience during their journeys?

Purpose

This chapter describes the context and composition of patient journeys in Chinese hospitals. Procedures and patient experience are essential aspects when of the patient journeys. This chapter begins by defining the concept of a patient journey, using the international literature as a starting point, describing its characteristics and the way it is being used in practice. Then it moves on to explain the relationships between components in patient journeys. Finally, it focuses on the patient journeys in Chinese hospitals and how they impact patient experience. This chapter paves the way for the next chapter, where the analysis of patient journeys inspires architectural solutions to address the underperformance of hospitals.

Approaches

1. In order to make the concept of a patient journey visible and measurable, pathways of patients from Top 5 departments in outpatient clinics, inpatient wards, and the Emergency Departments are analyzed by observation and literature study; the findings are structured according to the Pareto principle[6];

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6 The Pareto principle in Cambridge Dictionary is that "The idea that a small quantity of work or resources can produce a large number of results".

2 Based on the outcomes of observation and the literature review, interviews are conducted with doctors, nurses, and hospital experts; these shed light to the relationship between clinical and administrative processes on the one hand, and patient experience on the other;
3 Patient needs and interactions between patients and other actors in hospitals are analyzed by literature reviews of patient satisfaction surveys in recent years.

Findings

1 Main patient journeys in Chinese hospitals;
2 Patient experience including the patient's perception of time and architectural spaces in their journeys;

3.1 Introduction of patient journey

3.1.1 Definition

The concept of a patient journey refers to the experience a patient has in a healthcare facility or in the healthcare system. But what is meant by "experience"? On the one hand, some papers focus on the procedures that take place during the journeys. In this context, a patient journey is considered as a group of procedures involving the spatial trajectories of a patient in a healthcare facility (Curry, 2006:4726). These procedures can be further divided into the clinical processes related to medical science and the administrative processes that have a closer relationship with hospital management (Santos *et al.*, 2013:2; NSW Health, 2017: website). Waits, blocks and bottlenecks in the journeys are identified, and follow-up analyses are organized in order to find ways to improve the performance of a healthcare facility or the healthcare system. On the other hand, some papers pay more attention to the interactions and emotional feelings of patients when talking about the journeys. (Masso *et al.*, 2008:57-59,108; Manchaiah *et al.*, 2011:227). Cure and care are conceived as services provided to patients who are seen as a special group of customers; innovations are suggested to improve their experiences (TU Delft Online Learning, 2016: Theory Module 1:1).

To summarize, the concept of a patient journey can be defined as all the matters around patient cure and care that comprise both the procedures and patients' experiences during their stay in a healthcare facility or in the healthcare system.

3.1.2 Characteristics

Patient journeys have specific characteristics. In order to clarify them, a distinction should be made between the concept of patient journey and other terms including patient flow, medical process, and care pathway (Table3.1).

The terms "patient flow" and "medical process" are descriptions of objective facts. The patient flow canvasses the movement of patients through a set of locations in a healthcare facility. (Cote, 2000:8). The flow of patients is complemented by that of doctors, nurses and other staff. (Ge *et al.*, 2004:18). A "process" is a series of actions that are taken in order to achieve a result; the term "medical process" can be defined as a sequence of connected medical steps to be followed by patients with the aim of improving health or fighting diseases (Cambridge Dictionary, 2017: website). If medical processes change, the corresponding patient flows also change. Both terms, "patient flow" and "medical process", are neutral and factual.

The terms "care pathway" and "patient journey" are concepts created for the purpose of health enhancement. The term "care pathway" refers to a set of evidence-based, streamlined, and standardized medical processes for the diagnosis and treatment; it represents best practices in the treatment of specific diseases. (Wagenaar *et al.*, 2018:27; CPA, 2014: website). It tends to focus on clinical indicators and outcomes so as to reduce healthcare expenditure. (Boess *et al.*, 2014:32).

Similar to the concept of a care pathway, the patient journey is also based on empirical data, but it focuses on how a patient physically moves from point A to point B to follow a process that really matters to the patient himself/herself, and gives the highest priority to the quality of the patient experience. The sequence of a patient journey is inevitably dictated by the medical processes involved in his/her treatment scheme. In this thesis, patient journeys are analyzed by ways of mapping, a method suitable for the identification of problems such as long and unnecessary waits, blocks, and bottlenecks in procedures as well as in patient-staff interactions and patient emotions. From an architectural perspective, it sheds light on the processes patients really have to undergo, and their experiences throughout the whole process. Apart from patient journeys, there are also staff journeys and flows of specimens, materials, pharmaceuticals, and information in a healthcare system (Hall, 2013:9).

Although all of these aspects are interrelated, this thesis focuses on the patient journey, one reason being that it highlights aspects that revolve around the patient-centered design, a perspective that has become generally accepted as a fundamental quality in healthcare design.

TABLE 3.1 The comparison of the four terms

	Objective	Composition	Characteristic
Patient Flows	Description of a fact	1.An entrance 2. An exit 3.A path connecting the entrance to the exit 4.The random nature of the health care elements (eg. beds, examining rooms, physicians, or nurses)	Tracks of movement between departments
Medical Process	Description of a fact	-	The sequence of cure and care
Care Pathway	1.In-hospital errors reduction 2.Cost reduction (for insurance) 3.Clinical and process outcomes 4.Waste disposables	The best practice of medical processes	1. Evidence-based 2.Relate to the type of disease, specific for types of therapies
Patient Journey	1. Removal of wasted and excessive activities, process duplication 2. The improvement of communications between patients and other actors	1. Patient flows 2. Patient experience	1.Evidence-based 2.Include waits, blocks, and bottlenecks in procedure 3.Include interactions, emotions, and barriers in experience

(Cote, 2000:8-10; Hall, 2013:4; Wagenaar et al., 2018:10-11&27; Curry, 2006:4726; Manchaiah et al., 2011:49; Richardson et al., 2007:134-140; TU Delft Online Learning, 2016: Theory Module 1:1)

3.1.3 Development in academic research

The concept of patient journey can be traced back to the development of patient-centered care in the 1970s. One of the most famous examples is the Planetree Model, which was created by Angelica Thieriot in the United States in 1978. Patients were for the first time treated as human beings with a body, a mind, and a spirit rather than carriers of diseases (Shaller, 2007:7-8; Frampton, 2009:33; Planetree, 2017: website). The issues involved in patient-centered care inspired what Wagenaar has dubbed the “fourth revolution” in hospital architecture, which revolved around the ideals of “empowering the patient” (Wagenaar et al., 2006:37).

Academic research has focused on different aspects of the concept of patient journey. Some papers focus on patient journeys in a department like the Emergency Department (Sibbritt *et al.*, 2006:27-38; Richardson *et al.*, 2007:134-140;

Khanna *et al.*, 2017:18-23), while others discuss the journeys of patients with certain diseases (Wagner, 1998:2-4; Rolley *et al.*, 2009:2394-2405; Manchaiah *et al.*, 2011:227-234; Boess *et al.*, 2014:31-41). Research on patient journeys either encompasses the overall procedures or part of them.

In China, the term “patient journey” has only been found once in a journal paper, which deals with the experience in Australia (Yang *et al.*, 2009:3-10). However, academic circles of both architecture and hospital management show a great interest in its contents. From the perspective of architecture, Ge et al. (2004:18-21) have analyzed patient flows in the overall flow system of general hospitals, and have studied various layers of an Emergency Department: the functional area, the functional circle, and the functional cluster(Wu *et al.*, 2014:84). In the last few years, the terms of medical process and medical flows have been mentioned frequently in architectural journals and conferences. However, a patient flow is only one of the elements in the research on medical processes and medical flows, and is seen as equally important as the flows of staff, visitors, and logistics in a hospital.

3.1.4 Implementation worldwide

As the expenditure in healthcare increases worldwide, procedures in patient journeys are researched from the perspective of facility management, notably the idea of LEAN Thinking, which comes from the manufacturing industry. Competition among hospitals in the healthcare market is fierce. Hospitals are motivated to provide better services and environments to fulfill patient needs; the identification of patient journeys proves to be helpful. Studies from the perspective of patients are recognized as the most effective ways because patients are the only persons who see the whole journey in a healthcare system, while hospital staff are only involved in the few components they are responsible for (Ben-Tovim *et al.*, 2008:14). Therefore, the concept of patient journey has been widely adopted by a large number of healthcare organizations and health departments.

In the United Kingdom, “Improving the patient’s journey” has been included in the *National Health Action Plan* by the National Health Service (NHS) Scotland since 2000. (NHS Scotland, 2000: website). Five years later, the Department of Health published several guidelines to advise leaders how process and system thinking can be used to improve the performance of healthcare facilities from an administrative perspective (NHS, 2005:8; NHS, 2005a:9). The concept has become a part of the program *Quality, Innovation, Productivity and Prevention (QIPP)*, which also emphasizes the patient experience (NHS, 2010:3).

In New South Wales Australia, the term “patient journey study” is an essential asset in the *Clinical Services Redesign Program (CSRP)*. In the very beginning, *CSRP* only focused on efficiency improvement, especially in the Emergency Departments and elective surgeries. But now, *CSRP* recognizes the importance of patient needs, and a process of health patient surveys has been developed to assess patient satisfaction with the healthcare services provided (Masso *et al.*, 2007:61-63; Masso *et al.*, 2008:100).

In the Netherlands, there is little mention of the term “patient journey” in government publications and programs. Despite that, the government has established a healthcare financing system based on care pathways, and it gives priority to care activities in connection with diagnostics and treatment during patient journeys (*Volksgezondheidenzorg.info*, 2017: website). Diagnosis Treatment Combinations (*Diagnose Behandeling Combinaties*, DBCs), which define care products, are used as the basis of negotiations between healthcare providers and insurers. The method emphasizes the use of care pathways as a tool to monitor expenditures during patient journeys. (Busse *et al.*, 2011:428; Westerdijk *et al.*, 2012:203). Moreover, the Dutch Patient Consumer Federation (NPCF), representing over 160 patient and consumer organizations in the Netherlands, wants to strengthen patients’ voice in their patient journeys (Patientenfederatie Nederland, 2017: website). Zorgkaart Nederland, a website owned by the NPCF, collects patients’ comments and complaints about healthcare (Zorgkaart Nederland, 2017, website). Patients are able to find highly recommended doctors and healthcare facilities by referring to the experience of others. However, the representativeness of Zorgkaart Nederland has been criticized due to the small number of reviews per doctor (Stehmann *et al.*, 2016:1-7).

Similar to the Netherlands, the term “patient journey” has never been mentioned in any government publications or programs in China; however, the studies of the National Health Commission (NHC) contain two layers that are directly related to the concept of patient journey. On the one hand, since 2017 the NHC works on a new system of healthcare financing which has already included a series of 1,212 care pathways (CMA, 2016: website; CMA, 2017: website). Over 88% of all public hospitals (i.e. over 7,000) have joined this system in China, but so far fewer care pathways have been accepted than expected, especially in tertiary hospitals (NHFPC, 2017a: website; Kuang, 2017: website). On the other hand, surveys of medical quality have been conducted by the NHC nationwide every five years since 1993. Patient satisfaction has become a component of this report since 2003 (CHSI, 2003:49-59). Not only the NHC but also hospitals, local governments, and independent research institutes have engaged in these reviews.

3.2 Composition of a patient journey

3.2.1 Overall procedures

Similar to the healthcare system modeling by Hall *et al.* (2013:3), the overall procedures of the patient journey can be evaluated at four levels: macro, region, facility, and department. At different levels, the patient journey has different contextual implications.

3.2.1.1 At the macro level

At the macro level, the patient journey is considered to be the whole life cycle of an individual. An individual only leaves the journey at the end of his/her life. During a macro journey, an individual, who always oscillates between wellness and illness, is constantly participating in activities which have effects on his/her health (Hall *et al.*, 2013:6). For instance, when an individual is in a state of illness, he would take part in a series of medical activities like hospital visits looking for treatment until he has returned to the state of wellness. Likewise, when an individual is healthy, he may also take part in medical activities for disease prevention (Figure 3.1).

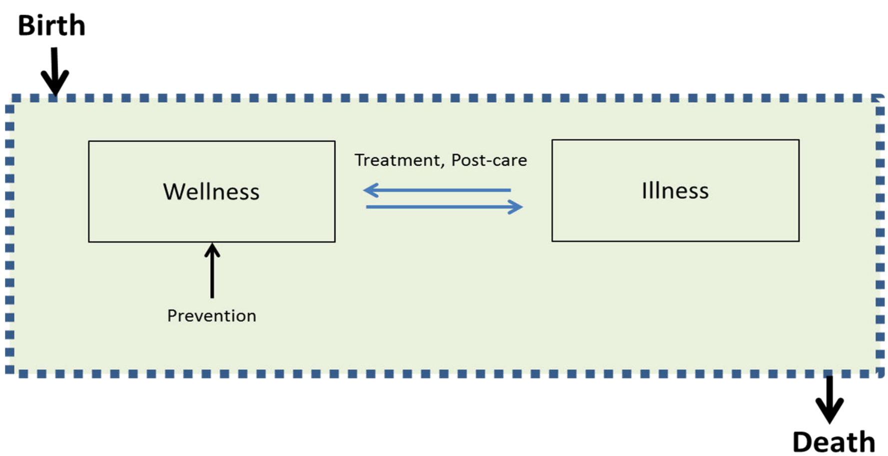

FIG. 3.1 Patient journey at the macro level

On a macro journey, the most critical things are to maximize life expectancy (i.e. the years from birth to death), prolongation of the state of health, and optimization of the quality of life during illness. (Hall et al., 2013:7-8). The same philosophy is shared all over the world.

3.2.1.2 At the regional level

Contrary to the emphasis on health states at the macro level, the regional level concentrates on the moments a patient interacts with the medical system. A patient journey at the regional level, therefore, covers all the health care facilities involved and the movements of a patient from the moment he or she fall ill until the time of recovery. It starts from an initial appointment with a doctor or a visit to an emergency department. A journey includes several visits where a patient plays one or several roles as an acute patient, an outpatient, or an inpatient. However, patient journeys vary from one healthcare system to another.

Because patients can freely choose between health care facilities in China, as stated in Section 2.2.1, there are many possible pathways of patients' movements within this regional framework. Obviously, the higher the level of healthcare facilities patients choose, the higher the cost will be (Meng *et al.*, 2015:89) (Figure 3.2).

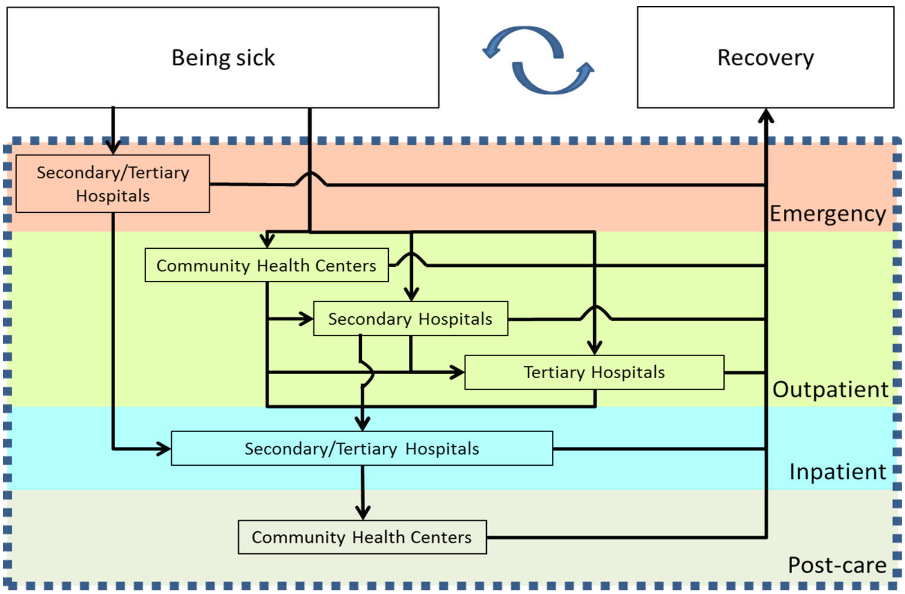

FIG. 3.2 Patient journey at the regional level in China

3.2.1.3 At the healthcare facility level

A patient journey at this level is a one-time visit or a group of visits that take place in a healthcare facility (i.e. a health center or a hospital). It may be an emergency visit, an outpatient visit, or an inpatient visit, which starts from a patient's entry in the facility and ends in his/her exit. At this level, the spatial dimension at the architectural level is introduced, which is absent in the macro and regional levels. Relevant medical departments and their respective locations are coordinated according to the clinical and administrative processes that greatly impact patient journeys. Similar patient journeys are shared among healthcare facilities in the same healthcare system.

As can be seen in Figure 3.3, patients move from department to department in a given journey. If the procedures of a patient journey are overcomplicated, or if transportation and waiting take a large amount of time, the healthcare facility is underperforming and patients will not have good experiences during their stay in such a healthcare facility.

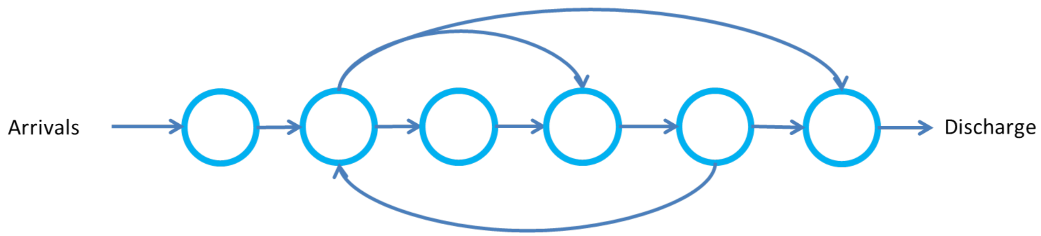

FIG. 3.3 Patient journey at the facility level

3.2.1.4 At the department level

The department level is the microscopic level of a patient journey. It represents the movements of patients in a unit within a healthcare facility. Different spaces such as consulting rooms and waiting areas are coordinated to perform a single function or a group of closely related functions (Hall *et al.*, 2013:10-11). At this level, the entire service provided, the medical outcomes and the interactions between patients and other end-users in the facility can be measured qualitatively and quantitatively. Patients are affected by the services and the environment in which they take place. However, patient journeys are vastly different from one facility to another.

This research exclusively focuses on patient journeys at the healthcare facility level. As such, the research can benefit from the knowledge accumulated in hospital architecture, which deals with the built environment, the logistical infrastructure, etc., which are measurable and comparable within a healthcare system and across healthcare systems. In the conclusion, however, the discussion will not be limited at the healthcare facility level, it reaches further to the previous and next steps on cure and care outside hospitals (ie. the regional level and the department level) to achieve a better outcome.

3.2.2 Patient experience

Patient experience is normally evaluated by patient satisfaction surveys. As an effective tool, the patient satisfaction survey, which is derived from the mature customer satisfaction survey, is employed as a valuable approach to understand patient experiences and to clarify the quality of procedures in a patient journey (Locker and Dunt, 1978:289). It is one of the indicators for Health Departments to evaluate the quality of medical service, and also a way for hospital managers to understand patient needs so as to improve the performance of hospitals. However, owing to the asymmetry of information and the sensitivity of medical ethics, the relationship between doctors and patients cannot be equal to the one between merchants and customers. The evaluation of patient satisfaction is far more complicated (Liu, 2015:60-61).

Eight dimensions that prove to be of more practical than theoretical interest are used to describe patient satisfaction survey (Ware *et al.*, 1983:248). Nevertheless, this research exclusively focuses on the interactions between patients and the medical facility, which are closely related to a patient journey, and explores the patient needs in this context. The scope of these interactions is not limited to patient interactions with care providers. It is extended to include the interactions between patients and all the other actors involved in a patient journey.

3.2.2.1 Patient interactions with actors

The patient journey is not only made up of hospital procedures and the people involved in them, but comprises interactions with numerous other actors. These play unique roles at different stages. Moreover, the intimacy of interactions between them varies. In China, they can be categorized into groups (Figure 3.4) :

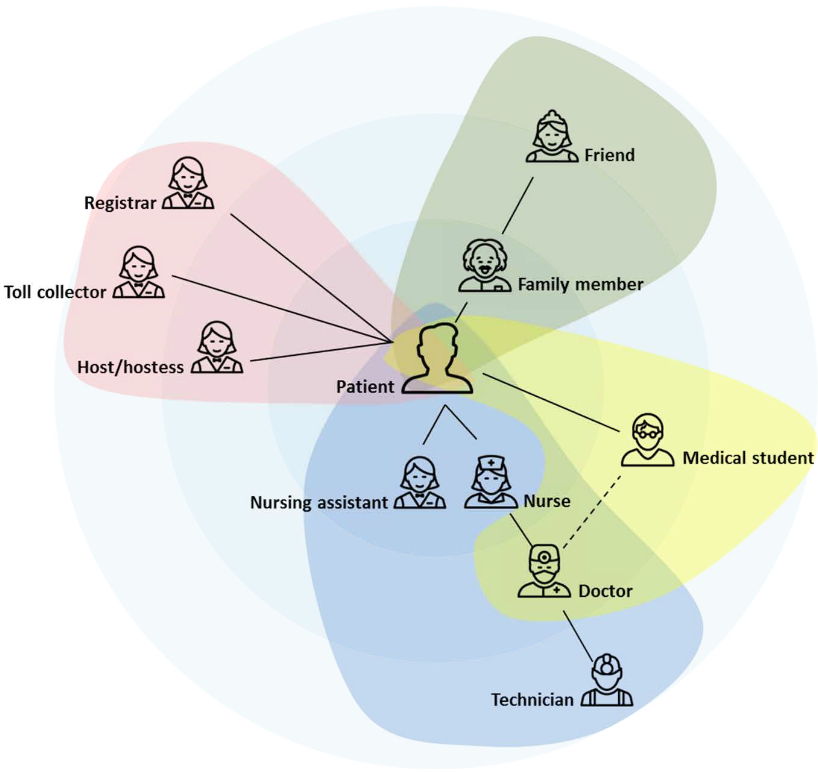

FIG. 3.4 Interactions between patients and actors

Family members and friends

On the one hand, family members and friends usually play a role as companions in an outpatient or acute patient journey. Company is considered as a form of social support, which can be tangible, emotional or informational, such as driving patients to the hospital, providing moral support, and facilitating communication between patients and care providers (Cené et al., 2015:2; Cené et al., 2017:254-255). Experiencing social support, including being accompanied by family members and friends, patients have significantly better medical outcomes (Cené et al., 2015:28, Warren and Agtarap, 2017:64). On the other hand, in an inpatient journey, family members and friends play a role as visitors rather than companions, because in most cases they are only allowed to visit the wards in visiting hours. Restricting family members and friends from visiting inpatient wards is generally considered beneficial to minimize infection risks, keep wards quiet, and help patients to recover (He et al., 2017:3-4).

Evidence-based studies, however, prove that family-centered care, which was first applied in Pediatrics, is now also encouraged in some other inpatient departments because the positive effects appear to outweigh the negative ones (Festini, 2014: A33). It creates a partnership between patients, families, and care providers (Hedman and Palmer, 2009:164). Family members are permitted to stay overnight with inpatients in wards, in some cases even to be present in the Operating Theater or in the recovery room in the Surgery Department, or in the delivery room in the Maternity Department (An et al., 2015:270; Chen, 2010:4217; Ban, 2015:2104).

In China, however, the problem is that there are too many companions. As the data of one hospital record, about 5,000 outpatients per day unleashed a flow of people of more than 20,000, which meant that on average around 3-4 family members or friends accompanied one patient (Jingzhou Central Hospital, 2017: website). The number of companions can be six or seven if the patient is a child (Li & Zhang, 2013: website).

Medical team

A medical team is a group of staff including doctors, technicians, nurses, and nursing assistants, who are critical to patient care and cure. Among various patient interactions with medical team members, doctor-patient communication and nurse-patient communication strongly influence patient satisfaction (Boudreaux and O'Hea, 2004:24; Shirley and Sanders, 2013:e69(2)) because doctors and nurses are the most active actors in patient journeys, and their work largely defines the quality of cure and care. Technicians who work in the Departments of Radiology, Laboratory and Pharmacy are responsible for patients' samples, tests, and medication. Patient interactions with them are less intense than the ones with doctors and nurses.

The interactions between doctors and patients are inadequate in China, especially in outpatient journeys. Evidence showed that the consultation length in tertiary general hospitals was less than 8 minutes in four hospitals in Guangzhou, less than 5 minutes in one hospital in Qingdao, and about 8 minutes in two hospitals in Shanghai (Xiang, Wei & Guo, 2012: website; Qingdao News. 2014: website; Gu et al., 2017:27). This does not mean that doctors are lazy; on the contrary, they are simply too busy. On average, a doctor has to see five to seven outpatients per working hour (CABP & ASC, 2017:153). By contrast, the mean length of consultation was 10.2 minutes in the Netherlands and 10.7 minutes in six main European countries (Deveugele *et al.*, 2002:472). It proves that longer consultation allows for more attention to care. For example, doctors have time to ask more questions related to patients' health history and psychosocial concerns, and make more statements about health education and prevention (Dugdale *et al.*, 1999:S34).

The interactions between nurses and patients are also problematic, especially in inpatient journeys. Instead of nurses, nursing assistants or family members help inpatients with activities of daily living (Wu & Xue, 2005: website).

Educational team

Unlike other kinds of education, a large part of medical education takes place in university medical centers, teaching hospitals and training hospitals. Not only medical students but also junior doctors are being taught in educational teams (Lin *et al.*, 2014:4362). The interactions between patients and educational teams differ from those with doctors and nurses, as they are not necessary for patients in their journeys, but beneficial for the education of doctors and the future of medical science. In order to build and maintain patients' trust, the interactions have to respect the principles of medical ethics like informed consent, privacy protection, and medical development. (Xu & Cheng, 2001:44).

Non-medical assistants

Non-medical assistants are a group of volunteers or staff like hosts/hostesses, registrars, and toll collectors who take care of patients without nursing or medical duties. They also play an important role in the patient journey, as they would give patients directions, deliver meals, or do daily cleaning work.

3.2.2.2 Patient needs in their journeys

Human needs are categorized in a 5-level hierarchy according to the theory of human motivation. It includes the needs for physiology, safety and security, love and belonging, esteem, and self-actualization from the bottom-up (Maslow, 1943:372-382). In the field of healthcare, Maslow's hierarchy of needs has been widely applied as an effective approach to analyzing patient needs. Compared with the common needs of human beings, patient needs seem to be more urgent and specific because human beings tend to get tired physically and more fragile emotionally in the state of illness than in the state of wellness. Patient needs have been studied in different contexts, such as the needs of patients who receive palliative care, the needs of older patients in emergency wards (ECU), and the needs of patients in intensive wards (ICU) (Zalenski and Raspa, 2006:1126; Nydén et al., 2003:271-272; Jackson et al., 2014:440). In brief, patient needs applying Maslow's hierarchy can be recognized as follows (Figure 3.5) :

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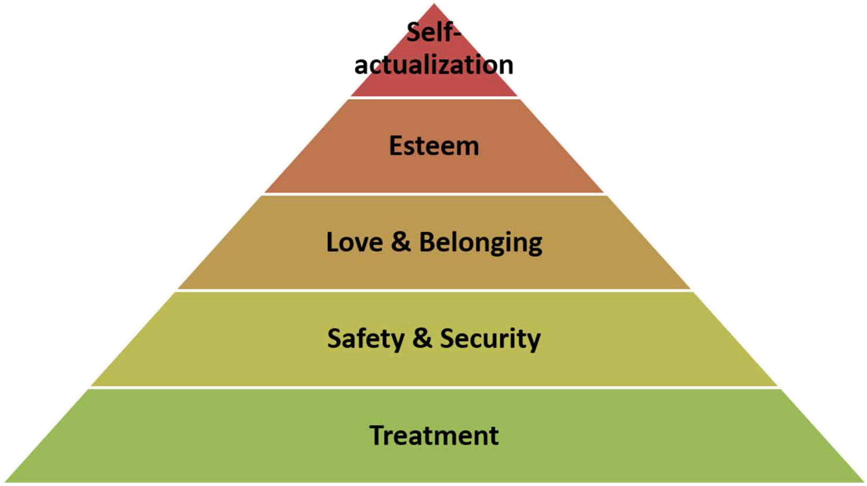


FIG. 3.5 Patient needs analysis applying Maslow's hierarchy

The needs for treatment

At the bottom of Maslow's hierarchy, physiological needs are essential for human physical survival, such as water, air, clothing, and food. From the perspective of healthcare, the basic goal of patients is to fight against diseases and return to the state of wellness. As a result, the needs for treatment are the primary requirements for human health.

The needs for safety and security

These needs concern the basic emotional well-being of humans, such as "security; stability; dependency; protection; freedom from fear, anxiety, and chaos; the need for structure, order, law, limits; strength in the protector; and so on", as formulated by Maslow (1954:39). When individuals are sick or injured, the need for safety and security becomes stronger. On the one hand, they highly trust and rely on care providers who are thought to be powerful enough to save them from pain, fear, anxiety, and chaos of diseases, and also protect them from medical errors and hospital-acquired infections. On the other hand, patients feel safer and more protected when staying in a familiar environment rather than in an unfamiliar environment, or when being aware of the process rather than knowing nothing.

The needs for love and belonging

They include the longing for affectionate relationships with people. Patients feel cut off from the support of family members, intimate partners, and friends. Therefore, in many cases, patients want company when they have to visit or stay in a healthcare facility (Cené et al., 2015:22; Cené et al., 2017:254-255).

The needs for esteem

Esteem is the result of being highly appreciated by other people as well as by oneself (Maslow, 1943:381). Fulfillment of this need creates a sense of utility and self-confidence. From the perspective of healthcare, patients care about their reputation and privacy, and wish to gain respect from other people including members of medical teams, educational teams, and non-medical assistants.

The needs for self-actualization

Self-actualization needs rank highest in the hierarchy of needs that revolve around the realization of personal potential and self-fulfillment. In the field of healthcare, these needs are concrete. For example, patients are eager to know how to improve their health in daily life or want to gain back some abilities after surgery (Keizer, 2015:42).

All the patient needs follow one of the most important principles in Maslow's theory: only if the needs at a lower level are fulfilled, human beings begin to pursue the fulfillment of needs at a higher level (Maslow, 1943:373). The needs that patients require to fulfill vary in different countries and are partly determined by a country's economic development. For example, as most of the needs for treatment, safety and security have been fulfilled by care providers in well-developed countries, patients start longing for the needs for love and belonging, esteem and self-actualization. However, in Maslow's hierarchy, these are not the patients' major concerns in developing countries, because there most people are struggling with the bottom two tiers. Therefore, the needs that a developed country tries to satisfy are usually not the ones a developing country focuses on. Undoubtedly, most civilized countries want to fulfill the highest-ranking needs in Maslow's pyramid, but even they can only do so if the other needs appear to have been satisfied (Nunes et al., 2017:6) (Figure 3.6). Consequently, when studying patient needs, we cannot ignore the current development level of a country or a region.

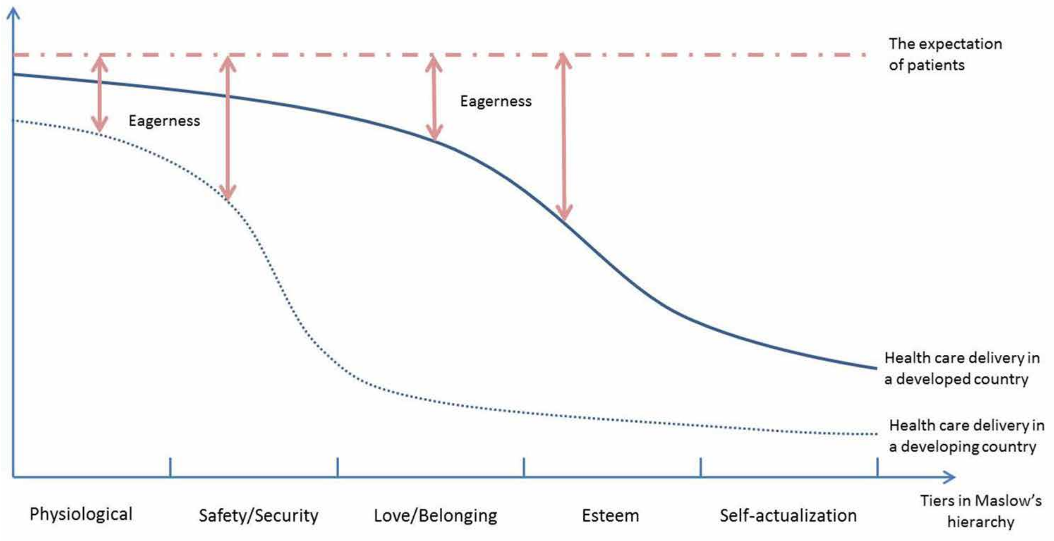


FIG. 3.6 Different eagerness of patients between developed and developing countries

Even so, this by no means suggests that the upper tiers of patient needs are not important. They have positive impacts on the lower tiers of patient needs, too. In addition, it is worth noting that when the current needs have been met, the needs in the upper tiers need to be addressed in any country or region. However, it seems nearly impossible to reconstruct hospital buildings so that they can keep up with the constant pressure to fulfill needs in the higher tiers. As a result, it would be wise to design hospitals either with the consideration of all tiers of patient needs or in a flexible way to ensure the upper tiers of patient needs can be met in the future.

3.3 Patient journeys in hospitals

Since there are many similarities between hospitals, in this research, patient journeys are primarily studied at the facility level. Only if there is a need for it, for instance when certain steps are complicated, does the analysis include the department level. Even though patient journeys in hospitals are diverse, they can be divided into three major groups: outpatient journeys, inpatient journeys, and acute patient journeys.

3.3.1 Outpatient journeys

Individuals receive outpatient care services in hospitals on an appointment basis without the need for admission or overnight stay in hospitals (Segen's Medical Dictionary, 2011: website). In recent years, the number of outpatient journeys to healthcare facilities keeps on growing in China. In 2015, this number reached over 7.7 billion, including 3.08 billion to hospitals, 4.34 billion to community health centers (NHFPC,2016: 117). In other words: a Chinese individual saw doctors 5.6 times on average as an outpatient, as opposed to 8.2 times for a Dutch individual in a year. The Dutch data includes the outpatient visits to both general practitioners in clinics and specialists in hospital outpatient departments (OECD,2018: website).

Outpatient care services are delivered by different departments for various kinds of diseases. According to the database organized by NHC, 22 outpatient departments have been analyzed (NHFPC, 2016:120). Table 3.2 shows the Top 10 outpatient departments that have the largest number of outpatient visits in hospitals in 2015. There is an obvious gap in outpatient visits between the Top 5 departments and the other 5 departments. The number of outpatient visits in each of the Top 5 departments accounted for over 9% of the total number of visits, while the other 5 departments only accounted for 2-3% of the visits. As a result, over 2 billion outpatients visited the Top 5 departments, which made up 68% of the total number in 2015. Applying the Pareto principle (the 80-20 rule), the Top 5 outpatient departments can be considered as representative for outpatient journeys.

TABLE 3.2 Number of visits to major outpatient departments in hospitals in 2015

No.	Department	Number of visits	Weight (%)
1	Internal Medicine	643,096,709	21.32
2	Traditional Chinese Medicine (TCM)	566,415,592	18.78
3	Surgery	290,316,655	9.62
4	Gynecology & Obstetrics	273,177,518	9.06
5	Pediatrics	271,547,955	9.00
6	Stomatology	92,184,896	3.06
7	Dermatology	92,121,777	3.05
8	Ophthalmology	90,109,740	2.99
9	Ears Nose and Throat (ENT)	83,865,225	2.78
10	Integrated Chinese and Western Medicine	62,078,833	2.06
Top 5 departments		2,044,554,429	67.78
Top 10 departments		2,464,914,900	81.72
Total		3,016,549,832	100

(Data source: NHFPC, 2016:120)

At the facility level, the Top 5 outpatient departments share the same journey (Figure 3.7). From arrival to check out, outpatients normally undergo six clinical processes and two administrative processes in total. Several clinical processes such as clinical check-ups, functional tests, imageing, or treatment can be skipped in some cases while several clinical processes like diagnosis might be repeated several times. In other words: in an outpatient journey not all of the clinical processes may be applicable to all outpatients, and not all of them take place only once. Doctors decide whether clinical processes can be skipped or need to be repeated. However, the two administrative processes (i.e. registration and payment) are unavoidable in any case. In addition, the order of some clinical processes is changeable for either of the two reasons below:

1 The medical specializations involved in specific medical procedures. The drug administration rules make it imperative for outpatients to take the drugs needed for most of the treatment from the clinical pharmacy. This is the case, for example, treatment in the Dermatology Department and intravenous infusion. Atomization treatment and surgical dressing change, on the other hand, are exceptions: here outpatients can go for treatment directly and collect medication before going home.

2 The simultaneous processing of different clinical procedures. Clinical check-ups and functional tests, for instance, may also require a visit to the Radiology Department, but the order is at random.

3 Pharmacy, as a clinical process in an outpatient journey, is not skipped in most cases. Doctors' prescriptions are usually sent to the hospital pharmacies directly. When outpatients pay their bills, medicine starts being prepared. It is so convenient that Chinese outpatients are used to buying medicine in the hospital pharmacy after they see doctors in the same hospital.

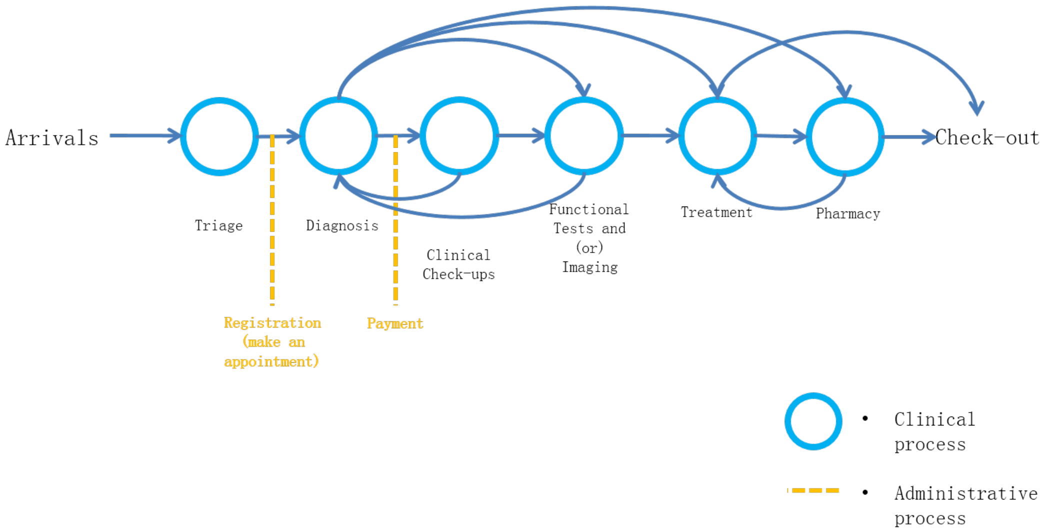


FIG. 3.7 An ideal outpatient journey

All clinical and administrative processes included in outpatient journeys are completed by outpatients themselves. Between processes, outpatients have to go to different places and wait for the next process. Outpatients spend a considerable amount of time waiting and moving between departments.

More often than not, it takes a long time for outpatients to go through some clinical processes (Table 3.3). In many cases, outpatients are able to finish sample collection for clinical check-ups, functional tests, and some imageing tests on their first visits, some results of which will not be available on the same day, which forces patients to make an appointment for a second visit. If CT, MRI or nuclear medicine are needed for the diagnosis, the whole outpatient journey is likely to be extended to at least three visits, the reason being that these tests require specific appointments (Figure 3.8). However, each hospital has its own rules on the turnaround time (TAT) of specific test items, depending on the performance of certain departments.

TABLE 3.3 Turnaround time (TAT) of some clinical tests in outpatient departments

Department	Test items	Sample collection	The time of getting reports	Notes
Clinical Laboratory	Routine analytes in clinical hematology	-	≤30 min	
	Routine analytes in clinical biochemistry	-	1 workday	
	Routine analytes in clinical Immunology	-	1 workday	
	Routine analytes in clinical Microbiology	-	4 workdays	
Function test	ECG	-	Immediately	DCG, ABPM, TECG need appointments
	Ultrasound	-	Immediately	
	EEG	-	The same day	Except for Holter tests
	EMG	Appointment	-	
Oncology	-	Appointment	-	
Radiology	X-ray	-	30 min	
	CT	Appointment	1 workday	
	MRI	Appointment	3 workdays	
Nuclear	ECT	Appointment	-	

TAT of normal check-ups in clinical laboratory as defined in the Requirements of Standard B (intermediate level) in Clause 4.16.4.3 of Implementing Regulations of Evaluation Standard of Territory General Hospitals (Edition 2011). The TAT of CT and MRI is based on the outcome of a survey of 12 territory general hospitals by Guo et al. (2016:59). Other data of TAT in the Table come from the website of Beijing Anzhen Hospital (2019: website).

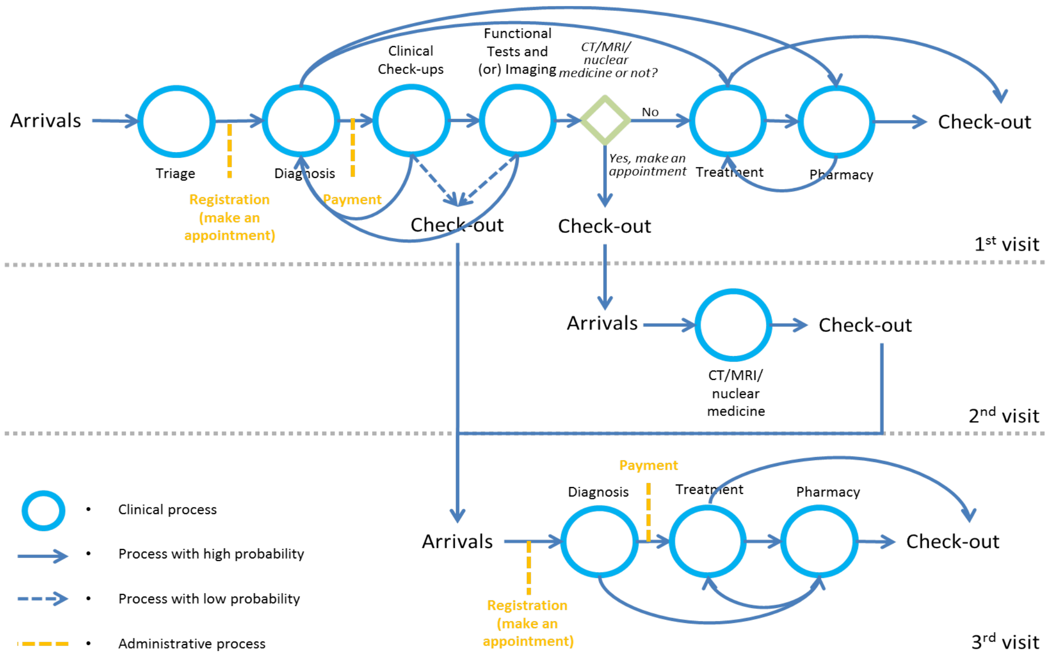


FIG. 3.8 Outpatient journey in reality

3.3.2 Inpatient journeys

Individuals who receive inpatient care services have to stay in hospitals at least one night while they are being treated (Cambridge Dictionary, 2017: website). The number of inpatients has rapidly increased in recent years. In 2015, the number was 210.54 million in total, with around 160 million in hospitals, much higher than the 152.98 million in 2011 (NHFPC, 2016: website).

As is the case in the outpatient care services, there are also 22 inpatient departments in inpatient care, according to the national database (NHFPC, 2016:130). Table 3.4 shows the number of discharges in the Top 10 inpatient departments in 2015. Again, there is a distinctive gap in inpatient discharges between the Top 5 departments and the other 5 departments. The weight of each Top 5 department is above 9% of the total number; by contrast, it is below 3% of the total number in each of the other 5 departments. As a result,over 129 million inpatients were discharged from the Top 5 departments, which constituted approximately 80% of the total discharges in hospitals in 2015. The Top 5 inpatient departments accounted for the majority of the discharges, which is the main focus of this study.

TABLE 3.4 Number of discharges in major inpatient departments in hospitals in 2015

No.	Department	Number of discharges	Weight (%)
1	Internal Medicine	44,367,797	27.71
2	Surgery	30,980,070	19.35
3	TCM	22,445,033	14.02
4	Gynecology & Obstetrics	17,156,267	10.71
5	Pediatrics	14,426,184	9.01
6	Oncology	6,406,845	4.00
7	Ophthalmology	3,994,697	2.49
8	Infectious diseases	2,910,205	1.82
9	ENT	2,742,117	1.71
10	Integrated Chinese and Western Medicine	2,529,223	1.58
Top 5 departments		129,375,351	80.80
Top 10 departments		147,958,438	92.40
Total		160,138,975	100

(Data source: NHFPC, 2016: 130)

Although there are no direct data of inpatient journeys in China, NHC is establishing a healthcare financing system based on care pathways (NHFPC, 2017b: website).

As care pathways represent the best practices of medical processes, they can be a source for studying inpatient journeys.

The procedures of the analysis are as follows (Figure 3.9):

Step 1: Data on care pathways are mainly collected using document analysis. Documents used for the analysis include national annual reports and government announcements.

Step 2: The standard clinical processes of the Top 5 inpatient departments are assembled and categorized according to care pathways.

Step 3: The generic clinical processes of the Top 5 departments are formulated based on the ones of each department.

Step 4: A generic inpatient journey is defined with the consideration of administrative processes.

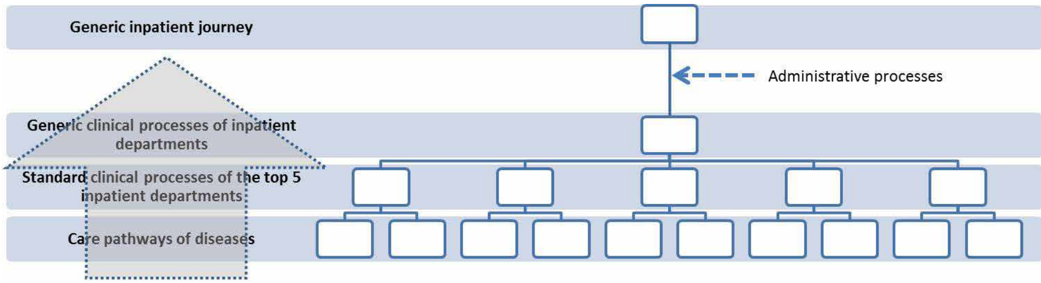


FIG. 3.9 Procedures of the analysis

3.3.2.1 Care pathways of diseases in inpatient departments

Until 2017, the NHC defined 1,212 care pathways, and the SATCM formulated another 92 care pathways, which covers numerous common and prevalent diseases in more than 30 clinical specialties (NHFPC, 2017a: website; SATCM, 2017: website). There are 1,006 care pathways in the Top 5 inpatient departments, which make up 77% of the total number (Table 3.5). The number of care pathways keeps on increasing year by year.

TABLE 3.5 The number of care pathways in major inpatient departments

Department	Number of care pathways	Weight (%)
Internal Medicine	335	25.69
Surgery	401	30.75
TCM	92	7.06
Gynecology & Obstetrics	67	5.14
Pediatrics	111	8.51
Top 5 departments	1006	77.15

(Data source: NHFPC, 2017a: website; SATCM, 2017: website)

The care pathway records of inpatients have a fixed number of fields: major tasks, medical advice, nursing service, variation in disease severity and the reasons for it, nurse's signature, and doctor's signature. It documents the whole clinical processes an inpatient follows.

3.3.2.2 Standard clinical processes of the Top 5 inpatient departments

Department of Internal Medicine

Inpatients normally undergo four or five clinical processes from referral or arrival to discharge. Clinical check-ups, functional tests, and imageing are necessary at the beginning and occasional at the end of internal medicine clinical processes. Unlike outpatients, inpatients do not have to go for clinical check-ups on their own; nurses deliver inpatients' samples to the clinical laboratory instead. Treatment outside the wards and intensive care are only rarely needed.

Department of Surgery

Inpatients are normally subjected to five or six clinical processes from referral or arrival to discharge. Clinical check-ups, functional tests, and imageing are essential both at the beginning and at the end of surgical clinical processes. Surgery is the core of the whole care pathway while intensive care is optional.

Department of Obstetrics and Gynecology

Inpatients normally undergo five or six clinical processes from referral or arrival to discharge. Clinical check-ups, functional tests, and imageing are essential both at the beginning and occasionally at the end. Surgery and delivery are the centers of the overall clinical processes, while intensive care is also a possibility.

Department of Pediatrics

Inpatients normally go through four to six clinical processes from referral or arrival to discharge. Clinical check-ups, functional tests, and imageing are essential both at the beginning and occasionally at the end of pediatric clinical processes. Considering that Pediatrics Department is divided into the Pediatric Internal Medicine Department and the Pediatric Surgery Department, surgery and intensive care are not necessarily part of the clinical processes.

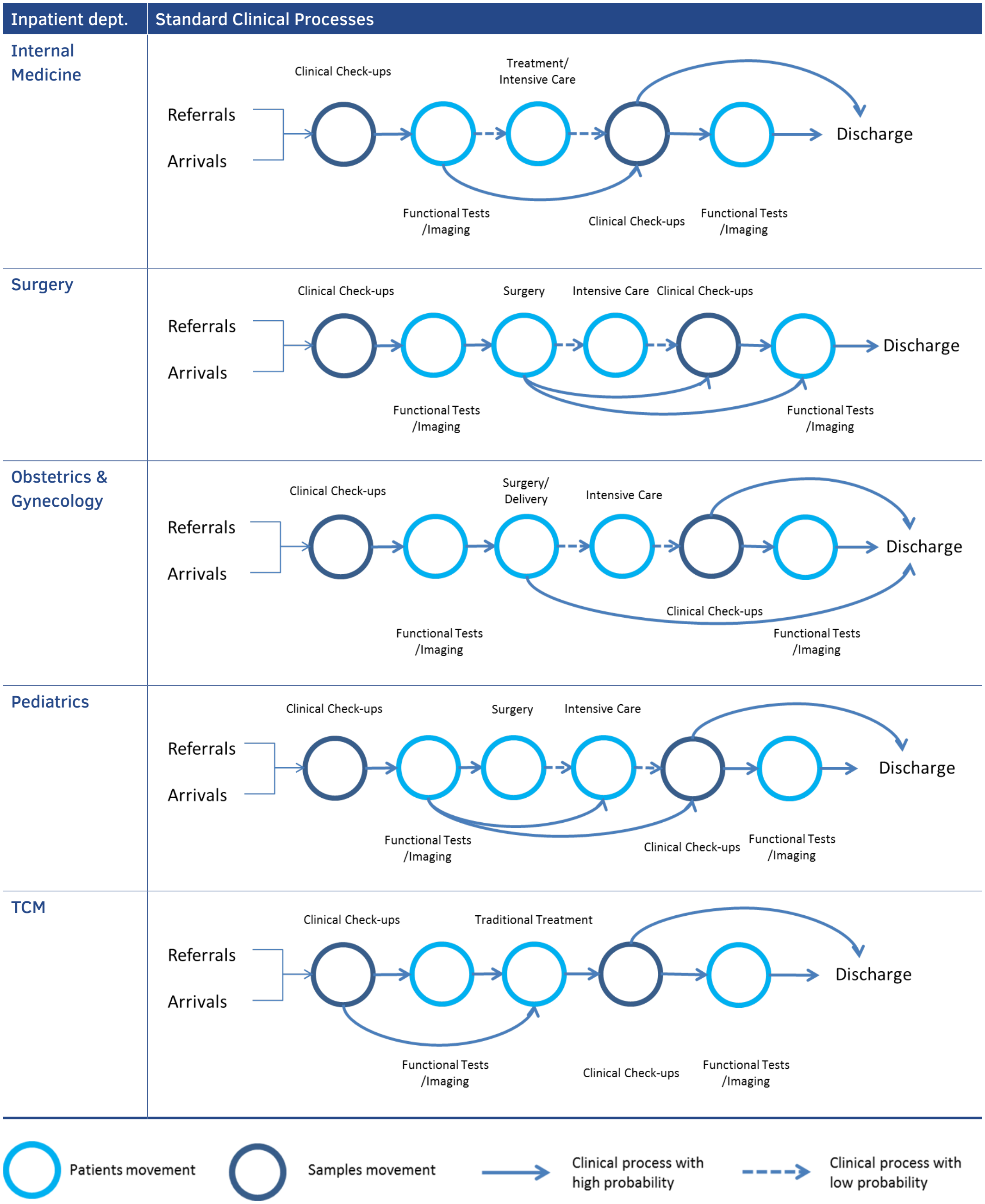
Department of TCM

Inpatients normally experience five clinical processes from referral or arrival to discharge. Clinical check-ups, functional tests, and imageing are essential in the standard clinical processes of TCM. Traditional treatment is the core of the overall process. (Table 3.6)

3.3.2.3 Generic clinical processes of inpatient departments

In terms of the medical requirements, the processes in Departments of Internal Medicine and TCM are a little simpler than the ones in Departments of Surgery, Obstetrics and Gynecology, and Pediatrics. On the whole, inpatients undergo up to six clinical processes during hospitalization at the facility level. No matter which department inpatients are in, clinical check-ups, functional tests, and imageing are mandatory at the beginning and occasionally at the end of the overall processes. There is a low probability that intensive care is needed (Figure 3.10).

TABLE 3.6 Standard clinical processes of the Top 5 inpatient departments



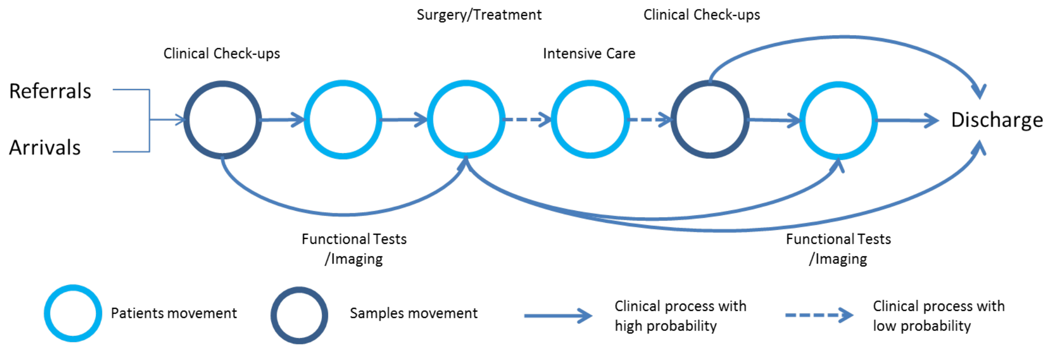


FIG. 3.10 Generic clinical processes of inpatient departments

The clinical processes of surgery are far more complicated than other procedures, and therefore they will be explained in detail at the department level. There are four sub-processes for patients in the Operating Theater as follows (Figure 3.11):

1. Patients are moved from the wards to Operating Theaters in transfer beds;
2. Patients are welcomed and change beds in the bed changing area;
3. Patients wait in a holding ward;
4. In operation rooms, patients are anesthetized;
5. Surgeries start;
6. After surgeries, patients are moved to Post-Anesthesia Wards (PACUs) where they normally stay until they wake up. However, if patients are critically ill, they are immediately sent to Intensive Wards (ICUs).
7. When patients wake up and are stable, they are transferred back to the wards.
8. During the whole journey in the Operating Theater, patients are taken care of by nurses. (Liu, 2011:32-33)

3.3.2.4 Generic inpatient journey

Inpatient departments share a similar journey as the one described above. Two administrative processes (i.e. admission and payment) are unavoidable in any case. Compared to outpatients, inpatients do not have to go for clinical check-ups on their own, since nurses deliver their samples to the clinical laboratory. Between processes, inpatients do not have to wait for a long time as nurses make their appointments (Figure 3.12).

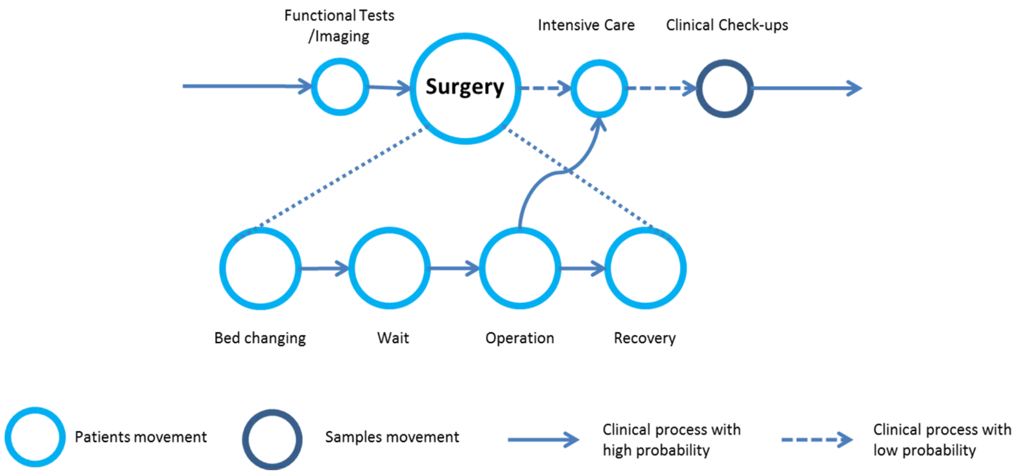


FIG. 3.11 Department processes in Operating Theaters

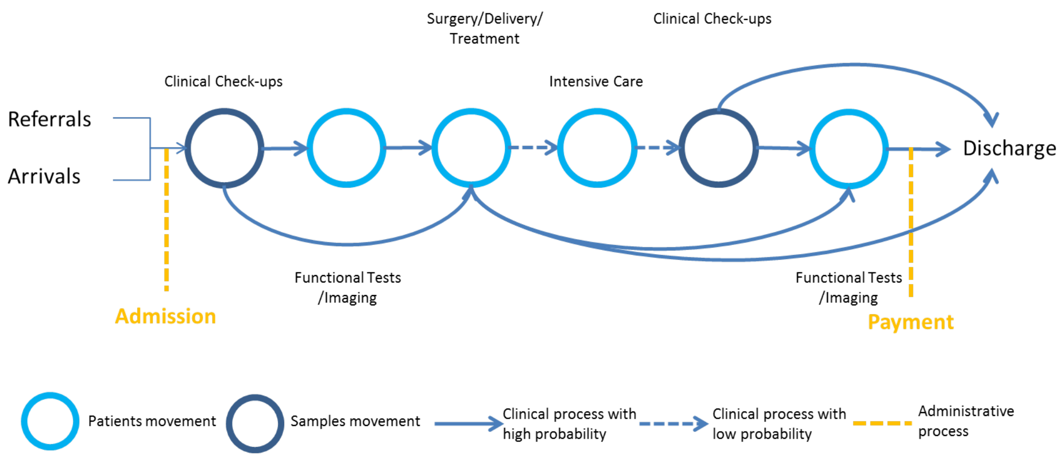


FIG. 3.12 Generic inpatient journey

3.3.3 Acute patient journeys

Acute care is "short-term medical treatment, usually in a hospital, for patients having an acute illness or injury or recovering from surgery" (Segen's Medical Dictionary, 2011a: website). There were over 152.7 million acute patient visits in China in 2015 (NHFPC, 2016:120).

Acute care services are provided on the basis of an evaluation of patient acuity and resource needs. In China, triage nurses in emergency departments prioritize incoming patients utilizing the triage system recommended by NHFPC in 2012. Table 3.7 portrays this four-level triage algorithm. Acute patients are categorized into four groups, where medical services and waiting time vary (NHFPC, 2012:2-3).

TABLE 3.7 Triage system in China

Acuity level	Classification criteria	In time
Level 1	Require immediate life-saving intervention	Immediately
Level 2	Life-threating	Within 10 minutes
Level 3	With severe symptoms but not life-threating	Within 30 minutes (recommend)
Level 4	With mild symptoms	-

(NHFPC, 2012)

More often than not, acute patients come to emergency departments by ambulance or taxi. No appointments or permission are needed in emergency departments. At the facility level, if a patient meets the high acuity level criteria (i.e. Level 1 or Level 2), there are only two or three clinical processes that the patient has to go through after the triage, due to the fact that all the cure and care services are provided around the patient. For instance, if a patient needs resuscitating, functional tests and imageing are taken at the bedside and the patient's samples are delivered to the emergency laboratory by nurses when necessary. In order to save lives, clinical processes take priority over administrative processes like registration and payment, which can be taken care of by family members and friends before admission. However, if a patient meets the low acuity level criteria (i.e. Level 3 or Level 4), the pathway is quite different from the one mentioned above. There are six clinical processes and two administrative processes in total after the triage, all of which are completed by the patient. The acuity level of a patient is not constant. When the condition of a patient changes, pathways shift immediately (Jin *et al.*, 2012:45; Wu *et al.*, 2014:87; Yang& Wu, 2014:95) (Figure 3.13).

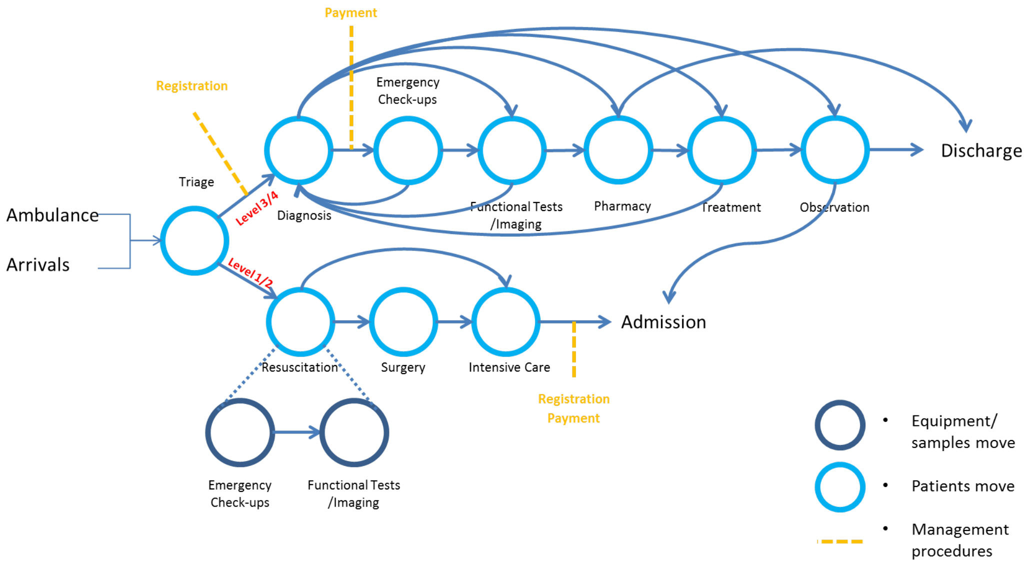


FIG. 3.13 Acute patient journey

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3.4 Patient experience in patient journeys in hospitals

Obviously, patient needs and experiences may vary greatly for outpatients, inpatients, and acute patients. This section discusses the actual interactions and feelings of different kinds of patients based on the outcomes of patient satisfaction surveys conducted in the last few years in China. Rather than covering all aspects of patient needs, this section focuses on patient dissatisfaction and the urgent needs of patients.

3.4.1 Methodology and source analysis

3.4.1.1 The selection and the quantity

The differences in the outcomes of patient satisfaction surveys lie in the realities of care, personal preferences, as well as in personal expectations (Ware, 1976:433-463, 607-622). Therefore, the numerical value of patient satisfaction rates can only be compared within the same nation or region and in similar timeframes, and any comparisons between nations or regions are meaningless. As the patient satisfaction discussed in this section mainly concerns China, only China's academic databases are examined.

The China National Knowledge Infrastructure (CNKI), official websites of Health Commissions, and newspapers have been analyzed using the keywords "patient experience", "patient satisfaction", "hospital satisfaction", "patient need", "health service survey", and "quality of health service". The search has been limited to publications that appeared after 2013, ensuring that the analysis can represent the current feelings and needs of patients. Publications are cited for this study if they meet the following three criteria: A) The patient satisfaction surveys included in the publications are conducted nationally or regionally, rather than being carried out in a single hospital; B) Publications are excluded if they fail to provide enough details to verify their conclusions; C) Publications should have analyzed what can be improved in the future.

In the light of the above, 13 publications are selected, which include open access government documents, journal papers, and articles from newspapers. However, this study is unable to present all the items patients were dissatisfied with, especially for acute patients, due to the small number of selected publications.

3.4.1.2 The quality of the selected patient satisfaction surveys

From the perspective of research objectives and contents, most of the publications place emphasis on the numerical value of a patient's satisfaction rate, but lack the analysis of the items of patient dissatisfaction and practical suggestions. Two publications presented research on the national level, the other 11 publications were based on studies in well-developed provinces and cities (Table 3.8). As such, the results from this literature review tend to reflect the needs of patients from well-developed regions. In addition, most of the research objects are public healthcare facilities, private ones were excluded.

TABLE 3.8 Research scope and objects of the selected field research

	Number of studies
Regions	
National	2
Guangdong Province	1
Hainan Province	1
Shanghai	8
Taiyuan	1
Healthcare facilities involved	
All healthcare facilities	2
Only public healthcare facilities	8
Both public secondary and tertiary hospitals	2
Only public tertiary hospitals	1

3.4.2 Patient experience in outpatient journeys

A patient meets different actors in different processes. The only actors that take care of a patient during the whole outpatient journey are family members and friends. Firstly, they accompany patients in the clinical processes of diagnosis, clinical check-ups, functional tests, imageing, and treatment. They are immensely helpful for facilitating communication between patients and care providers, especially in the diagnosis process. Secondly, they are able to complete some processes in the absence of the patient. These include all the administrative processes (i.e. registration and payment) and certain clinical processes such as triage and pharmacy. On top of that, family members and friends provide moral support which boosts the patient's confidence to fight against diseases.

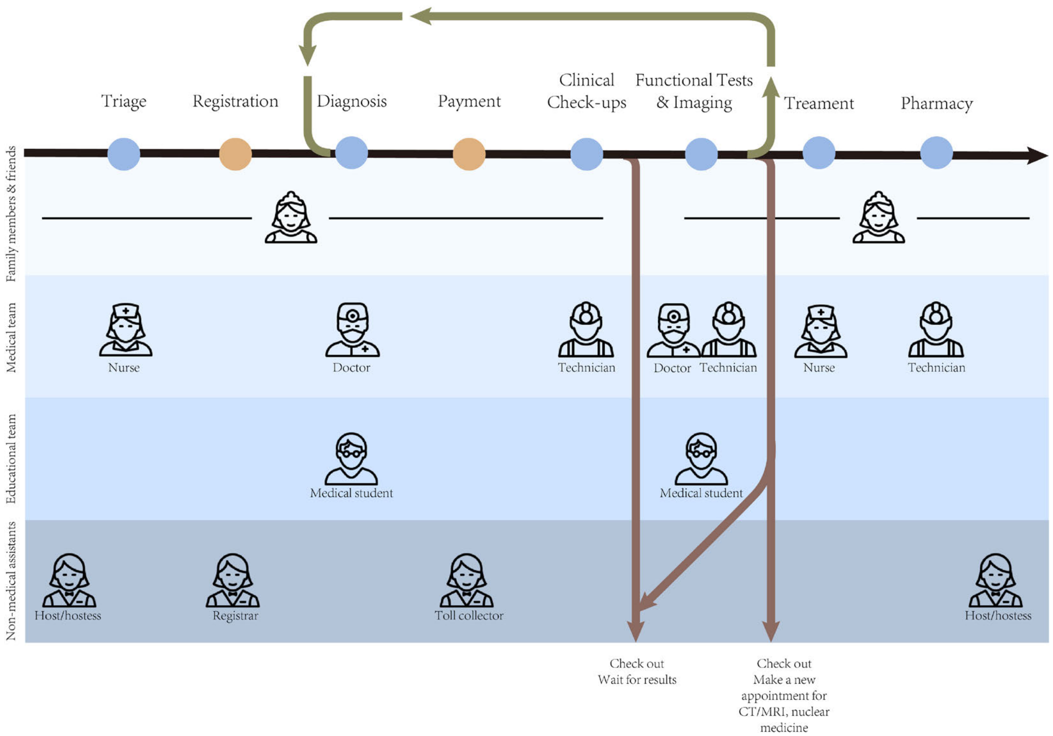

FIG. 3.14 Patient interactions in an outpatient journey

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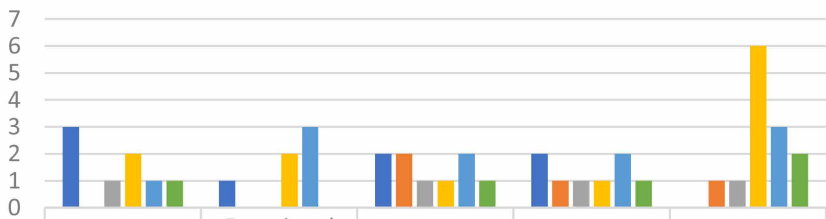
Members of the medical team participate in all clinical processes in an outpatient journey. Nurses who appear in the processes of triage and treatment have limited interactions with patients, while technicians, who are normally met in the processes of clinical check-ups, functional tests, imageing, and pharmacy, seldom communicate with patients directly. Most doctors interact with patients mainly in the process of diagnosis; but some doctors analyze X-rays for detection in functional tests and imageing, who do not contact patients directly. In teaching hospitals, medical students in education teams engage in the processes of diagnosis, functional tests, and imageing. Non-medical assistants can be seen in the administrative processes of registration and payment, as well as at the entrance of hospitals where they may assist patients (Figure 3.14)

Table 3.9 lists all the relevant studies concerning outpatient satisfaction in China since 2013. The analysis of these studies shows that the issues of patient dissatisfaction can be categorized into five groups: the costs, functional processes, service, environment, and procedure (Figure 3.15)



	Costs	Functional processes	Service	Environment	Procedure
2013	3	1	2	2	0
2014	0	0	2	1	1
2015	1	0	1	1	1
2016	2	2	1	1	6
2017	1	3	2	2	3
2018	1	0	1	1	2

FIG. 3.15 The statistics of outpatient dissatisfaction in their journeys

TABLE 3.9 Literature review of outpatient satisfaction surveys in China (2013-2018)

Study	Recourse	Timespan	Valid sample size	Setting	Patient dissatisfaction
CHSI, 2015:53-56	Government document	2013	24,600	Healthcare facilities national wide	1. High medical expense (40%) 2. Poor skills of medical teams (16.1%) 3. Poor service (14.8%) 4. Unreasonable medical expense (7.1%)
SMEA, 2014, website	News	2013	5,569	Public healthcare facilities in Shanghai	1. Unclean washrooms 2. Uncomfortable environment in waiting areas 3. Unreasonable medical expense 4. Limited interactions between patients and doctors
Fan *et al.*, 2015:13-14	Journal	2014	7,147	Public healthcare facilities in Shanghai	1. Unclean washrooms (17.42%) 2. Inconvenient registration and payment (15.3%) 3. Lack of health educational materials in waiting areas (15.21%) 4. Limited interactions between patients and doctors (12.52%)
SMEA, 2016: website	News	2015	11,493	Public healthcare facilities in Shanghai	1. Unclean washrooms (13.61%) 2. Limited interactions between patients and doctors in tertiary hospitals (11%) 3. Inconvenient registration and payment in tertiary specialized hospitals (15.3%) 4. Unreasonable medical expenses in secondary and tertiary hospitals (12%-16%)
SMEA, 2017: website; Wang *et al.*, 2017:462	News & journal	2016	12,242	Public healthcare facilities in Shanghai	1. Long waiting in hospitals (24.59%) 2. Unclean washrooms (15.01%) 3. Unreasonable medical expense (>10%)
Chen *et al.*, 2017:466	Journal	2016	9,581	Public tertiary hospitals in Shanghai	1. Limited interactions between patients and doctors: General (9.92%), Gynecology & Obstetrics Department (40.82%), Pediatrics Department (53.98%) 2. Long waiting in public tertiary hospitals (29.03%) 3. Long waiting in procedure: waiting for a diagnosis (52.2%), medical check-ups and tests (23.01%), registration and payment (20.47%)

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TABLE 3.9 Literature review of outpatient satisfaction surveys in China (2013-2018)

Study	Recourse	Timespan	Valid sample size	Setting	Patient dissatisfaction
Bai, 2016: website	News	2016	27,475	Healthcare facilities national wide	1. Long waiting for medical check-ups (27.2%)
He &Yue, 2016: website	News	2016	Not mentioned	Public secondary and tertiary hospitals in Guangdong Province	1. Long waiting for consultation (24.51%) 2. Long waiting for medical check-ups (24.25%) 3. Unreasonable medical expense (19.9%) 4. Not enough parking lots (14.5%) 5. Too crowd to take elevators (4.2%)
Dong *et al.*, 2017:158	Journal	2017	180	Six hospitals in Taiyuan	1. Complicated procedures (25.8%) 2. Not enough receptions (20.5%) 3. Unclean washrooms (19.6%) 4. Poor service (18.7%) 5. Not enough cashiers (12.3%) 6. Poor skills of medical teams (9.6%)
SMEA, 2018: website	Government document	2017	12,496	Public healthcare facilities in Shanghai	1. Long waiting for diagnosis and treatment (30.52%) 2. Unclean washrooms (19.36%) 3. Unreasonable medical expense (17.90%) 4. Poor order maintenance of queuing (13.07%) 5. Poor service (12.6%)
SMEA, 2019: website	Government document	2018	18,085	Public healthcare facilities in Shanghai	1. Long waiting for diagnosis and treatment (27.28%) 2. Unreasonable medical expense (16.94%) 3. Unclean washrooms (16.23%) 4. Limited interactions between patients and doctors (15.3%) 5. Poor order maintenance of queuing (10.78%)

(Data source: Center for Health Statistics and Information (CHSI), National Health and Family Planning Commission (NHFPC), Shanghai Medical Ethos Association (SMEA), Shanghai Municipal Commission of Health and Family Planning (Shanghai HFPC)

Costs

The complaints of medical expense mainly focus on two aspects: affordability and the lack of transparency, which can be translated to the needs for affordable medical treatment and knowing where each penny is spent. The former can be considered as a need for treatment: if patients cannot afford the medical expenses, their basic rights of getting treated and returning to the state of wellness are undermined. However, affordability of medical care is only mentioned in the government document of CHSI, NHFPC (2015:56) while the lack of transparency has been mentioned in different articles every year, highlighting the public demand for safety and security. Patients would feel more at ease if their rights to know how they are charged are respected.

Functional processes

Complaints about functional processes include the poor skills of medical teams and the lack of infrastructure (i.e. not enough parking lots, elevators, receptions, and cashiers). The former complaints reflect the need for better quality treatment, while the latter can be attributed to long queues and endless waiting, which make patients nervous and ill-tempered. Even though the lack of infrastructure does not affect the diagnosis or the medical treatment, it has a negative impact on the patients' emotional state. These complaints are an outcry for safety and security.

Service

Most of the complaints concerning service focus on the limited interactions between patients and doctors. The dissatisfaction rate is substantially higher in Departments of Pediatrics, Gynecology, and Obstetrics than in other departments (Chen *et al.*, 2017:466). This degree of dissatisfaction reflects the patient need for safety and security. Apart from dissatisfaction about the interactions with the staff, there are also complaints about "the lack of health educational materials in waiting areas" (Fan *et al.*, 2015:13). This points towards a need for self-actualization, namely, patients desire to know more about how to improve their health than hospital managers provide.

Environment

Unclean washrooms are the major complaint about the hospital environment which has been mentioned in many articles every year since 2013. Another complaint concerns the uncomfortable environment in waiting areas, but this was only mentioned once, in a patient satisfaction survey in 2013 (SMEA, 2014: website). Both complaints about the environment show the need for better safety and security.

Procedure

The complaints about procedures revolve around their complexity, long waiting times between procedures, and poor management of queuing, especially in large hospitals. Among the outpatients who are not satisfied with the waiting time, over 50% of the complaints are about the long waiting time for diagnosis, around 23% are about the long waiting time for medical check-ups and tests, while approximately 20 % are about the lengthy processes of registration and payment (Chen *et al.*, 2017: 466). Patients tend to get anxious or angry after waiting or queuing for a long time. And the poor management of queuing aggravates the anxiety of patients. Again, it demonstrates the need for safety and security in the hierarchy.

3.4.3 Patient experience in inpatient journeys

Family members and friends do not play an essential role in an inpatient journey. All hospitals restrict visits to certain hours. Some of them allow one of the family members to stay overnight in the wards while others do not. Even though Zhang *et al.*, (2012:2124) stated that there is no obvious difference in patient satisfaction on nursing services no matter whether family members and friends accompany patients or not, a survey of 270 inpatients in 4 hospitals in Shandong Province showed that around 80% of inpatients still prefer family members or friends to be with them. The patient need for family members and friends is psychological rather than physiological (He *et al.*, 2017:4-5). It demonstrates the need for love and belonging.

In medical teams, nurses in wards are responsible for inpatients during their whole patient journeys except for registration in the beginning and payment in the end. Nursing assistants take care of all everyday needs of inpatients. Doctors normally take ward rounds three times a day. After the first ward round in the morning, doctors decide which inpatients can be discharged. They would adjust prescriptions if necessary and communicate with family members of inpatients before the second ward round in the afternoon (Zhang & Peng, 2015:14). If an inpatient needs clinical check-ups, functional tests or imageing, nurses would book reservations the day before, and the technicians of relevant departments would be expecting the patient at the scheduled time. Inpatients do not have to wait in the waiting areas or join a queue.

Medical students in the education teams usually follow their supervisors and doctors during the ward rounds and help with some paperwork recording the situation of inpatients. Some of them also appear in the processes of functional tests and imageing, surgery, delivery, or intensive care according to their specialties.

Apart from assisting inpatients at the hospital lobby and in admission and payment processes, non-medical assistants also transport inpatients from their wards to the departments where they have check-ups or tests (Figure 3.16).

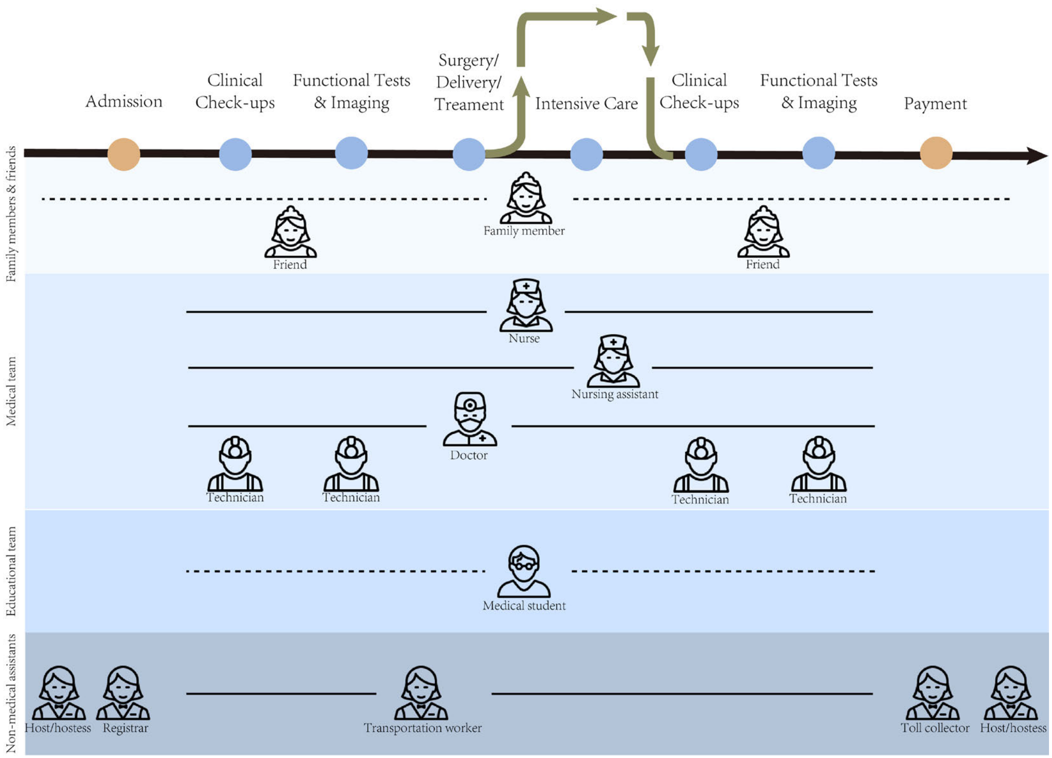

FIG. 3.16 Patient interactions in an inpatient journey

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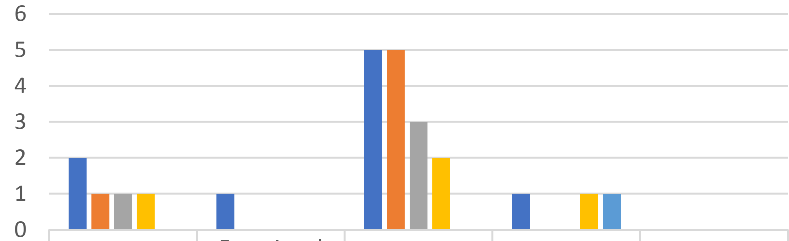
TABLE 3.10 Literature review of inpatient satisfaction surveys in China (2013-2017)

Study	Recourse	Timespan	Valid sample size	Setting	Patient dissatisfaction
CHSI, 2015:57-61	Govern-ment document	2013	24,740	Healthcare facilities national wide	1. High medical expense (40.2%) 2. Poor skills of medical teams (16.1%) 3. Poor service (14.8%) 4. Unreasonable medical expense (7.1%)
SMEA, 2014: website	News	2013	1,081	Public healthcare facilities in Shanghai	1. Not tasty food
Wang *et al.*, 2015:583	Journal	2013	1,350	Public secondary and tertiary hospitals in Hainan Province	1. Not positive in patient care by nurses (15.82%) 2. Not enough explanation of follow-up surgeries or treatment (13.12%) 3. Neither knowing what patients have eaten nor providing assistance (12.82%) 4. Environment of wards is not good enough (12.07%)
Fan *et al.*, 2015:13-14	Journal	2014	1,942	Public healthcare facilities in Shanghai	1. Unreasonable price and choice of food (11.1%) 2. Unreasonable medical expense (7.41%) 3. Unclean food (7.41%) 4. Food becomes cold after delivery (4.74%) 5. Nursing assistants and non-medical assistants are not polite enough (4.35%) 6. Not good enough in privacy protection in some secondary hospitals and community health centers
SMEA, 2016: website	News	2015	3,381	Public healthcare facilities in Shanghai	1. Unreasonable price and choice of food (10.86%) 2. Unreasonable medical expense (6.45%) 3. Unclean food (8.06%) 4. Food becomes cold after delivery (5.32%)
SMEA, 2017: website	News	2016	15,000	Public healthcare facilities in Shanghai	1. Not tasty food (13.72%)
Bai, 2016: website	News	2016	19,938	Healthcare facilities national wide	1. Not tasty food (16%) 2. Not quiet enough in wards (10.8%) 3. Unreasonable medical expense (9.4%)
SMEA, 2018: website	Govern-ment document	2017	3,396	Public healthcare facilities in Shanghai	1. Not enough choice of food (42.86%)

Table 3.10 lists all the relevant articles concerning inpatient satisfaction in China since 2013, which also can be studied on the same five aspects as analyzed in outpatient satisfaction. Figure 3.17 shows the number of inpatient dissatisfaction on each aspect every year.



	Costs	Functional processes	Service	Environment	Procedure
2013	2	1	5	1	0
2014	1	0	5	0	0
2015	1	0	3	0	0
2016	1	0	2	1	0
2017	0	0	0	1	0

FIG. 3.17 The statistics of inpatient dissatisfaction in their journeys

Costs

The complaints of medical expenses focus on the high costs and the lack of transparency, which mirror the ones from outpatients. Therefore, as stated in Section 3.4.1, the complaints about high expenses can be translated as a need for better treatment, while the lack of transparency can be interpreted as a need for safety and security.

Functional processes

The poor skills of medical teams were the target of complaints only once by CHSI (2015:59). Since then, no other complaints about hospital functional processes have been found in articles. The complaint of poor skills reflects a need for quality treatment.

Service

The largest number of complaints from inpatients concerns hospital services. Most of them focus on the food provided in hospital canteens. Inpatients are not satisfied with the taste, the cleanliness, and the price of food. They also complain that food becomes cold after being delivered from canteens to patient wards by non-medical assistants. Apart from the food, inpatients complain about doctors, nurses and nursing assistants not being considerate enough in cure and care. Moreover, sometimes inpatients are not even made aware of what the schedules are and what they have to do to prepare for surgeries or follow-up treatments (Wang *et al.*, 2015:583). In some secondary hospitals and community health centers, inpatients are not satisfied with their privacy protection (Fan *et al.*, 2015:14). All these complaints about food, the members of medical teams, and the lack of privacy indicate the inpatient's needs for safety and security. Other than that, the indifferent attitude of nursing assistants and non-medical assistants is criticized by Fan et al (2015:13), albeit only once. This points towards the inpatient's need for esteem.

Environment

Inpatients are not satisfied with the environment of wards. They think that the bedrooms are too tiny, noisy or dirty, or complain about a lack of privacy (Wang *et al.*, 2015:584). It reflects a need for safety and security.

Procedures

Neither medical nor administrative procedures have been complained about by inpatients since 2013.

3.4.4 Patient experience in acute patient journeys

The interactions with other actors are different between acute patients who meet the high acuity level criteria (i.e. Level 1 or Level 2) and the ones who meet the low criteria (i.e. Level 3 or Level 4). The former acute patients interact more frequently with members in medical teams and education teams who will do everything they can to save patients' lives, while family members and friends are usually only allowed to stay in waiting areas. Other acute patients have either severe but not life-threatening symptoms or mild symptoms, and they have similar interactions as those of outpatients.

During the patient journey, family members and friends are still called upon to help acute patients go through the processes fluently (Ge *et al.*, 2012:54) (Figure 3.18).

There are very few studies that focus exclusively on acute patient satisfaction. According to the two studies of Peking Union Medical College Hospital during 2014 and 2015, the complaints of acute patients mainly concern functional processes, environment, and procedure, rather than costs or the quality of the services offered (Table 3.11). However, it appears that these complaints stem from acute patients who meet the low criteria so they have to wait in waiting areas.

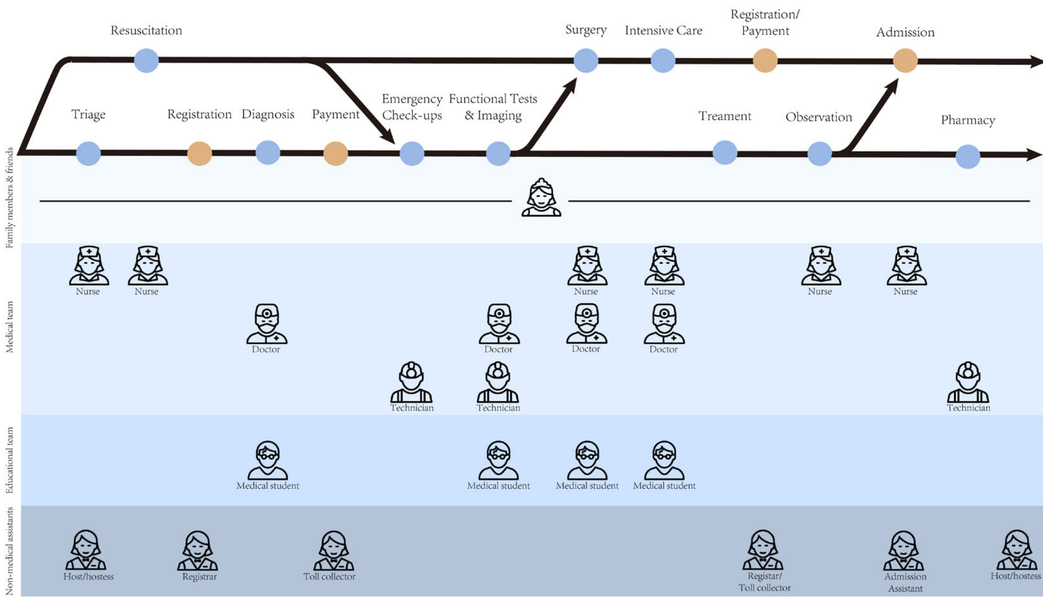


FIG. 3.18 Patient interactions in an acute patient journey

TABLE 3.11 The contents of acute patient dissatisfaction in Peking Union Medical College Hospital

	Complaints	Complaints (%) in 2014	Complaints (%) in 2015
Costs	None	-	-
Functional processes	1. Not enough wheelchairs and mobile beds 2. Not enough chairs in treatment rooms	59.85% 54.85%	49.82% 40.21%
Service	1. No chargers for mobile phone	29.19%	23.44%
Environment	1. Crowded and noisy waiting areas	60.34%	50.81%
Procedure	1. Long waiting for a consultation 2. Long waiting for admission	54.85% 32.69%	46.81% 30.46%

(Zhou et al., 2016:489; Zhou et al., 2016a:53)

Functional processes

The two complaints in the field of functional processes suggest a lack of basic medical infrastructure in the Emergency Departments. All these complaints reflect the needs for treatment.

Service

As mobile phones are increasingly popular, it is annoying and frustrating when mobile phones are out of battery, especially for acute patients and the companions who have to contact family members or have to wait for a long time. It is not necessary but reflects the needs for love and belonging.

Environment

In China, patients can opt to see a doctor in an Emergency Department without any referral from a general practitioner. Especially in the out-of-hours periods on weekdays and at weekends when clinics are closed, outpatients prefer to head straight to Emergency Departments. In fact, Emergency Departments have already become enlarged clinics. Therefore, it is not uncommon to see a large number of acute patients and their companions in Emergency Departments, making waiting areas crowded and noisy. The complaint of such nature demonstrates a patient need for safety and security.

Procedure

The complaints about procedures point to the long waiting times for consultation and admission. Contrary to the outpatient clinics, the priority rules of consultation and admission are based on the condition of acute patients rather than their arrival time. Therefore, acute patients who meet the low criteria could face the need to wait much longer than they would have expected, which leads to complaints. This points to the need for safety and security.

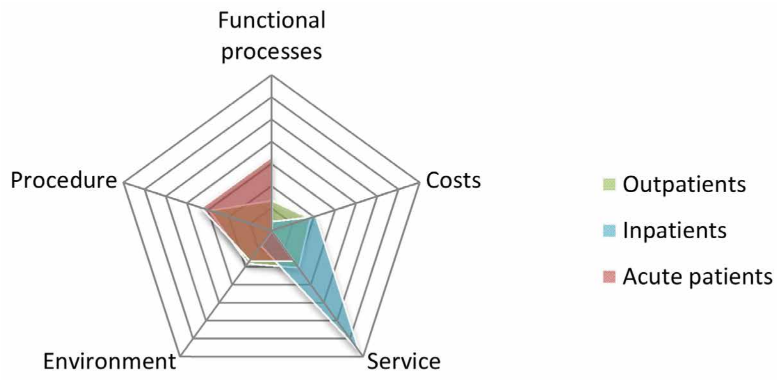
3.5 Discussion

3.5.1 Different complaints from different groups of patients

For outpatients, the weight of complaints on each aspect is more or less the same (Figure 3.19). That is to say, outpatients care about all aspects of the patient journey including costs, functional processes, service, the environment, and procedures. This phenomenon seems to be the result of the full participation of outpatients in all clinical and administrative processes in their patient journey. Outpatients have a deeper overall impression of every aspect than other groups of patients. Outpatients appear to think hospitals should be upgraded holistically and be well-balanced on all fronts. Simply put, outpatient journeys should be customer-oriented (Wagenaar *et al.*, 2018:54).

For inpatients, the weight of complaints is different in every respect. Most of the dissatisfaction revolves around the hospital services, while few touch on the procedure and functional processes. It corroborates the opinion of the author in Section 3.3.2 that in inpatient journeys, members in medical teams take good care of inpatients and help them as much as they can. However, the excessive dependence on members of medical teams leads to other complaints. Although there are a few complaints on the aspect of environment, a better environment does make the patient journey more pleasant and sets the tone for improving the experience of inpatients.

The complaints from acute patients center on the aspects of functional processes, procedure, and environment. Obviously being concerned most of all with a fast and effective treatment (Wagenaar *et al.*, 2018:54), acute patients are not overly sensitive to the price and the level of services. Their top concern is whether Emergency Departments are well-equipped and how long they have to wait. Only when acute patients have to wait for a long time will they become aware of the environment in waiting areas.



	Outpatients	Inpatients	Acute patients
Costs	8	5	0
Functional processes	6	1	2
Service	9	16	1
Environment	8	2	1
Procedure	13	0	2

FIG. 3.19 Distribution of complaints from different groups of patients

The distribution of complaints can be used as guidance for architects and hospital managers. For instance, when it comes to hospital functional processes, Emergency Departments should be well-equipped perfectly and operated by skilled staff, but in outpatient clinics, this might be a little bit less important. For inpatients, the quality of hospital services should be the priority. In areas that are frequented by outpatients and acute patients, the quality of the environment should be a top priority.

The environment is very important for neither short-stay outpatients nor patients with severe illnesses. By contrast, the environment is crucial for outpatients who prefer to wait for results for second diagnoses on the same day, long-stay inpatients, and acute patients who meet the low acuity level criteria (i.e. Level 3 or Level 4), as well as for their family members and friends. Regarding the procedures in the patient journey, acute patients and outpatients are less tolerant of long waiting times and complicated procedures than inpatients.

3.5.2 The distribution of patients' urgent needs in China

Table 3.12 distinguishes different tiers of urgent needs from the feedback of outpatients, inpatients, and acute patients between 2013 and 2018; these findings are based on literature reviews. It unequivocally shows that the most urgent patient needs to be fulfilled in China are at the second level of the hierarchy from the bottom, namely, safety and security. Urgent needs concerning treatment can be found at the bottom of the hierarchy. Based on Maslow's theory, only if the needs at a lower level are satisfied, patients begin to pursue the fulfillment of needs at a higher level (Maslow, 1943:373). The situation in China suggests that after rapid development of hospital construction in recent years, a large number of basic requirements of patients concerning treatment have already been satisfied. As of now, patients can easily find a hospital for treatment nearby. Then it naturally leads patients to pursue a higher level of needs concerning the basic emotional well-being.

As stated by Allyson M. Pollock (2004:226), "The demand for healthcare is infinite, so rationing is inevitable". Even developed countries are unable to fulfill all the requirements in the hierarchy of needs (Nunes *et al.*, 2017:5). Therefore, in China, at this moment one of the effective approaches to improve the performance of hospitals could be to pay more attention to the most urgent needs for safety and security.

On the other hand, it is also clear that there are rising needs for esteem and self-actualization, which fall into the top three tiers. In fact, the top three tiers of patient needs have positive impacts on the lower tiers, and some of the top-tier needs can be met with relatively small investments. Accordingly, it would be wise to design hospitals either with the consideration of all tiers of patient needs at the outset or in a flexible way to ensure the upper tiers of patient needs can be met in the future.

TABLE 3.12 Distribution of patient needs in the hierarchy

	Outpatient urgent needs	Inpatient urgent needs	Acute patient urgent needs
Self-actualization	1	0	0
Esteem	7	3	0
Love and Belonging	0	0	1
Safety and Security	33	19	3
Treatment	3	2	2

4 The relationship between patient journey and hospital architecture

Question

1. What are the core driving forces of the development of hospital architecture?
2. How can the concept of patient journey impact hospital architecture?

Purpose

This chapter tries to build up connections between hospital architecture and patient journeys. To this end, the chapter outlines the historical core driving forces of the development of hospital architecture. After introducing the functional space in hospitals, the patient journeys that have been discussed in Chapter 3 are presented as a major driving force in hospital architecture today. This is demonstrated by mapping them in the floor plans of hospitals.

Approaches

In order to connect the concept of “patient journey” with hospital architecture, the approach of mapping is used. It is based on observations in case studies. Not only the positional relationship is shown, but the strength of the connections is also examined.

Findings

1 The driving forces of hospital architecture development;
2 The way patient journeys and hospital architecture influence each other;
3 The uncertainties around hospital architecture;
4 The concept of patient journeys relative to other trends in hospital architecture.

In the definition of the World Health Organization (WHO) (2003: 8), a hospital is "an organized effort to provide a specific set of medical services, usually physically located in one or several buildings, and related to specialized cure such as diagnosis and treatment, and care (as opposed to the primary care level) with the input of health professionals, technologies and facilities". This definition also applies to hospitals in China although the distinction between hospitals and community health centers is different from what is normally seen in Europe and the United States. Based on the WHO definition, hospital architecture is mainly considered as a physical carrier of medical services. This implies that the efficient accommodation of cure and care processes should be seen as a top priority in hospital architecture. The best ways to achieve this continually change, and that deeply impacts patient journeys in hospitals.

4.1 Development of hospital architecture

4.1.1 Historical development of hospital architecture since the 1860s

Hospital architecture has dramatically changed, both in form and organization, over the past two centuries. At the end of the eighteenth century, hospitals developed as the first building type that was determined by science and philosophy (Wagenaar et al., 2006: 29). There are many overviews of the way hospitals developed. In this section, Prof. Jan Delrue's[7] version (Delrue, n.d.: website) is introduced mainly for the

7 A well-known scholar from KU Leuven who is famous in the academic circle of health care architecture in China.

reason that the Chinese version (Luo, 2010:14) has been based on his work. Prof. Cor Wagenaar's version (Wagenaar et al., 2006:27-39, Wagenaar *et al.*, 2018:42-51) is used as a supplement for a better understanding.

As illustrated in Figure 4.1, when hospital architecture became a specialized building type in the mid-nineteenth century, it used to be designed as a set of separate pavilions. The pavilion system was replaced by monolithic blocks in the early 20th century. At that time hospital architecture stood at a crossroad. A group of hospitals became more vertical, named "MONOBLOCS", which was popular especially in North America. Hospitals of the vertical type were shaped as a single large-scale complex which heavily relied on high-tech building technology. It created a sophisticated hospital atmosphere, for instance in the RWTH Aachen University Medical Center. In Europe, this type took the form of the highly popular Breitfuss Model (also known as "Wide Foot Model", "Matchbox on a Muffin", or "Tower with Technical Block"). Another group of hospitals preferred to "go out than up", which resulted in the concrete forms of "TITANICS" and "VILLAGES". These had many open ends so as to increase the flexibility of the buildings. Some of the "VILLAGES" forms were named after the alphabet like the T-type, the K-type, and the H-type (Wagenaar et al., 2006:35-37, Wagenaar *et al.*, 2018:48-50).

Looking to the future, Jan Delrue argues that "the MONOBLOCS type and the TITANICS type have disappeared or will soon disappear from all hospital drawing tables", whereas, the VILLAGES type would be the only direction of hospital development in the future (Delrue, n.d.: website).

Based on Jan Delrue's contribution, Chinese scholars incorporated local practices in China into the mainstream of the historical evolution worldwide (Figure 4.2) (Luo, 2010:12-14; CABP & ASC (ed). 2017:144). The starting point of modern hospitals in China is marked by Peking Union Medical College and its affiliated hospitals, which adopted the pavilion system in the 1910s (Liu, 2006:113). Since then, hospital architecture in China has been transformed gradually from decentralization into semi-centralization and centralization (Huang, 2001:4).

China developed a variant of the Breitfuss Model, which was particularly popular in metropolitan cities. Figure 4.2 shows how the centralized vertical form of the Breitfuss Model has evolved to become a semi-centralized type. Relatively decentralized wings connected with corridors are used as outpatient clinics in low-rise parts of the building, and centralized nursing units in the high-rise parts.

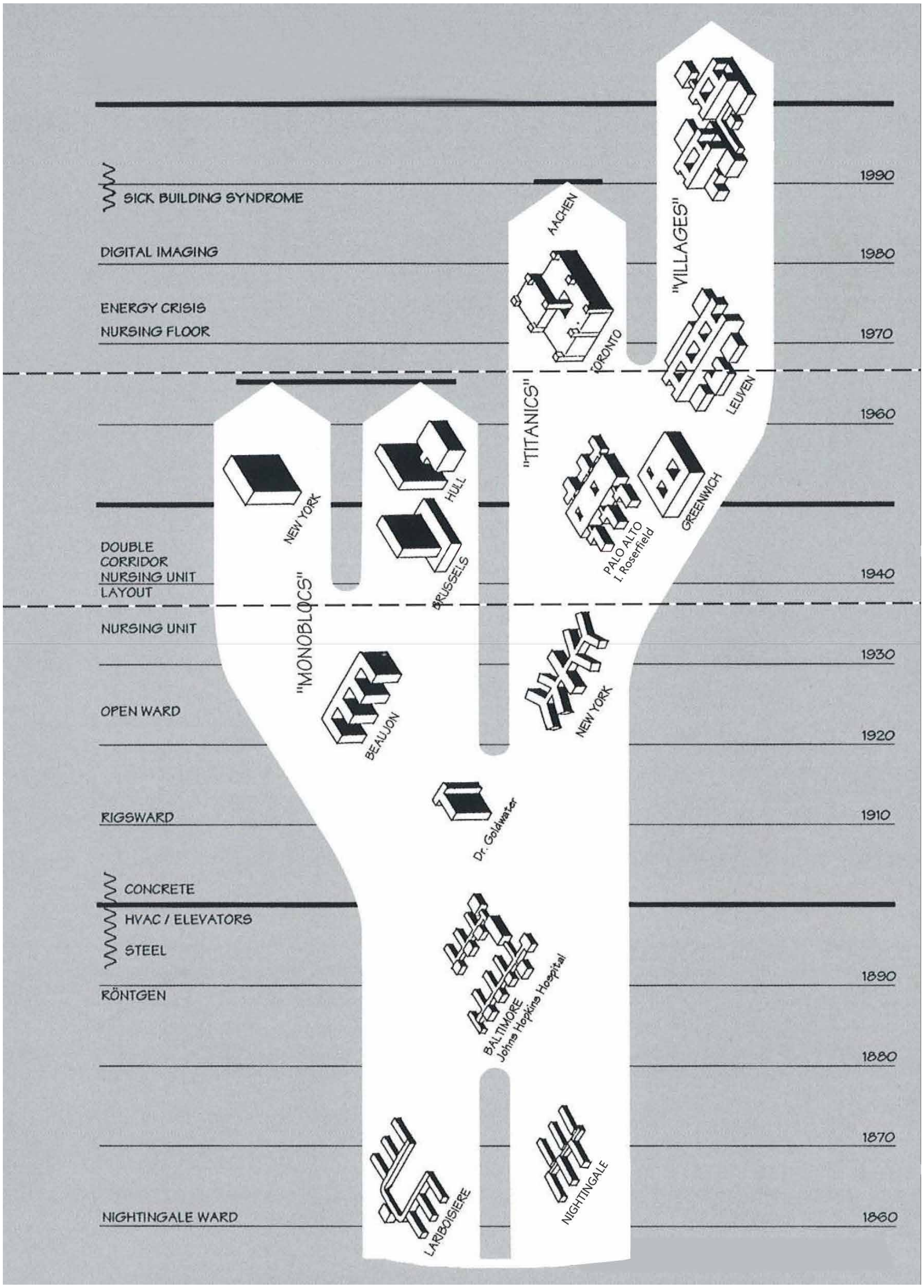


FIG. 4.1 Historical evolution of hospital architecture
(Delrue, n.d. b: website)

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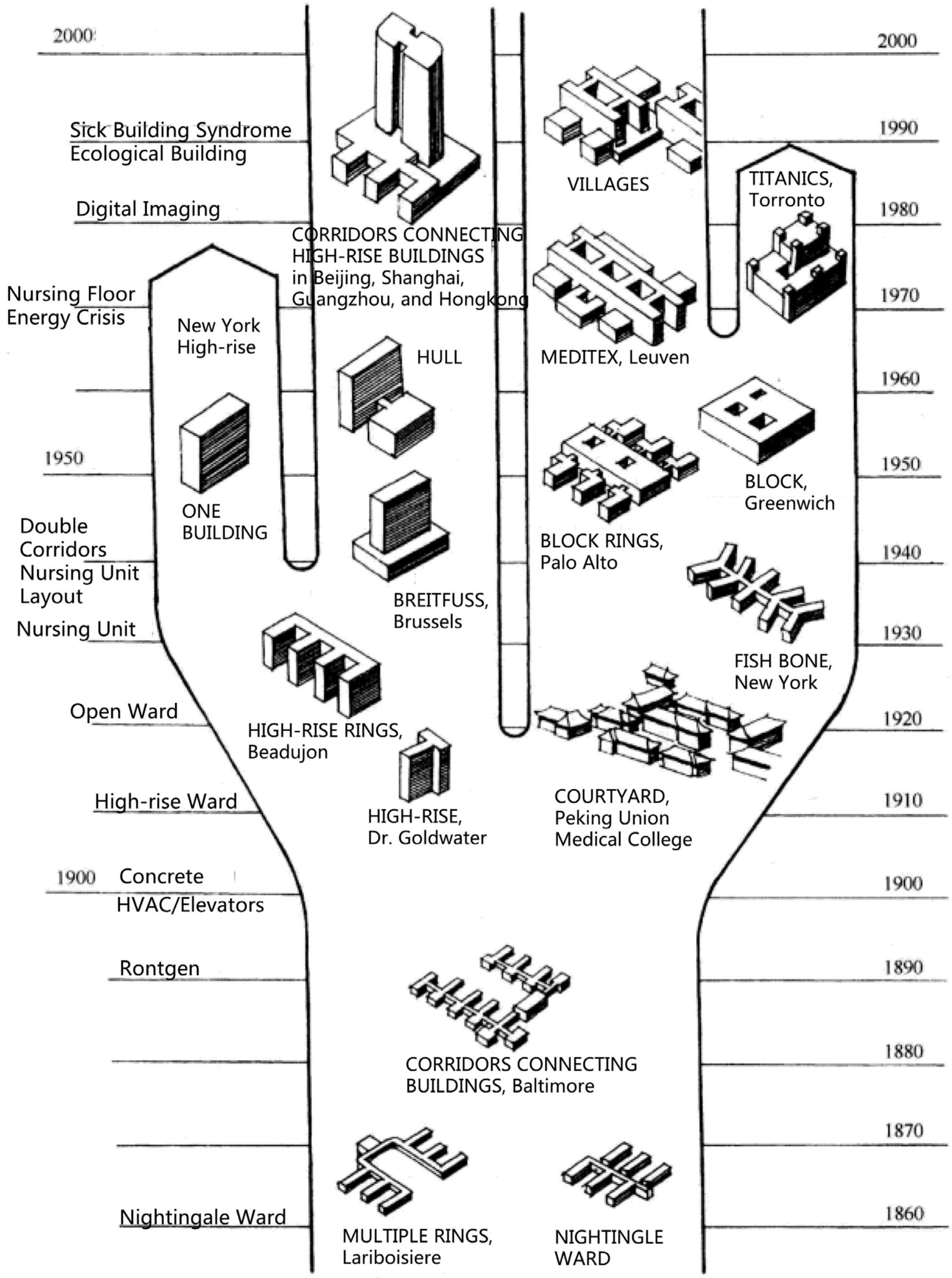


FIG. 4.2 Historical evolution of hospital architecture (including the ones in China)
(Luo, 2010:14)

4.1.2 Core driving forces of the development

Hospitals are defined by their context. Their evolution is affected by a large number of factors such as policy, finance, culture, architecture and medical science. In each historical period, different driving forces dominate architectural changes.

Even though the factors of policy, finance, and culture may vary in different countries, the evolution of hospital architecture follows the same lines all over the world. Basic layouts are shown in Figure 4.1 and Figure 4.2. Figure 4.1 shows that Jan Delrue (n.d.: website) and Markus Schaefer (2005:202) see innovations in medical science and building technology as the major factors of typological changes. The influence of medical science can illustrate this. Due to the widespread application of medical devices like X-ray machines, CTs, and MRIs in today's diagnosis, most hospitals with a large number of patients have introduced a Radiology Department. In the interior design and layout planning of a hospital, not only should the location and size of the Radiology Department be considered, the procedures for admitting patients and the logistics involved in getting them there should also be taken into account. Similarly, like all forms of architecture, hospital architecture is also deeply affected by the improvement of building technology such as the use of steel, concrete, elevator, and mechanical ventilation in the early 20th century (Delrue, n.d.: website). The new technologies also allowed hospital buildings to opt for high-rise buildings.

Nevertheless, medical science and building technology only explain part of the typological changes of hospitals. They do, for instance, not explain the preferences for either low-rise or high-rise buildings. In Cor Wagenaar's (2006:37-41) opinion, the preference for low-rise buildings in the 1970s is related to what he dubbed the fourth revolution, which revolved around "empowering the patient". This was linked to a general trend towards a more humane architecture; high-rise buildings were associated with the alleged authoritarian attitude of the medical profession. Hospital architecture began to pay more attention to patient experiences and introduced concepts such as patient-centered care, healing environment, and Evidence-Based Design (EBD). In recent years, the focus on hospital architecture has gradually extended from patients to all end-users of hospitals.

Therefore, apart from medical science and building technology, social trends also play a major role. Owing to globalization, new trends spread all over the world in a short time, constantly shaping hospital architecture.

4.2 Patient-related functional zones in patient journeys

As shown in Table 4.1, most hospitals in China are composed of seven zones: the emergency department (ED), the outpatient clinics, the hotfloor[8], the inpatient wards, logistics and supply area, administration area, and residential facilities (MOHURD and NDRC, 2008:3). Nevertheless, not all zones impact patient experiences. Only the ED, the outpatient clinics, the inpatient wards, and part of the hotfloor are normally part of patient journeys. The arrangement of functional zones in China is based on the clear distinction between the outpatient clinics and the ED, the hotfloor, the inpatient wards, as well as logistics and supply, which is similar to "the typological model" In the Netherlands (Wagenaar *et al.*, 2018: 53-54).

TABLE 4.1 Functional composition of a hospital in China

Functional zones	Components
Emergency Department (ED)	Emergency room, observation room, ED operating room, emergency intensive ward (EICU), transfusion room, consulting room, etc.
Outpatient clinics	Consulting room, outpatient therapeutic room, registration station, reception, cashier, outpatient pharmacy, etc.
Hotfloor	Radiology, clinical laboratory, ultrasonography, endoscopy, pathology, operating theater, central sterile supply department (CSSD), nuclear medicine, dialysis, etc.
Inpatient Wards	Admission and discharge, inpatient pharmacy, ward, etc.
Logistics and Supply	Laundry, electricity distribution room, nutritious diet center, morgue, biohazard waste, sewage disposal, parking, storeroom, drug manufacturing room, etc.
Administration	Office, meeting room, library, archives, computer room, etc.
Residential Facilities	Dormitory, canteen, etc.

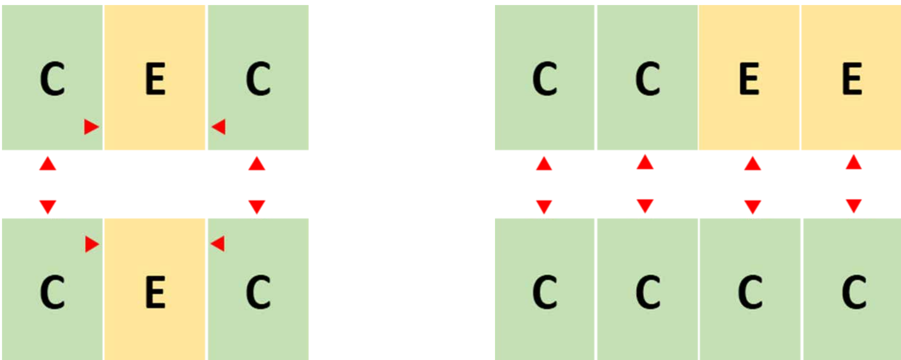
8 Hotfloor is also named medico-technical departments in China

4.2.1 Outpatient clinic

Outpatient clinics are visited by large numbers of individuals. They provide outpatient care services on weekdays from around 8:00 to 17:00. They can be spatially divided into three parts: the consulting area, the clinical treatment area, and the public area (Huang, 2012:68).

4.2.1.1 Consulting area

The consulting area is composed of clusters of consulting rooms and examining rooms. There are different ways to organize the connections between consulting rooms and examining rooms in a cluster. Some of them have separated entrances while others are connected by doors (Figure 4.3). In the consulting area, doctors interact with patients and make clinical diagnoses. In today's China, consulting rooms and examining rooms in most of the hospitals provide comfort, convenience and privacy for doctor-patient interactions. Sometimes medical students and family members of the patients also attend the consultation. Only a few community health centers and old hospital buildings have shared consulting rooms.

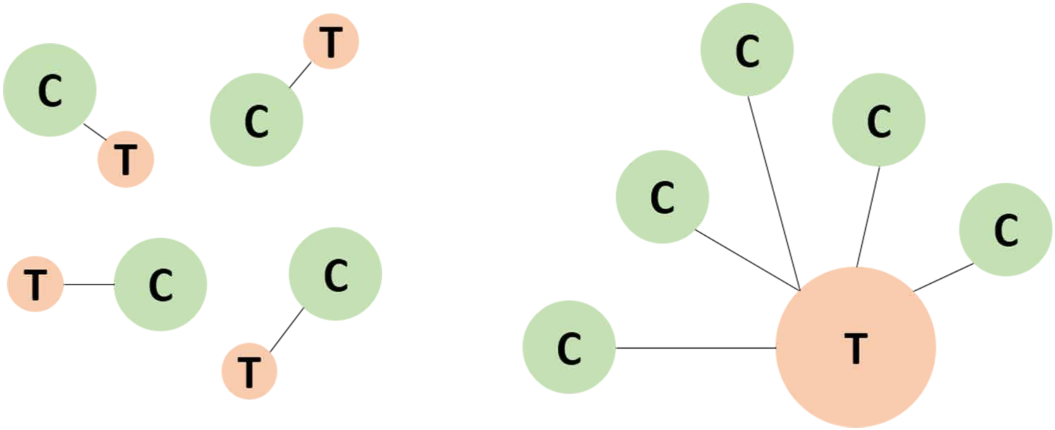


C: Consulting room; **E:** Examining room

FIG. 4.3 Spatial configuration of consulting area (Left: Connect each other by doors; Right: With separated entrance)

4.2.1.2 Clinical treatment area

Traditional clinical treatment areas are scattered in clinical departments and patients are treated in separated therapeutic spaces. They are usually located near the clusters of consulting rooms. The Surgery Outpatient Department, for example, comprises the surgical dressing room, a kind of therapeutic room that is normally placed next to both the consulting rooms and the nursing station. In recent years, separate therapeutic rooms in various outpatient departments tend to be combined so as to establish an integrated treatment center. This improves the performance of treatment (Figure 4.4).



C: Consulting room; **T:** Therapeutic rooms

FIG. 4.4 Spatial configurations of consulting area (Left: Decentralized treatment areas; Right: Integrated treatment center)

4.2.1.3 Public area

Public areas in hospitals include all the medical and administrative assistant facilities for outpatients, such as triage desk, registration station, waiting areas for consultation and treatment, cashier, clinic pharmacy, elevators, and escalators. Outpatients spend most of their time in public areas. Besides medical and administrative assistant facilities, hospitals in China are exploring new ways to activate the public area, for instance, by the introduction of commercial facilities like restaurants and shops.

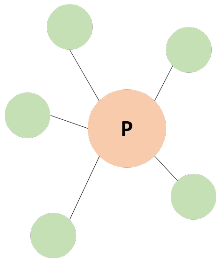
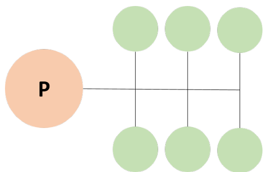
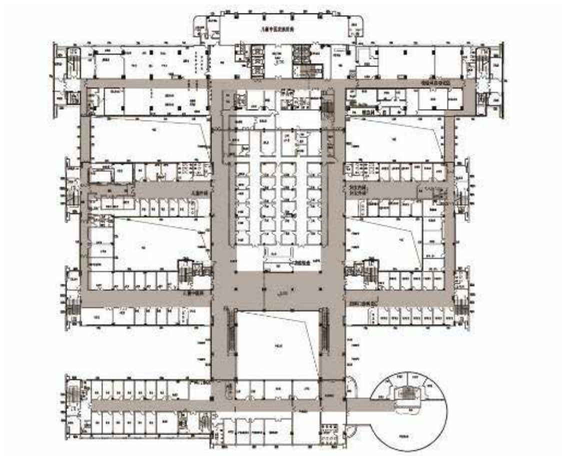
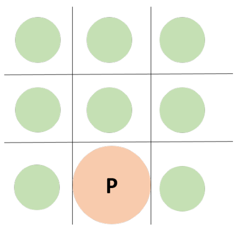
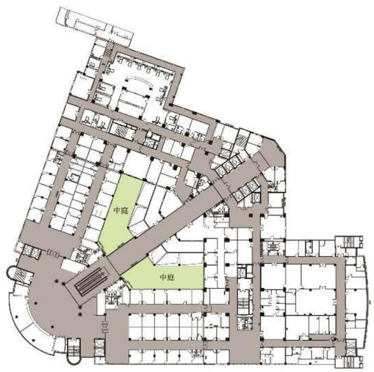
4.2.1.4 Spatial configuration of an outpatient clinic

There are three types of spatial relationship between the public areas and the areas of consultation and clinical treatment (Zhang, 2018:154-163). In the dot-shape configuration, the public area is placed at the center, surrounded by several tight-knit independent areas of consultation and clinical treatment. In the branch-shape configuration, the public areas and the areas for consultation and clinical treatment do not have direct connections. Most of them are linked by a two-layer branch-like transport system. The first layer is named boulevard or hospital street, which connects the main public area (eg. the entrance hall) with decentralized public areas (eg. the waiting areas in each outpatient department). The boulevards are part of the hospital's public area and contain flower shops, cafés, barbershops, etc. The second layer of the transportation system is made up of corridors that connect the decentralized public areas with the areas for consultation and clinical treatment. Compared with the branch-shape configuration, the block-shape configuration lacks a clear-cut distinction between public areas and the areas of consultation and clinical treatment. Here we find the shortest distances, but outpatients may find it difficult to find their way.

4.2.2 Inpatient wards

Inpatient wards take the greatest percentage (39%) of the overall area of a hospital, according to the *Construction Standard of General Hospital* in China. Wards are the core components in inpatient wards where patients have to stay overnight. They can be divided into four functional parts: the patient bedrooms, auxiliary areas for cure and care, residential areas for staff, and public areas.

TABLE 4.2 Spatial configurations in outpatient clinics

	Type of spatial relationship	Sample
Dot-shape		 Sun Yat-sen Memorial Hospital, Sun Yat-sen University*
Branch-shape		 Guangzhou Women and Children's Medical Center*
Block-shape		 Foshan Traditional Chinese Medicine Hospital*

*"P" refers to "Public area". / * Provided by Wenyu Zhang*

4.2.2.1 Inpatient bedroom

A ward usually contains 16-20 inpatient bedrooms with separate bathrooms. Contrary to what has become major trends in developed countries, single-bed rooms are still quite rare in China. In practice, a bedroom is commonly shared by 3-6 inpatients (CABP & ASC, 2017:181). Nurses and doctors visit inpatient bedrooms several times a day to check the patients. That designates inpatient bedrooms as the spaces where the interactions between medical teams and inpatients are most frequent. An inpatient bedroom is normally equipped with a bathroom, a TV set, a cabinet for shared use, and bedside tables and lamps for individual use (Figure 4.5). Understandably, there is not much space left for visitors, and consequently, visitors inevitably disturb the other patients in the same bedroom.

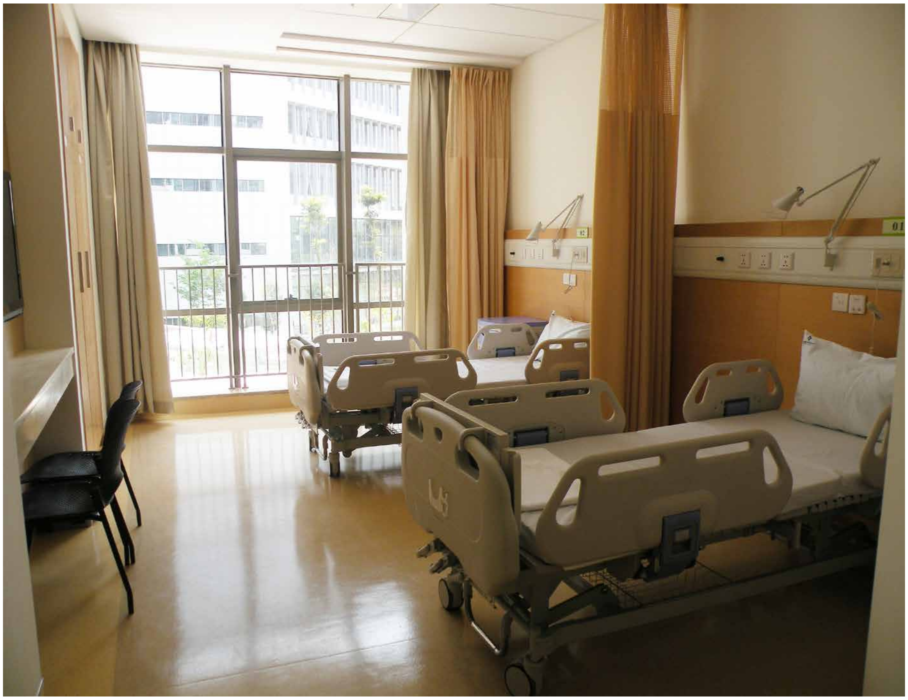


FIG. 4.5 Facilities in an inpatient bedroom in the University of Hongkong-Shenzhen Hospital

There are two different planning options for the position of en-suite bathrooms: on the corridor side of the room adjacent to the patient room door, or on the exterior wall side. Both have pros and cons (Figure 4.6) (Table 4.3). In hot and humid regions, it is advantageous to prevent too much sunshine in a room, especially in summer. The balcony and the en-suite bathroom work as climate buffers for the inpatient bedroom. As a result, en-suite bathrooms located on the exterior wall side are suggested especially in South China, also from an energy-saving perspective (Zhou, 2012:93-95).

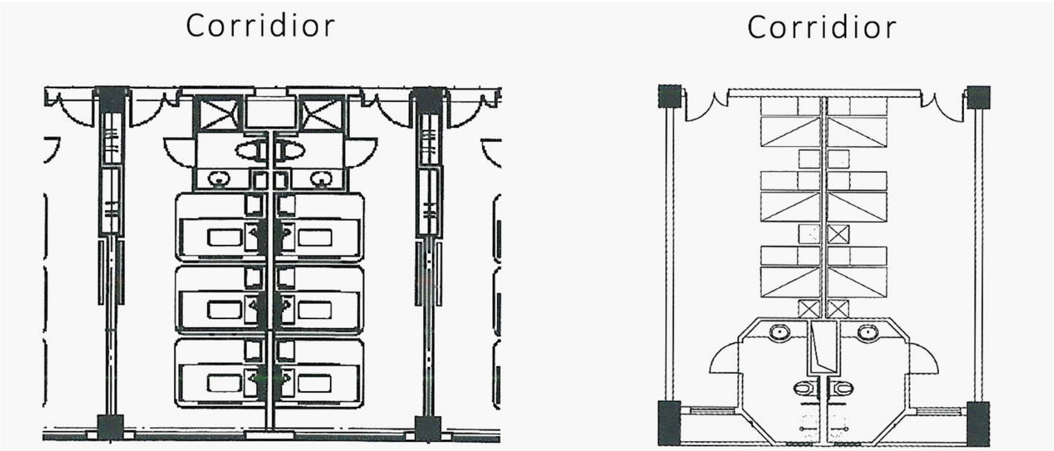


FIG. 4.6 Different locations of the bathroom in an inpatient bedroom
(Su et al., 2012:122)

TABLE 4.3 The pros and cons of different bathroom positions in an inpatient bedroom

	Pros	Cons
Bathroom located on the corridor side	1. Easy for maintenance	1. Less patient visibility from the corridor for nurses 2. Increase nurses' walking distance 3. Require mechanical ventilation in the bathroom 24 hours a day
Bathroom located on the exterior wall side	1. Greater patient visibility from the corridor for nurses	1. Less sunshine 2. Limited view from the window

(Adapted from Luo, 2010:147)

4.2.2.2 Auxiliary areas for cure and care

The auxiliary areas for cure and care in inpatient wards include a nursing station, the doctor's office, therapeutic rooms, deposal rooms, dispensing rooms, washing rooms, etc. Because doctors do the rounds three times a day, they stay in the wards during work, except when they have to visit outpatient clinics (Table 4.4). Therefore, doctor's offices are usually located in the wards (Huang, 2012:119). The auxiliary areas for cure and care represent the second most active space for the interactions between medical teams and inpatients. Sometimes, family members and friends of inpatients are also present.

TABLE 4.4 Day Arrangement in inpatient wards

Time	Doctors	Nurses	Hosts and hostesses
6:00-8:00		Take blood tests before breakfast	Serve breakfast
8:00-9:00		Have ward rounds, distribute infusion and drugs	Deliver patients to take imageing or tests
9:00-10:00	Have ward rounds	Take skincare/oral care, change bedding and clothing	Book tomorrow 's diets
10:00-12:00	Admission/ Discharge		Serve lunch
12:00-14:00	Rest		
14:00-16:00	Adjust the dosage of medicine and communicate with patients' family members	Distribute infusion and drugs	Deliver patients to take imageing or tests
16:00-17:00	Have ward rounds		Serve supper
17:00-20:00	Rest		
20:00-21:00	Have ward rounds	Contact inpatients who do not return to the wards	

4.2.2.3 Residential area for staff

As wards run 24 hours a day, three teams of nurses and two teams of doctors take turns being on duty each day. Therefore, a residential area for staff is necessary in wards, which is mainly composed of duty rooms, locker rooms, and washrooms. It is a restricted area where neither patients nor family members and friends are allowed without permission.

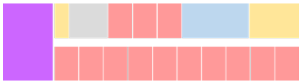
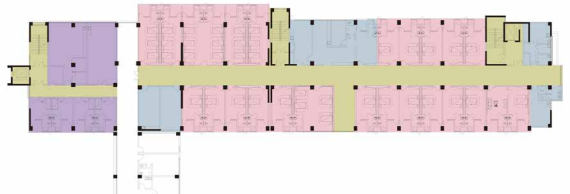
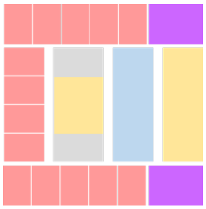
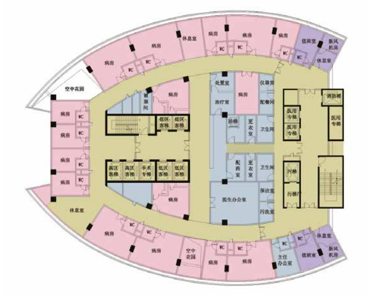
4.2.2.4 Public areas

Besides elevators, stairs, and corridors that connect the three functional areas mentioned above, the public areas in a ward also include social space for inpatients. However, since they are usually too small and crowded, it is hard for inpatients to find a place to relax, socialize with other patients, or meet visitors – a fact that is undoubtedly detrimental to their recovery.

4.2.2.5 Spatial configuration in wards

There are two types of spatial configuration in a ward (Table 4.5) (Zhang, 2018:193). In the linear-shape configuration, single or double main corridors connect inpatient bedrooms, auxiliary areas for cure and care, residential areas for staff, and other public areas. The residential areas for staff are usually located at one end of a ward, or behind the auxiliary areas for cure and care. The connections between the functional areas are direct and clear, which is helpful for wayfinding. In the surround-shaped configuration, all the inpatient bedrooms and residential areas for staff are placed on the outer ring so as to receive daylight and natural ventilation; the areas which do not require daylight, like the auxiliary areas for cure and care and part of the public areas, are located in the inner ring. Layouts with surround-shaped configuration are more compact than the ones with linear-shaped configuration. However, it may not be as easy for inpatients to find their way in wards with surround-shaped configuration.

TABLE 4.5 Spatial configuration in wards

	Type of spatial configuration	Sample
Linear-shape		 Panyu Central Hospital Ward Building 1
Surround-shape		 The 1st Affiliated Hospital of Guangzhou Medical University*

* Provided by Wenyu Zhang

4.2.3 Emergency department

The Emergency Department (ED) provides acute care. Based on different types of treatment for patients with different levels of acuity, the medical functional areas in the ED can be divided into first-aid areas, emergency areas, and shared public areas (Figure 4.7).

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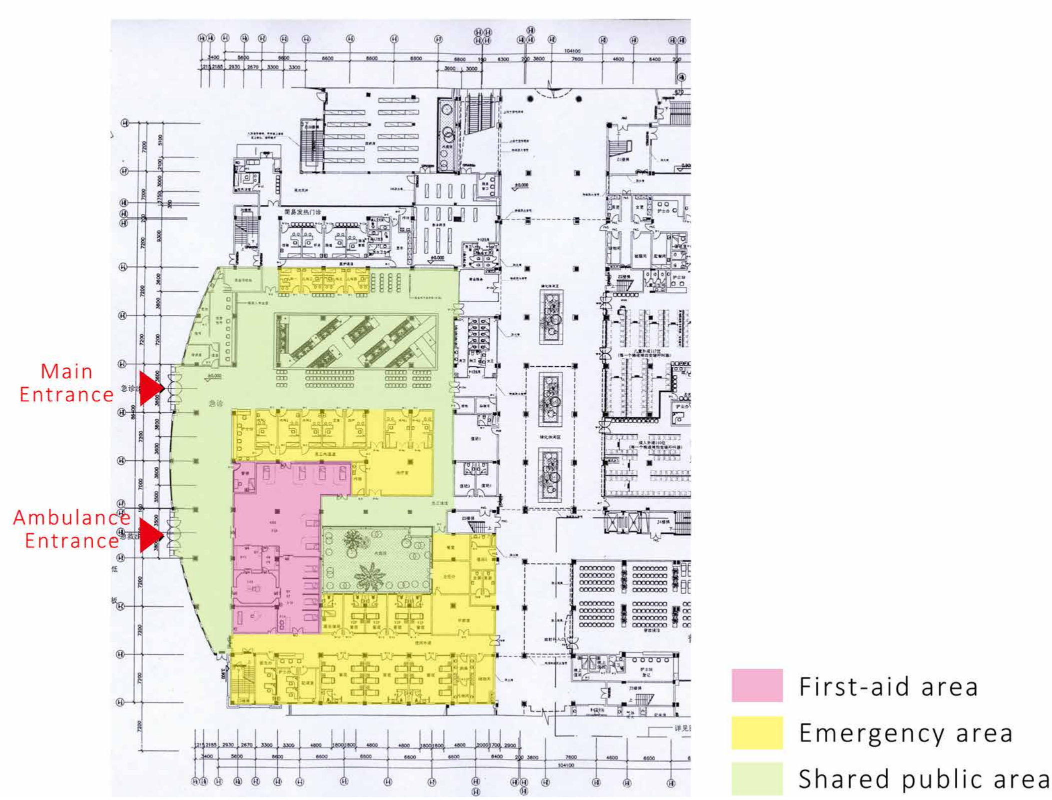

FIG. 4.7 Medical functional areas in an Emergency Department

4.2.3.1 First-aid area

Acute patients who require immediate life-saving interventions will be brought directly to the first-aid area, which normally includes a resuscitation room, a debridement room, a gastric lavage room, and EICU.

4.2.3.2 Emergency area

Acute patients with severe but not life-threatening symptoms are directed to the emergency area which includes consulting rooms, therapeutic rooms, and an observation ward.

4.2.3.3 Shared public area

The first-aid area and the emergency area share the same medical and administrative assistant facilities such as triage desk, registration station, waiting areas for emergency consultation and treatment, the cashier, and an emergency pharmacy. To some extent, EDs are miniature general hospitals that require a separation of traffic flows.

4.2.3.4 Connections with other medical departments

The Emergency Department needs to have direct connections with several hotfloor departments. The distance between the ED and these hotfloor departments has to be short in order to transfer acute patients as quickly as possible. Some ED's and trauma centers have their own operating rooms, X-ray rooms, CT rooms, and ultrasound rooms.

4.2.4 **Hotfloor**

The hotfloor is a collection of technology-based diagnostic facilities and treatment areas. Compared with outpatient clinics, inpatient wards, and other components that make up a hospital, the hotfloor turns out to be the most essential and irreplaceable part. Hotfloor departments can be generally categorized as departments for diagnosis, departments for intervention, and departments for treatment (Kobus *et al.*, 2008:11,14,50,91).

4.2.4.1 Departments for diagnosis

Departments for diagnosis include the Radiology Department, the Clinical Laboratory, the Ultrasonography Department, etc. A common characteristic is that they use technological equipment to assess the physical and psychological condition of patients.

4.2.4.2 Departments for intervention

Departments for intervention include Digital Subtraction Angiography (DSA), the Endoscopy Department, the Operating Theater, Ambulatory surgery center, etc. Surgery is either performed in a traditional way or – using sophisticated technology – geared to achieve the goal of minimal invasion.

4.2.4.3 Departments for treatment

Departments for treatment include the Radiotherapy Department, the Chemotherapy Department, the Dialysis Department, the Physiotherapy Department, the ICU, etc. Their common characteristic is the use of technology to treat patients.

4.2.4.4 Connections with other medical departments

Unlike outpatient clinics and inpatient wards, hotfloor departments are relatively independent of each other. There are various layouts, which are determined by the type of medical specialization and the technology that is used. As a consequence, it is hard to describe the spatial configurations of all the hotfloor departments in hospitals in detail. In this thesis, it makes more sense to analyze the connections between hotfloor departments and other medical departments, such as the outpatient clinics and inpatient wards.

The hotfloor comprises a cluster of departments that outpatients, acute patients, and inpatients usually visit in their first and follow-up patient journeys. From the perspective of patients, the urgency and frequency of their visits to these departments are two main indicators that best describe these connections. In life-threatening situations, these visits are extremely urgent; when they are frequently repeated they demonstrated how close the daily connections are between departments.

As illustrated in Table 4.6, EDs have the largest number of urgent connections with departments for diagnosis, departments for intervention, and departments for treatment in the hotfloor. Short and fast connections are essential. While the connections between inpatient wards and the hotfloor departments are less urgent. Outpatient clinics usually have the least urgent connections with the hotfloor. On the other hand, the ICU is likely to receive the most patients with life-threatening symptoms among hotfloor departments, while the Radiology Department where diagnoses take place, and the Operating Theater where interventions take place, rank second in this respect.

TABLE 4.6 Urgency analysis between hotfloor departments and other medical departments

		Inpatient Ward					Outpatient Clinic	Emergency Department
		Internal Medicine	Surgery	Orthopedics	Gynecology	Pediatrics		
Departments for diagnosis	Nuclear Medicine	◘	◘	○	◘	◘	●	○
	Clinical Laboratory	◘	◘	◘	◘	◘	○	●
	Radiology	◘	◘	●	◘	◘	●	●
Departments for intervention	Operating Theater	○	●	●	●	●	○	●
	Delivery Room	○	○	○	●	●	○	●
Departments for treatment	ICU	●	●	●	●	●	○	●
	Rehabilitation	◘	◘	◘	○	○	◘	○
	Radiotherapy	○	○	○	○	○	◘	○

● *Urgent* ◘ *A little urgent* ○ *Not urgent*
(Adapted from Luo, 2010:24)

Moreover, EDs also have the most frequent interactions with hotfloor departments. The inpatient departments of Surgery, Gynecology & Obstetrics, and Pediatrics have nearly the same need for frequent connections with the hotfloor departments as EDs, while the Internal Medicine Wards and outpatient clinics require less assistance from hotfloor departments. It is worth noting that the Radiology Department, diagnosis-related and visited by outpatients, acute patients and inpatients, turns out to be the busiest department in the hotfloor. The Clinical Laboratory is also one of the busiest departments even though fewer patients visit it, because samples from inpatients are delivered by nurses instead of acute patients themselves (Table 4.7) (Note, however, that even though many books and journal papers in China have cited Table 4.6 and Table 4.7, none of them mention the data and research methodology, so it is difficult to verify whether the results of these two tables are accurate.)

In practice, many hospitals have opted to position the departments for diagnosis near the ED and outpatient clinics, while departments for intervention are often placed next to inpatient wards, but with a fast track for acute patients' delivery from the ED. Moreover, departments for treatment are best located near inpatient wards.

TABLE 4.7 Frequency analysis between hotfloor departments and other medical departments

		Inpatient Ward					Outpatient Clinic	Emergency Department
		Internal Medicine	Surgery	Orthopedics	Gynecology	Pediatrics		
Departments for diagnosis	Nuclear Medicine	◘	◘	◘	◘	¤	¤	¤
	Clinical Laboratory	●	●	●	●	●	●	●
	Radiology	●	●	●	●	●	●	●
Departments for intervention	Operating Theater	○	●	●	●	◘	◘	●
	Delivery Room	○	¤	○	●	●	○	●
Departments for treatment	ICU	¤	◘	◘	◘	¤	○	●
	Rehabilitation	◘	◘	●	○	◘	◘	○
	Radiotherapy	◘	○	○	○	¤	◘	○

● *High strength & frequent* ◘ *Frequent* ¤ *Incoherence* ○ *Seldom*
(Adapted from Luo, 2010:24)

4.3 Patient journey mapping

4.3.1 Introduction of patient journey mapping

Patient journey mapping is a research method that creates a visual overview of the geography of patient journeys. It often results in what has been referred to as the Spaghetti diagram (NHS, 2010: 109). Unlike conventional process mapping, which tries to eliminate duplication and superfluous variations, and contrary to value stream mapping, which only considers what adds value for patients (NHS, 2010:95&101), this study focuses on spatial bottlenecks and constraints that are relevant to the overall process of the patient journey. To some extent, patient journey mapping objectively reflects the experience of patients when they visit hospitals. With the help of patient journey mapping, clear spatial pathways of patients can be visualized easily, exposing inefficient layouts, long distances between various processes, and uncomfortable environments for long waiting times.

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4.3.2 Outpatient journey mapping

4.3.2.1 Spatial pathways of outpatient journeys in a hospital

The spatial pathways of outpatient journeys are linear. There are four areas that outpatients normally cover in their first and subsequent visits (Figure 4.8):

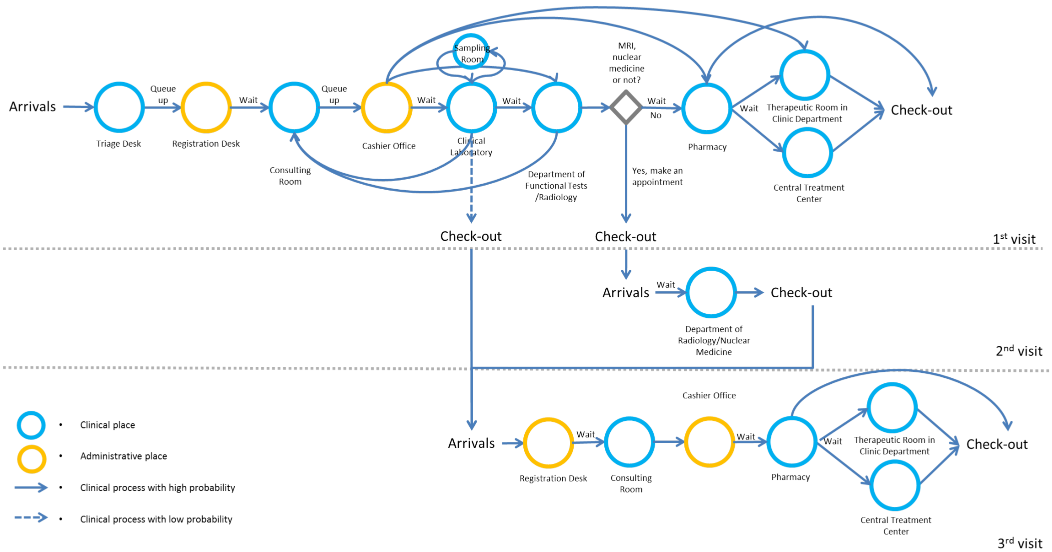

FIG. 4.8 Outpatient journey mapping

Area 1: Public area in outpatient clinics

When an outpatient enters a hospital for the first time, he/she first sees a nurse at the triage desk who determines which outpatient department in the clinic should be visited. These decisions are based on observation and the outpatient's description of his or her symptoms. Then the patient queues up and registers at a registration station. The triage desk and registration station are usually located in the entrance hall of a hospital. After consultation, the outpatient normally visits the public areas again to pay the bill at the cashiers and get medicine from the clinical pharmacy. Cashiers are distributed on certain floors or each floor, and often outpatients have to stand in the queue. The clinical pharmacy is located in the entrance hall because it is normally the last stop of an outpatient visit before leaving.

Area 2: Consulting area in outpatient clinics

After registration, the patient goes to the waiting area in the designated department in the outpatient clinics. Then he/she sees a doctor in a consulting room. The patient might visit the doctor again for a second diagnosis later on the same day, or another day.

Area 3: Departments for diagnosis in the hotfloor

If the doctor requires the results of clinical check-ups, functional tests, or imageing to arrive at a proper diagnosis, the outpatient has to visit departments for diagnosis in the hotfloor, such as Radiology Department, Clinical Laboratory, Ultrasonography Department, and etc. For some clinical check-ups, outpatients collect samples in sampling rooms near the Clinical Laboratory, while outpatients from the Departments of ENT or Gynecology & Obstetrics go back to the examining rooms to get their test samples which have been collected by doctors during the consultation.

Area 4: Clinical treatment area in outpatient clinics

If treatment is required, outpatients go to the clinical treatment area, which is either located next to the consulting area in the same outpatient department, or separated from it, but with a direct connection with the main public areas in outpatient clinics.

4.3.2.2 The gap between the experiences of outpatient journeys and outpatient needs

Based on the analysis of outpatient satisfaction in outpatient journeys in Section 3.4.1 and Figure 3.20, the weight of complaints on each aspect is more or less the same. Apart from complaints about the costs, a common point in the outpatient complaints is the complexity of procedures, long waiting times, queuing, and the long distances that need to be covered between processes. In addition, outpatients feel strongly about the lack of infrastructure and the uncomfortable environment. All these issues lead to a bad patient experience.

From the perspective of architecture, the spatial structure, the spatial relationship between various processes, and the signage system can be optimized so as to reduce the complexity of procedures and shorten the distance of patient movements.

Furthermore, even though long waiting times and queuing is directly related to human resources allocation, well-equipped and carefully designed public spaces are valuable because it makes people feel at ease.

4.3.3 Inpatient journey mapping

4.3.3.1 Spatial pathways of inpatient journeys

Compared to the outpatient pathways, the spatial pathways of inpatient journeys center on inpatient bedrooms. The spatial relationships in inpatient pathways are simple because there are only bidirectional connections between wards and any given area, unlike the linear connections in outpatient pathways. That is to say, wards are both the starting point and the end of every process. In general, there are three areas where inpatients stay throughout their journey (Figure 4.9).

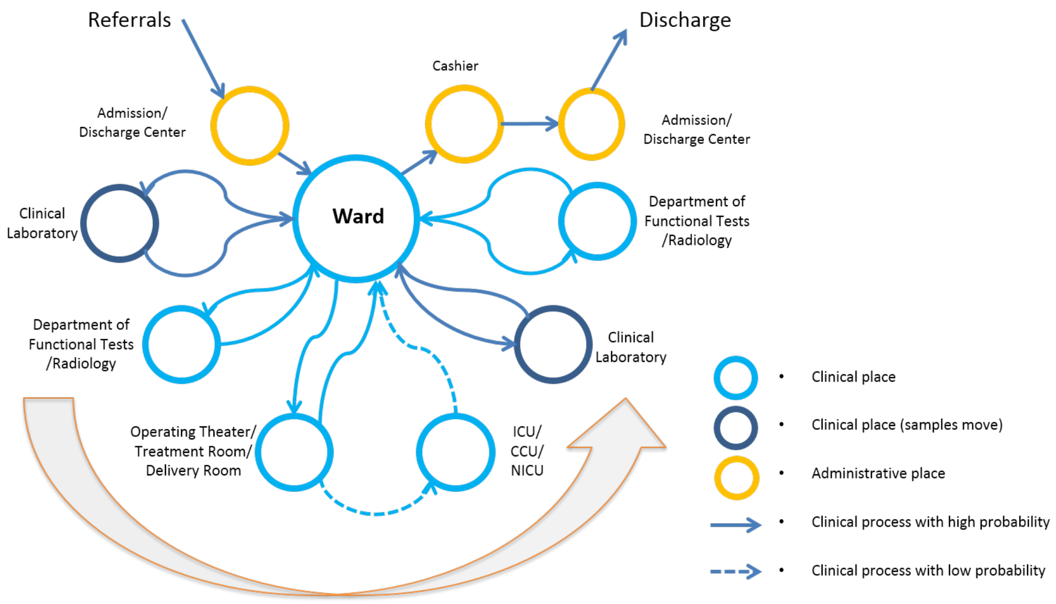

FIG. 4.9 Inpatient journey mapping

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Area 1: Public areas in the hospital

Inpatients are referred from the outpatient clinic or other hospitals if they need to stay in the hospital for a longer period of time. At the very beginning of a journey, inpatients are required to register at the admission desk; at the end of the journey, inpatients go to the cashier to pay the bill before being discharged. Both the admission desk and the cashier are located in the entrance hall of the hospital.

Area 2: Inpatient bedroom

Inpatient bedrooms are the place where inpatients live and bedside cure and care are administered by doctors and nurses. Inpatients spend most of the time staying in patient bedrooms.

Area 3: Departments for diagnosis, intervention, and treatment in hotfloor

Inpatients need to visit departments for diagnosis, intervention, and treatment in the hotfloor like the Ultrasound Department, the Radiology Department, and the Operating Theater. Inpatients are not involved in the interactions with the Clinical Laboratory as test samples are collected at the bedside and then are delivered to the Clinical Laboratory by nurses.

4.3.3.2 The gap between the experiences of inpatient journeys and inpatient needs

According to the assessment of patient satisfaction in inpatient journeys in Chapter 3, the first priority of inpatients is improved service; they wish for better food, and – more importantly – improved interactions between patients and other actors. Another priority on the list is the environment of the wards. The two top priorities (i.e. service and environment) prove that inpatients are sensitive to all aspects in the wards. On the other hand, few of them complain about function or procedures.

From the perspective of architecture, the environmental quality of wards has to be improved on the basis of the outcomes from evidence-based design (EBD), which include measures to improve patient experiences and reduce infection rates.

Inpatients should accommodate family members who want to stay in the wards, for instance. Moreover, social spaces in wards should be upgraded and have more facilities for socializing and leisure; this would encourage inpatients to leave their bedrooms and interact with other people.

4.3.4 Acute patient journey mapping

4.3.4.1 Spatial pathways of acute patient journeys in a hospital

After triage, the spatial pathways of acute patient journeys can be divided into two parts. If an acute patient meets the low acuity level criteria (i.e. Level 3 or Level 4), his/her spatial pathways are linear and are similar to the ones of outpatients. However, if an acute patient meets the high acuity level criteria (i.e. Level 1 or Level 2), his/her spatial pathways are also linear but significantly shorter. In other words, they visit fewer places in their journeys.

There are three core areas and three possible areas where acute patients commonly stay in their patient journeys (Figure 4.10).

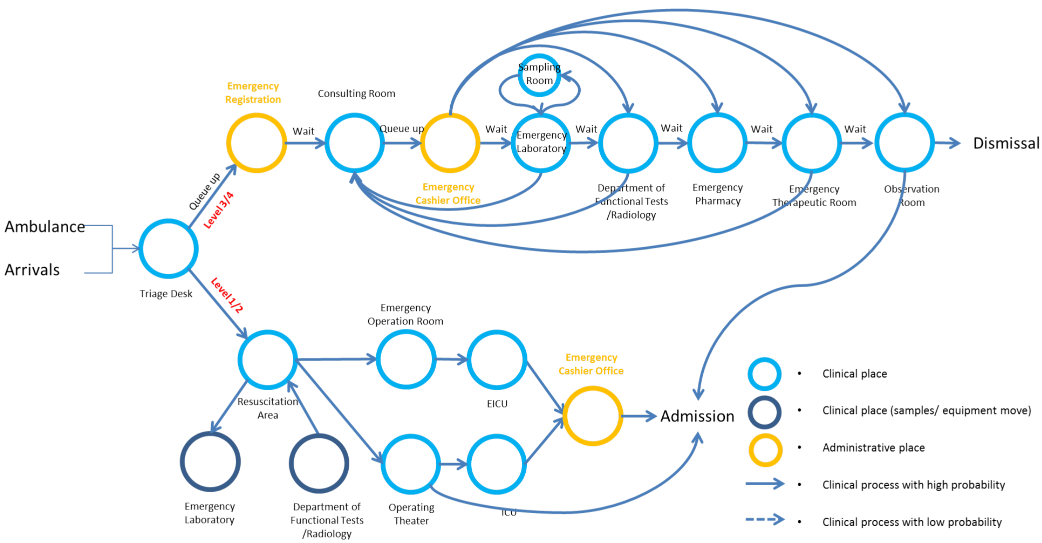

FIG. 4.10 Acute patient journey mapping

Core Area 1: First-aid area in ED

When an acute patient requires immediate life-saving interventions or is in danger of dying, he/she is immediately delivered to the resuscitation room. According to the status of the patient, the emergency operating room and the Emergency Intensive Ward (EICU) are where the patient is transferred to.

Core Area 2: Emergency area in ED

Acute patients with symptoms that are severe but not life-threatening are guided to the emergency area. There are no significant differences in the spatial pathways compared to the ones of outpatients. More often than not, these acute patients visit the consulting area, clinical treatment areas, etc. in the Emergency area.

Core Area 3: Shared public area in ED

Unlike the public areas in outpatient clinics, in the ED, there are labels with different colors on the ground or on the walls that point out to the nurses which patients are in the most critical condition. Red stands for the highest risks, yellow signifies a somewhat less critical condition, green means that the risks are relatively low. After triage, acute patients wait in a designated area.

Additional Area (optional): Departments for diagnosis, intervention, and treatment in the hotfloor

In small-scale general hospitals, it is not possible to arrange all the functional areas acute patients need in the Emergency Department. Acute patients might be delivered to the Radiology Department, the Central Operating Theater, or the ICU in the hotfloor, which requires emergency fast tracks.

4.3.4.2 The gap between the experiences of acute patient journeys and acute patient needs

In acute patient journeys, fast and effective medical procedures are more important than anything else, as has been stated in Section 3.4.4. The primary concern of acute patients is whether there are enough functional facilities – they are less interested in costs or the quality of the services. Only when acute patients (usually the ones who meet the low criteria) have to wait for a long time do they begin to care about the quality of the environment.

From the perspective of architecture, the most important thing is to shorten the distance acute patients have to cover between different steps in their journeys. This can be achieved by carefully planning the routes, and redistributing functional areas based on the medical processes in the Emergency Department. The main principle that defines spatial connections is the speed, and therefore the distance, between processes.

4.4 Discussion

As the gaps between the spatial pathways and patient needs are specific for different groups of patients, different measures can be taken from the perspective of architecture (Table 4.8).

TABLE 4.8 The aspects which can be improved from the perspective of architecture on the basis of patient journey

	The gaps between the spatial pathways and patient needs	The items which can be improved from the perspective of architecture
For outpatients	1. The complexity of procedures; 2. Long-time waiting or queuing; 3. Long-distance movement between processes; 4. The lack of infrastructure; 5. Uncomfortable environment.	1. Spatial structure of layouts; 2. Spatial relationship between processes; 3. Signage system; 4. Public space.
For inpatients	1. Poor service mainly concerning food as well as the interactions between patients and actors; 2. Noisy environment in wards.	1. Space for inpatients as well as accompanied family members 2. Public area in wards with more facilities for socializing and leisure.
For acute patients	1. The complexity of procedures; 2. Not enough functional facilities.	1. The distance an acute patient moves

5 Case studies and architectural strategies

Questions

1. What are the criteria for selecting cases?
2. How can the concept “patient journey” be applied in cases?
3. What can be improved in selected hospitals from an architectural perspective?

Purpose

This Chapter presents a quantitative analysis of patient journeys in outpatient clinics, inpatient departments, and Emergency Departments in two typical hospitals. Bottlenecks in procedures and patient experience are discussed in detail, followed by several architectural strategies to improve hospital performance.

Approaches

1. Case study
2. Data analysis
3. Patient journey walkthrough
4. Patient journey mapping
5. Semi-structured staff interviews
6. Questionnaire towards patients
7. Field observation

Findings

1. The way patient journeys influence hospital architecture;
2. Architectural strategies to improve patient journeys and the performance of hospitals.

Chapter 3 and Chapter 4 have already given a preliminary overview of patient journeys in Chinese hospitals. However, does the concept “patient journey” really work when it is actually applied to improve the performance of hospitals? This chapter aims to prove that it does. It does so by means of exploratory case studies.

5.1 The criteria for case selection

The principle of case selection is whether the selected cases represent the latest development of hospitals in China. This leads to the following set of criteria:

The representativeness on the aspect of hospital typology

Although Chinese hospitals show a rich architectural diversity, the number of types is quite limited. The statement in Section 4.1.1 has illustrated that today, both the village model and the Breitfuss type are popular. Nevertheless, the spatial distribution of these types shows that the village type is applied most often in rural areas and suburbs, whereas the high costs of the land make Breitfuss hospitals more appropriate in urban areas. Therefore, at least two cases had to be selected to represent the two architectural types.

The representativeness on the aspect of patient traffic system

The patient traffic system reflects the levels of patient-friendliness and efficiency in a hospital (Wagenaar and Mens, 2018:55). In general, there are two main patterns of flow in a patient traffic system. One of them is horizontal, which means that patients move on the same floor via corridors. The other is vertical, where patients move usually with the help of elevators and escalators. This results in vastly different patient flows. If a patient traffic system in a hospital prioritizes horizontal movement, corridors tend to be used to connect as many buildings as possible. On the contrary, if a patient traffic system values the vertical movement, traffic would revolve around several clusters of elevators and escalators. In order to test which flow pattern gives patients easier access to specific functional zones, this chapter is going to study two hospitals, one where patients mainly move horizontally, and the other where patients move vertically. Moreover, the hospital buildings selected include most of the main medical functions. Therefore, most patients can complete their patient journey in the same building.

A reflection of the latest achievements

In order to cover the latest achievements in medical science, building technology, social science, and psychology, the selected hospitals should have been built in recent years. This ensures that the latest ideas on the design and construction have been used.

5.2 Research methods

5.2.1 Methods used to study patient journeys in hospitals

5.2.1.1 Data and sources

The primary data for this part of the study were documented by Panyu Central Hospital and the 6th Affiliated Hospital of Sun Yat-sen University in 2017. The analysis distinguishes between three different groups of patients (i.e. outpatients, inpatients, and acute patients).

Based on the accessibility and completeness of the available data, 15 variables are formulated to analyze the outpatient journeys (Table 5.1), 14 variables for the analysis of inpatient journeys (Table 5.2), as well as 14 variables for the analysis of acute patient journeys (Table 5.3). The collection of data in this study had to cope with some lacunae: the selected variables do not cover all the points in a patient journey, such as nuclear medicine, radiotherapy, etc. This is a consequence of the fact that data are stored in different sub-systems of the Electronic Medical Record (EMR) System, which makes it hard to collect them.

TABLE 5.1 Descriptive variables for outpatient journeys recording

Variables	Description
Outpatient visits	The number of visits to outpatient clinics in 2017.
Department	The department a patient visited.
Registration time	The time that a patient registered.
Consultation time	The time that a doctor saved the patient's medical record, usually at the end of the consultation. (Case A: If a patient has a second diagnosis on the same day with the same doctor, the older data will be overwritten by the newer ones.) Case B: No data are recorded if a patient visits the same doctor several times on the same day.)
Payment time	The time that a patient paid.
Sampling time of clinical check-ups	The time that samples were taken from a patient.
Completion time of clinical check-ups	The time that reports came out.
Check-up items	The items being tested in the clinical check-ups.
Registration time for ultrasonography	The time that a patient reported himself/herself at the reception of the Ultrasonography Department.
Testing time of ultrasonography	The time that a patient finished the test.
Registration time for radiology	The time that a patient reported himself/herself at the reception of the Radiology Department.
Testing time of radiology	The time that a patient finished the test.
Completion time of radiology	The time that reports came out.
Radiology items	The items being tested in the Radiology Department.
Registration time for endoscopy (Case B only)	The time that a patient reported himself/herself at the reception of the Endoscopy Department.
Testing time of endoscopy (Case B only)	The time that a patient finished the test.
Completion time of endoscopy (Case B only)	The time that reports came out.

TABLE 5.2 Descriptive variables for inpatient journeys recording

Variables	Description
Inpatient visits	The number of all inpatient discharges in 2017.
Department when admission	The department a patient was admitted to.
Department when discharge	The department a patient was discharged.
Duration of hospitalization	The number of days a patient stayed in the hospital.
Date of surgery	The date a patient had a surgery.
Sampling time of clinical check-ups	The time that samples were taken from a patient.
Completion time of clinical check-ups	The time that reports came out.
Check-up items	The items being tested in the clinical check-ups.
Registration time for ultrasonography	The time that a patient reported himself/herself at the reception of the Ultrasonography Department.
Testing time of ultrasonography	The time that a patient finished the test.
Registration time for radiology	The time that a patient reported himself/herself at the reception of the Radiology Department.
Testing time of radiology	The time that a patient finished the test.
Completion time of radiology	The time that reports came out.
Radiology items	The items being tested in the Radiology Department.

TABLE 5.3 Descriptive variables for acute patient journeys recording

Variables	Description
Acute patient visits	The number of visits to the Emergency Department in 2017.
Registration time	The time that a patient registered.
Consultation time	The time that a doctor saved the patient's medical record, usually at the end of the consultation.
Payment time	The time that a patient paid.
Sampling time of clinical check-ups	The time that samples were taken from a patient.
Completion time of clinical check-ups	The time that reports came out.
Check-up items	The items being tested in the clinical check-ups.
Registration time for ultrasonography	The time that a patient reported himself/herself at the reception of the Ultrasonography Department.
Testing time of ultrasonography	The time that a patient finished the test.
Registration time for radiology	The time that a patient reported himself/herself at the reception of the Radiology Department.
Testing time of radiology	The time that a patient finished the test.
Completion time of radiology	The time that reports came out.
Radiology items	The items being tested in the Radiology Department.

5.2.1.2 Measures

Data selection

Following the methods explained in Section 3.3, first of all, departments of outpatient clinics and inpatient departments are listed separately according to the number of outpatient visits and inpatient discharges in 2017. Then the Top 5 departments are selected applying the Pareto principle. After that, the records of the patient visits in 2017 are collected on the basis of both stratified sampling and random sampling. The Emergency Department is an exception. The first two steps can be skipped and the records of acute patient visits are chosen at random.

Data management and the analysis of patient journeys

First of all, the data collected of the selected variables are entered into an Excel sheet. The excel data are then checked to ensure whether they represent entire patient journeys. With the use of qualified data, patient journeys are analyzed. Because of the limitations of the data, several measures are taken to correct the models of patient journeys, i.e. patient journey walkthrough analyses and semi-structured staff interviews.

Patient journey walkthrough

A patient journey walkthrough is a fieldwork rather than a simulation. The analysis of a patient journey walkthrough helps to gain insight into the overall procedure from a patient's perspective. There are two principles regarding this measure. First of all, a patient journey walkthrough shall be guided by experienced nurses in the selected hospitals. Secondly, the person conducting the walkthrough should try to put himself in the shoes of patients mentally (NHS, 2010: 79-80).

Semi-structured staff interviews

When there are some unclear points in the data analysis of patient journeys, semi-structured interviews with members of staff are conducted for clarification. Interviewees are chief nurses in wards or directors of outpatient clinics in the selected hospitals. Open-ended questions are used, some of which are prepared while the others are brought up during the interviews. In this way, not only the misunderstandings in the data analysis can be eliminated but also the stories hidden behind the data are uncovered.

Patient journey mapping

The patient journeys that emerge from the previous steps are mapped in lines on the floor plans. The width of the lines between two points represents the frequency of patient movements. Therefore, unnecessary movements and long-distance movements between key points are identified (NHS, 2010:109-110).

5.2.2 Methods used for the purpose of understanding patient experiences

5.2.2.1 Data and sources

The primary data for this purpose come from both the reports of patient satisfaction surveys conducted by Guangzhou Panyu Central Hospital, and patient questionnaires conducted in the 6th Affiliated Hospital of Sun Yat-sen University by Jun Guo (one of the author's colleagues) and the author.

Based on the literature review of nationwide patient satisfaction surveys (2013-now) in Section 3.4, the case studies pay attention to various aspects of patient dissatisfaction, especially on issues of functional processes, service, environment, and procedure. The issue of costs is excluded for the reason that architecture can do very little to solve this problem.

5.2.2.2 Measures

Report analysis

In Case A, quarterly comprehensive patient satisfaction surveys have been conducted by an independent third party. The reports of the surveys analyzed in this study were conducted in the first and second quarters of 2018.

In each survey, over 800 randomly selected outpatients and around 50 acute patients were asked to fill in a questionnaire at the pharmacy, near the cashiers, or in waiting areas of the hotfloor. Around 500 inpatients completed the questionnaire, too. What’s more, the surveys were conducted via telephone, interviewing 200 inpatients who had been discharged in the past few months.

Questionnaire survey

In Case B, the patient satisfaction surveys conducted by the hospital exclusively address specific services. Therefore, the author and Jun Guo conducted a complementary questionnaire survey of patient satisfaction with functional processes, environment, and procedure has been conducted by Jun Guo and the author as a supplement. The questionnaire has been conducted according to both Chinese laws and the regulations of SCUT. Besides 3 single-selection questions concerning background information of patients, multiple-choice questions (5-point scale (providing a scale ranging from 1, very positive to 5, very negative) and an open question were included in the questionnaire.

In outpatient clinics, 52 outpatients were asked by three volunteers in the waiting area in September 2017. In inpatient departments, 100 questionnaires were sent out and 87 valid questionnaires were collected.

Observation

With the analysis of the patient dissatisfaction from the report or the questionnaire, several observation points were determined. A further observation explored possible approaches to improving the patient experience. Both activities and facial expressions of patients were considered. The hospital gown is a characteristic marker to distinguish inpatients from outpatients and acute patients.

5.3 Case A

5.3.1 Case description

Panyu Central Hospital is the biggest general hospital in Panyu District, Guangzhou, which covers an area of around 147 hectares and has a built-up area of 235,000 square meters. The construction of the campus and the complex of main buildings were completed in 2009.

Hospital architecture

Thanks to the availability of land in this suburban area, the complex of main buildings of Panyu Central Hospital was designed according to the village model. The outpatient clinics, hotfloor departments, and the Emergency Department are located in four-story and five-story buildings at the front of the site; at the back three fifteen-story buildings for inpatient wards were added (Figure 5.1). This combination of low-rise buildings and high-rise buildings is quite common for the village type in China.

FIG. 5.1 Overview of the campus of Panyu Central Hospital
(Provided by the hospital)

Patient traffic system

To achieve greater coherence in the complex, an approximately 250-meter long and 15.7-meter wide internal street has been designed on the ground floor. Complementary corrodes connect all the buildings on the first four floors. The three high-rise inpatient wards are connected on the upper floors as well (Figure 5.2). Most of the patient journeys can be completed inside the complex except for the journeys of patients with infectious diseases.

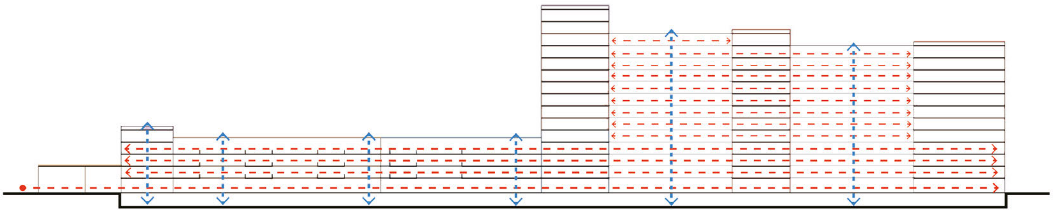

FIG. 5.2 Patient traffic system of Panyu Central Hospital
(Zhang, 2018: 98)

Latest achievements

When the construction of Panyu Central Hospital was completed in 2009, it was one of the best hospital complexes at that time in China in terms of energy-saving, wayfinding, healing environment, and access to public transportation. Furthermore, the hospital has kept on improving itself in the last nine years (e.g. Intelligent Pharmacy and the extensive use of Self-service Terminals) so as to catch up with the latest developments in the fields of medical science, information technology, social sciences, and psychology.

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5.3.2 **Outpatient journeys in the hospital**

5.3.2.1 Major outpatient journeys

At the facility level, the total number of outpatient visits was 2,354,960 in 2017. In other words, on average 6,500 outpatients visited the hospital per day. Table 5.4 shows that the number of outpatients to the Top 5 outpatient departments made up 71.91% of the total number of visits. Compared with China as a whole (Table 3.2), the Top 5 outpatient departments are the same, though their order slightly differs. Pediatrics and ENT ranked higher than the national average owing to the "Universal Two-child Policy" and the high incidence rate of ENT diseases in Guangdong Province.

In this case study, these Top 5 outpatient departments are considered representative. If the outpatient journeys of these departments can be improved, the overall outpatient experience in the hospital would be enhanced, too.

TABLE 5.4 Number of visits to major outpatient departments in Panyu Central Hospital in 2017

No.	Department	Number of visits	Percentage (%)
1	Internal Medicine	711,064	30.19
2	Pediatrics	383,357	16.28
3	Surgery	302,681	12.85
4	Gynecology	176,950	7.51
5	Ear, Nose and Throat (ENT)	119,459	5.07
6	Traditional Chinese Medicine (TCM)	113,442	4.82
7	Obstetrics	112,634	4.78
8	Ophthalmology	73,568	3.12
9	Dermatology	68,642	2.91
10	Stomatology	61,652	2.62
11	Infectious Disease	57,605	2.45
12	Rehabilitation	15,031	0.64
13	Psychiatry	14,172	0.60
14	Oncology	9,658	0.41
Top 5 departments		1,693,511	71.91
Top 10 departments		2,123,449	90.17
Total		2,354,960	100.00

(Data source: Panyu Central Hospital)

Over 200 outpatients from the Top 5 outpatient departments were selected at random. Among all these samples, 183 samples show valid data of the variables (Table 5.5). The invalidity is caused by either data missing or personal reasons. Accordingly, outpatient journeys of these Top 5 departments at one time are described as follows: (Table 5.6)

TABLE 5.5 Samples and valid samples

	Samples	Valid samples
Internal Medicine	53	44
Pediatrics	36	35
Surgery	38	31
Gynecology	35	33
ENT	40	40
Total number	202	183

TABLE 5.6 Major outpatient journeys in Panyu Central Hospital

Patient Journeys

Outpatient dept. Internal Medicine

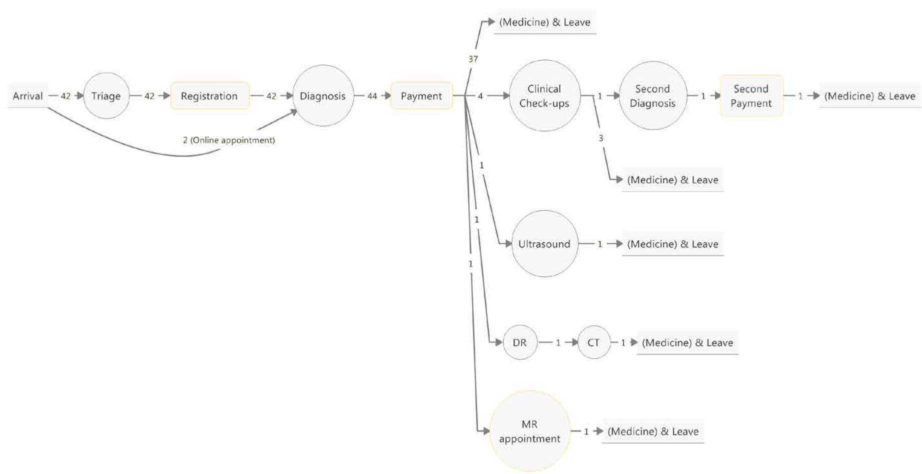

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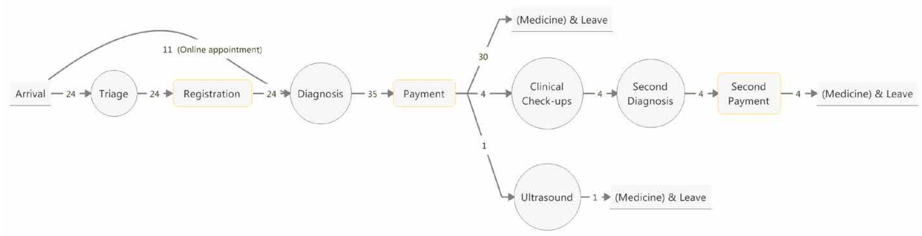
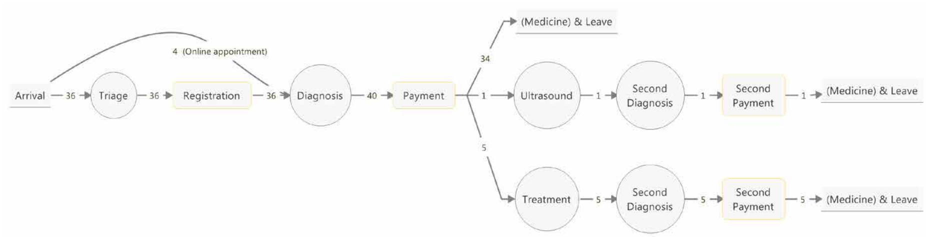
TABLE 5.6 Major outpatient journeys in Panyu Central Hospital

Patient Journeys

Outpatient dept. Pediatrics



Outpatient dept. ENT



Outpatient dept. Surgery

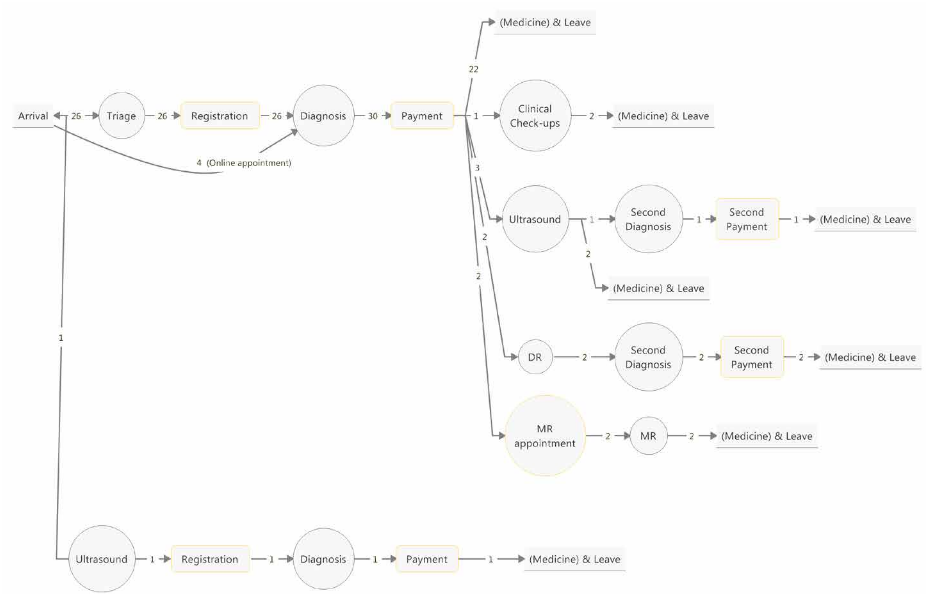
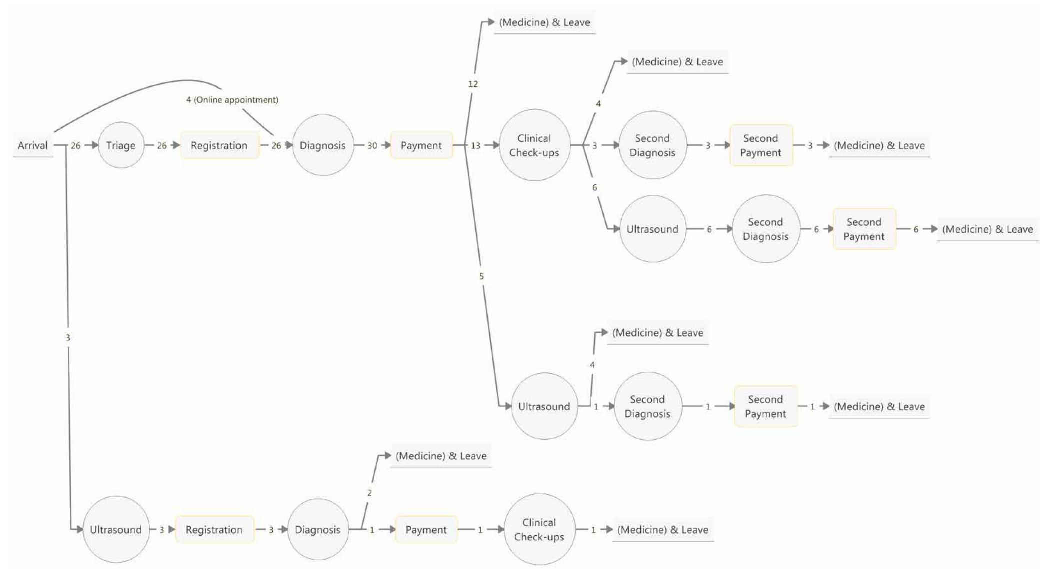


TABLE 5.6 Major outpatient journeys in Panyu Central Hospital

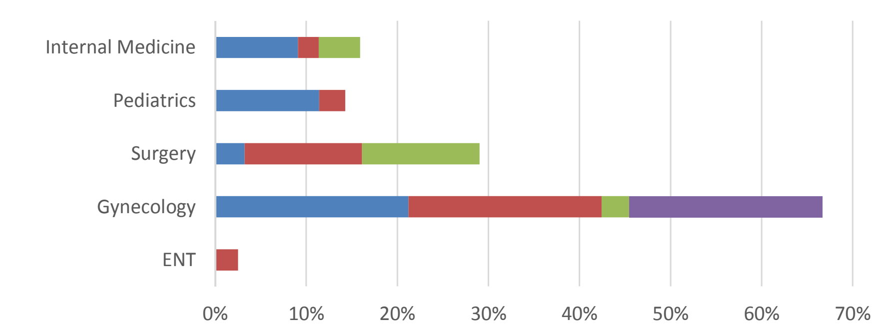
Patient Journeys

Outpatient dept. Gynecology



The clinical processes (i.e. triage, diagnosis, clinical check-ups, ultrasound tests, imaging, treatment, and pharmacy) and the administrative processes (i.e. registration, payment, and appointment) are normally included in an outpatient journey. The way to distinguish the patient journeys of an outpatient department from the others is by comparing the average number of clinical processes in the hotfloor and the frequency of follow-up diagnostic procedures on the same day.

The bar chart compares the average number of clinical processes in the hotfloor among the Top 5 outpatient departments in 2017 (Figure 5.3). It demonstrates that the requirements of clinical processes in outpatient journeys are different among departments. In the Departments of Internal Medicine and Pediatrics, 15% of the outpatients need clinical processes in the hotfloor. The percentage doubles in the Surgery Department (29%) and quadruples in the Gynecology Department (67%). On the contrary, of the Top 5 requirements, the ENT Department has the minimum requirement of clinical processes in the hotfloor. This leads to the conclusion that outpatients from the Departments of Gynecology and Surgery may have to stay longer in the hospital than other outpatients because they have to go through more clinical processes in their patient journeys.

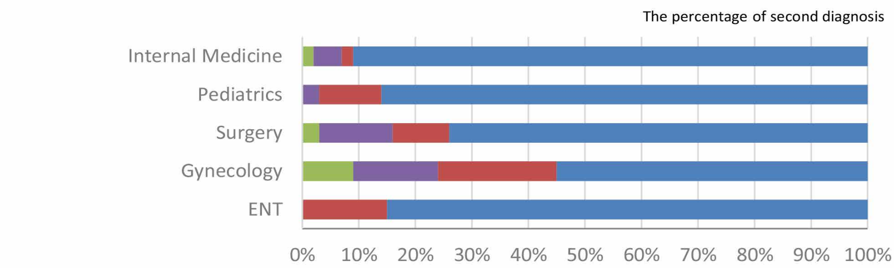


	ENT	Gynecology	Surgery	Pediatrics	Internal Medicine
Clinical check-ups	0%	21%	3%	11%	9%
B-ultrasound test	3%	21%	13%	3%	2%
Imaging	0%	3%	13%	0%	5%
Clinical check-ups + B-ultrasound test	0%	21%	0%	0%	0%

FIG. 5.3 The average number of clinical processes in hotfloor among outpatient departments

This statement is strongly underscored by the statistical analysis of the frequency of follow-up diagnostic procedures on the same day (Figure 5.4). It demonstrates that most of the outpatients including those who did not need second diagnoses and who saw their doctors again in the same half-day completed their patient journeys quite rapidly. 15% of the outpatients in the Gynecology Department and 13% in the Surgery Department had to visit the hospital again on another day to get the results of certain clinical check-ups like the cultivation of bacteria/viruses or take MRI tests.

However, 9% of the outpatients in the Gynecology Department, 3% in the Surgery Department, and 2% in the Internal Medicine Department had second diagnoses on the same day. According to the patient records, the reason for the delay of outpatients from the Departments of Gynecology and Surgery was the long waiting time for ultrasound tests; the reason for the delay of outpatients from the Internal Medicine Department was the need for a CT scan after a DR scan.



	ENT	Gynecology	Surgery	Pediatrics	Internal Medicine
Second diagnosis on the same day	0%	9%	3%	0%	2%
Second diagnosis on another day	0%	15%	13%	3%	5%
Second diagnosis within the same half day	15%	21%	10%	11%	2%
No follow-up diagnosis	85%	55%	74%	86%	91%

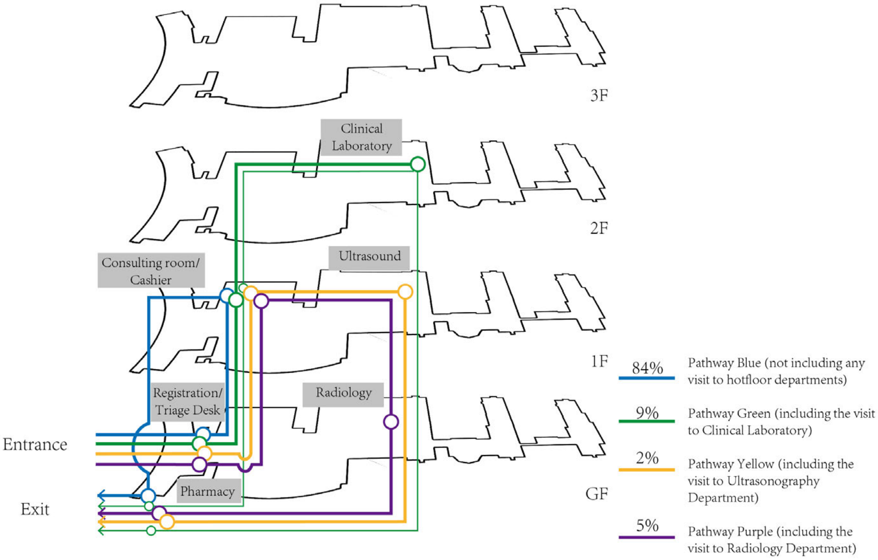
FIG. 5.4 The frequency of follow-up diagnostic procedures on the same day

To summarize, outpatients from the Departments of Gynecology, Surgery, and Internal Medicine stayed longer in Panyu Central Hospital as a consequence of having to go through more complicated clinical processes on the same day. Bearing these findings in mind, not only is it worthwhile to reconsider the clinical and administrative processes, but it also makes sense to analyze the experiences of outpatients, especially those from these three departments, so as to improve their patient journeys.

5.3.2.2 Major outpatient journeys mapping

For the purpose of visualization, the outpatient journeys of the Top 5 outpatient departments in Panyu Central Hospital are mapped on the floor plans (Table 5.7). As can be seen, all of the four areas which outpatients from the Top 5 departments have to visit are located on the first three floors (GF-2F) of the hospital buildings (Table 5.8). In many cases, the entrance hall is both the starting point and the endpoint of an outpatient journey because it contains the Triage Desk and the Main Registration Desk, where both the first clinical process and the first administrative process in a journey take place, as well as the Pharmacy, which is usually the last step before the outpatient leaves the hospital. Moreover, Registrations/Cashiers are evenly distributed throughout each floor so that patients can easily find one of them nearby in their patient journeys.

TABLE 5.7 Major outpatient journeys mapping in Panyu Central Hospital

<table>
<tr><th>Outpatient dept.</th><th>Patient Journeys Mapping</th></tr>
<tr><td>Internal Medicine</td><td>


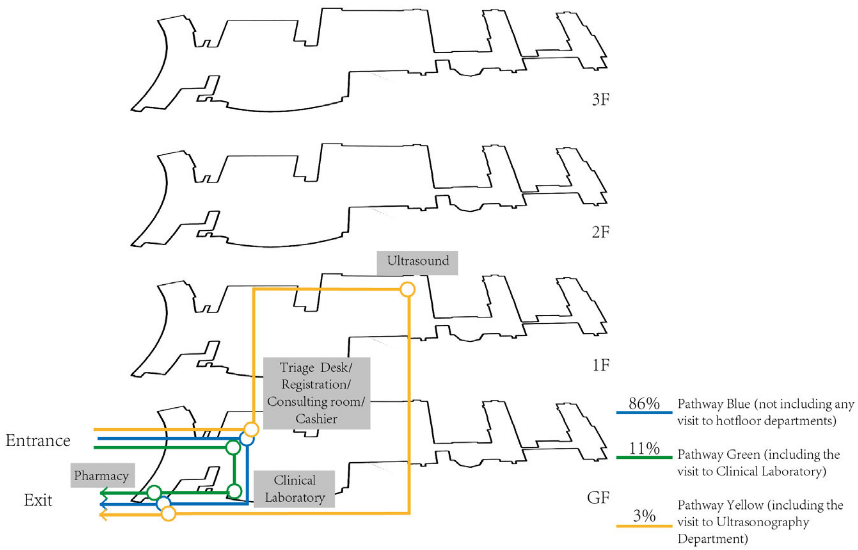
</td></tr>
<tr><td>Pediatrics</td><td>


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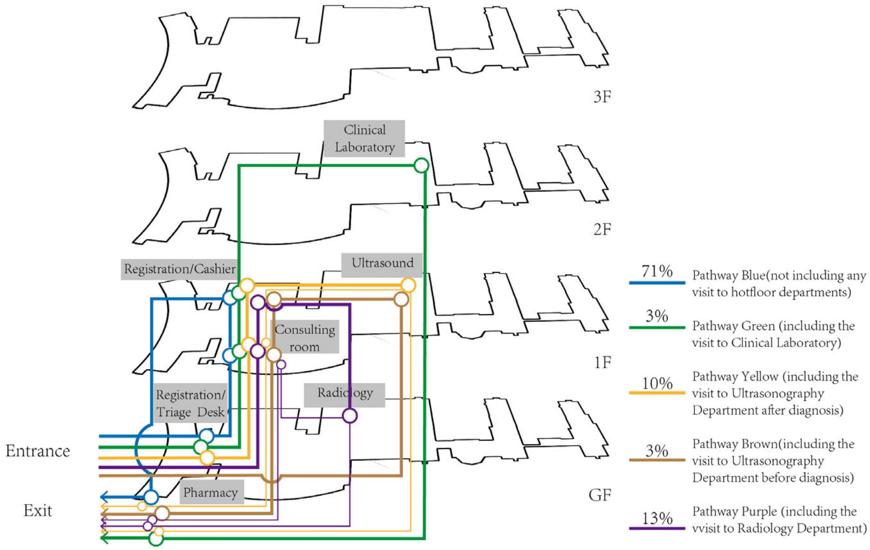
TABLE 5.7 Major outpatient journeys mapping in Panyu Central Hospital

<table>
<tr><th>Outpatient dept.</th><th>Patient Journeys Mapping</th></tr>
<tr><td>Surgery</td><td>


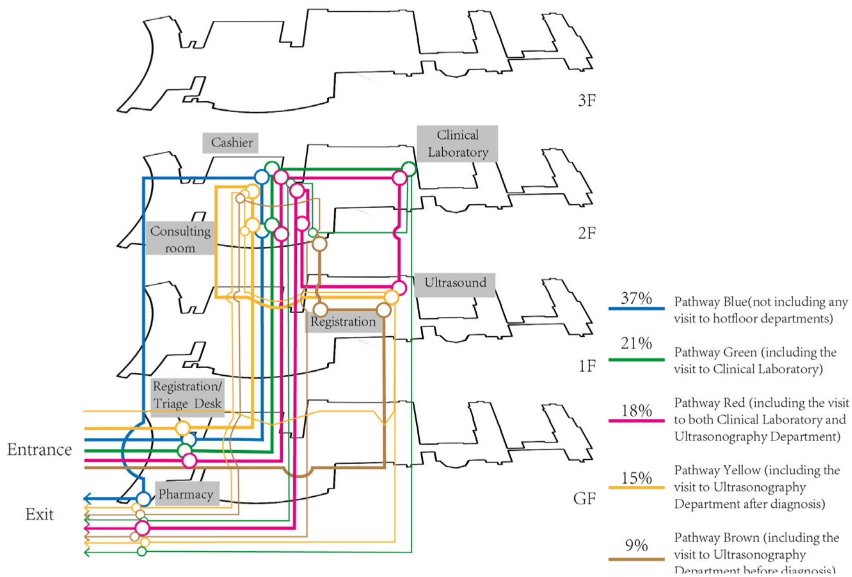
</td></tr>
<tr><td>Gynecology</td><td>


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TABLE 5.7 Major outpatient journeys mapping in Panyu Central Hospital

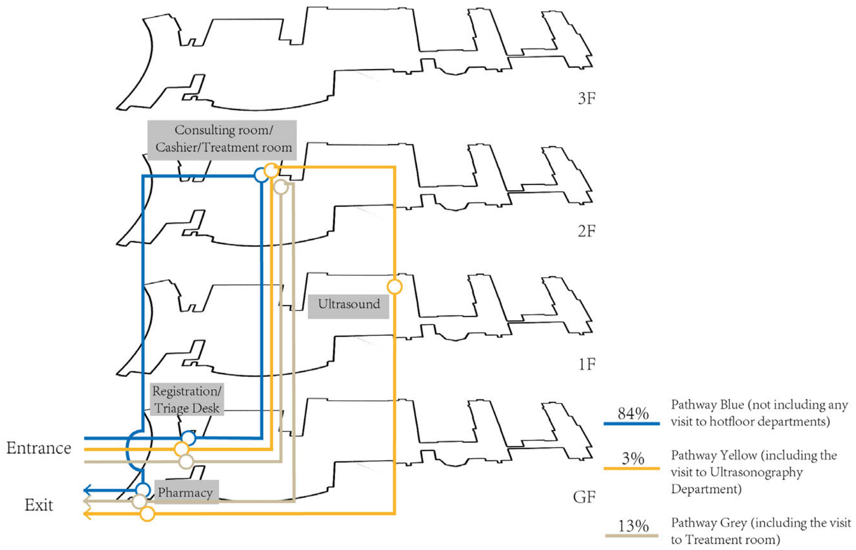
Outpatient dept.	Patient Journeys Mapping
ENT	

TABLE 5.8 Distribution of the areas where outpatients from the Top 5 departments visit

	Area 1: Public area	Area 2: Consulting area	Area 3: Hotfloor departments for diagnosis	Area 4: Clinical treatment area
2F	Registration/Cashier	Gynecology, ENT	Clinical Laboratory	Gynecology treatment room, ENT treatment room
1F	Registration/Cashier	Internal Medicine, Surgery	Ultrasonography	Surgery treatment room
GF	Triage Desk, Main Registration, Pharmacy	Pediatrics	Radiology, Emergency Clinical Laboratory	Central treatment center

Internal Medicine

The spatial pathways of outpatient journeys in the Internal Medicine Department indicate that outpatients who need clinical check-ups risk going through complicated journeys due to the need for a second diagnosis. Even so, most of them could finish the whole patient journey on the same half-day except for two patients, one whose results of clinical check-ups only became available the next day, while the other had to come again for an MRI test. However, the outpatient who had a DR test in the morning and a CT test in the afternoon stayed in the hospital for a whole day. His patient record shows that he did not have to wait long for the test, but a very long time for the results. He received a message when the results became available and could go wherever he liked while he was waiting.

Pediatrics

The spatial pathways of outpatient journeys in the Pediatrics Department are simple. Outpatients are allowed to have their blood samples taken in the Emergency Clinical Laboratory on the ground floor. Therefore, all the patient journeys including the ones requiring second diagnoses were completed on the same half-day except for one patient, who came to the hospital too late in the afternoon. Even though the ultrasound test could still be carried out, he had to return the next day for a second diagnosis.

Surgery

The complexity level of spatial pathways of outpatient journeys in the Surgery Department is moderate. Outpatients who take ultrasound tests or DR/MRI tests risk going through complicated journeys due to the second diagnosis. Nevertheless, DR tests take a short time, and for MRI tests appointments need to be made the day before. Therefore, outpatient journeys in the Surgery Department are likely to be completed on the same half-day. Only one patient in the sampling test had to stay in the hospital for a whole day because of the long-time waiting for an ultrasound test.

Gynecology

The spatial pathways of outpatient journeys in the Gynecology Department are the most complicated among the Top 5 departments. A large number of gynecological outpatients had to visit the Clinical Laboratory and/or the Ultrasonography Department, while only a few of them visited the Radiology Department. It is advisable to locate consulting rooms, cashier desks, and the Clinical Laboratory next to each other on the same floor because outpatients have to deliver the samples to the Clinical Laboratory themselves and can only do so after paying for them.

In addition, nearly half of the gynecological outpatients needed a second diagnosis while only 47% of them could complete it on the same half-day. In the sampling test, three patients stayed in the hospital for a whole day: one of them waited for the result of clinical check-ups while the other two waited for ultrasound tests. Whilst waiting for the results of clinical check-ups, patients can go everywhere they like; however, patients are expected to stay in the waiting area of the Ultrasonography Department, keeping track of the waiting list update on the screen. Some ultrasound tests require a full bladder, which prevents patients from wandering around.

ENT

The spatial pathways of outpatient journeys in the ENT Department are simple. All patient journeys, including the ones that required a second diagnosis, were completed within the same half-day.

The maps show the complexity of the pathways of outpatient journeys in the Top 5 outpatient departments:

1 There are five pathways in the Gynecology Department. Most of them are complicated owing to the high rate of second diagnosis on the same day. Moreover, as a consequence of the balanced number of patients (from 9% to 37%) following each pathway, all the five pathways have to be treated equitably.

2 The Surgery Department and the Internal Medicine Department have five pathways and four pathways respectively, Pathway Blue is more or less generic (i.e. 71% in the Surgery Department and 84% in the Internal Medicine Department).

3 The Departments of Pediatrics and ENT only have three simple pathways respectively, Pathway Blue is more popular than the other two, too. The rate of second diagnosis is low in all pathways.

5.3.2.3 Experience of outpatients during their journeys

Throughout the entire patient journeys of the Top 5 outpatient departments, there are five key points in major processes where outpatients have to wait or queue up. The patient traffic system connects various areas mainly in a horizontal way.

A) Key points

Registration

Outpatients do not have to visit the registration area at the very beginning of their journeys if they have made appointments before they arrive. Outpatients can also drop in without appointments, but they are required to register first. The bar chart compares the appointment rates of the Top 5 outpatient departments in the sampling test according to the data in 2017 (Figure 5.5). It suggests that the average appointment rate was quite low in Panyu Central Hospital, especially in the Internal Medicine Department, whereas with an appointment rate of over 30%, the Pediatrics Department was an exception. That is to say, one-third of the pediatric outpatients could go to the consulting area directly, while most of the outpatients from the other four departments had to register before seeing a doctor. However, since registration stations and self-service terminals are distributed on each floor of the outpatient clinics, outpatients can easily complete the process in 5 minutes without waiting or queueing (Figure 5.6).

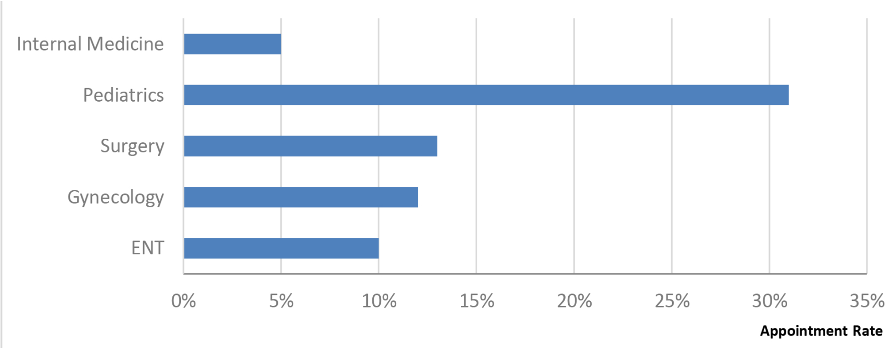


FIG. 5.5 Outpatient appointment rate in the sampling test

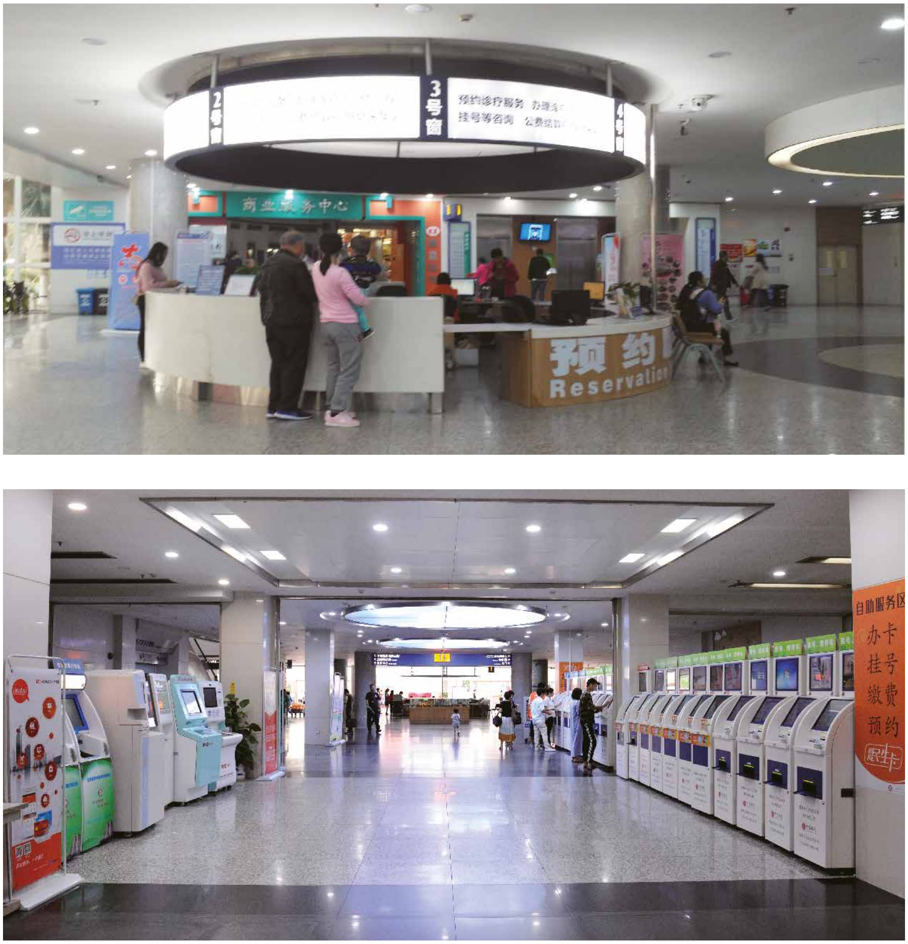


FIG. 5.6 Registration area near the entrance hall (Top: Main registration station; Bottom: Self-service machine) *(Provided by Panyu Central Hospital)*

In the reports of patient satisfaction surveys conducted by the hospital, what outpatients appreciated most in terms of procedures were the various ways of registration (Ark Marketing Consulting, 2018:32; Ark Marketing Consulting, 2018a:16). Outpatients are allowed to register seven days before diagnoses via telephone, official website, or apps outside the hospital, or via self-service machine or registration stations inside the hospital. Nevertheless, the staff of the registration stations received a lower score in comparison with other staff on the aspect of service. Outpatients expected friendlier explanations and clearer answers when asking for directions (Ark Marketing Consulting, 2018:13; Ark Marketing Consulting, 2018a:16).

Waiting area in the consulting area

All outpatient departments have a general waiting area for patients (Area 1). No matter for which outpatient department they come to, that is where outpatients usually stay before seeing doctors. When their names appear on the screen, they are permitted to proceed to the next waiting area (Area 2), after having their medical records and registration receipts checked at the nursing station. Outpatients can easily find seats in the general waiting, even during rush hours in the morning (Figure 5.7). They chat quietly in small groups, watch TV, or are absorbed by their mobile devices. Drinking water is provided. In the Pediatrics Department, the general waiting area is decorated with 3D cartoon drawings on the walls and the ground, which serves as a joyful, soothing haven for children. Sometimes, staff would appear in cartoon costumes to entertain the kids (Figure 5.8).

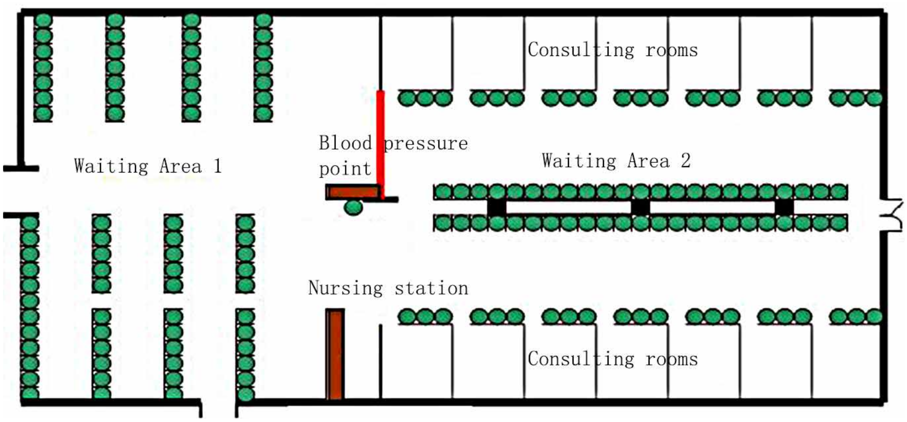


FIG. 5.7 Waiting areas in an outpatient department (Adapted from the hospital website: http://www.pyhospital.com.cn/show_list.php?id=71)

FIG. 5.8 Decoration and activities in the waiting area 1 of the Pediatrics Department (Top: Photo by the author; Bottom: Provided by Panyu Central Hospital)

Based on the reports of the patient satisfaction surveys, patients had no complaints in terms of functional processes, service, and environment. Instead, they were dissatisfied with the long waiting times. Of all the places where outpatients had to wait, the dissatisfaction rate was highest in the waiting area in the consulting area (A.M.Consulting, 2018:15; A.M.Consulting, 2018a:18).

Cashier

In this hospital, the cashiers and registration stations are combined. In other words, the cashiers are also distributed on each floor of the outpatient clinics. Moreover, outpatients can pay the bills by mobile phone or at self-service terminals. However, many outpatients are only reimbursed by the medical insurance fund only when they pay at the cashiers. For this reason, most of the outpatients queued up at the cashiers. After following 254 outpatients in June 2018, the hospital found that less than 40% outpatients could complete this process in 10 minutes while it took over 50% outpatients 10 to 30 minutes. This result is confirmed by the Patient Satisfaction Surveys, which show that the cashier/registration station usually gets the lowest score on the aspect of service (Ark Marketing Consulting, 2018:13; Ark Marketing Consulting, 2018a:16). This situation has improved since October 2018. Outpatients can receive reimbursement not only when paying at the cashiers, but also via mobile phone or at self-service terminals.

Waiting area in hotfloor departments

There is one waiting area in each hotfloor department, where outpatients usually find seats after check-in at the nursing station. But the purpose of waiting varies among the departments.

According to the statistical analysis, a large number of outpatients who were seen in the Clinical Laboratory were from the Departments of Internal Medicine, Gynecology, and Obstetrics (Figure 5.9). They do not have to wait in the Clinical Laboratory after having handed in the samples of tests. And it takes only a few minutes waiting for blood drawing. In fact, most of them wait for the results. Only few patients stay in the waiting area of the Clinical Laboratory because they can receive the results via mobile phone and print them using the self-service machines.

In the Ultrasonography Department, over 70% of the outpatients were from the Departments of Gynecology and Obstetrics (Figure 5.9). They wait for tests. As a consequence of the full-bladder requirement for some gynecological tests, outpatients always stay in the waiting area, which is crowded all the time.

In the Radiology Department, outpatients often came from the Departments of Internal Medicine, Surgery, and Stomatology (Figure 5.9). They wait for both tests and results. It usually takes less than an hour, except for MRI tests which require appointments the day before. Patients prefer to stay in the waiting area when waiting for tests, but like to walk around when waiting for results.

Based on the reports of patient satisfaction surveys conducted in the first two quarters in 2018, outpatients had the second and third largest number of complaints on the aspect of procedure, namely the long waiting times (A.M.Consulting, 2018:15; A.M.Consulting, 2018a:18). Based on the field observation, this unpleasant experience is likely to be caused by the departments which need patients to wait for tests, such as the Ultrasonography Department and the Radiology Department.

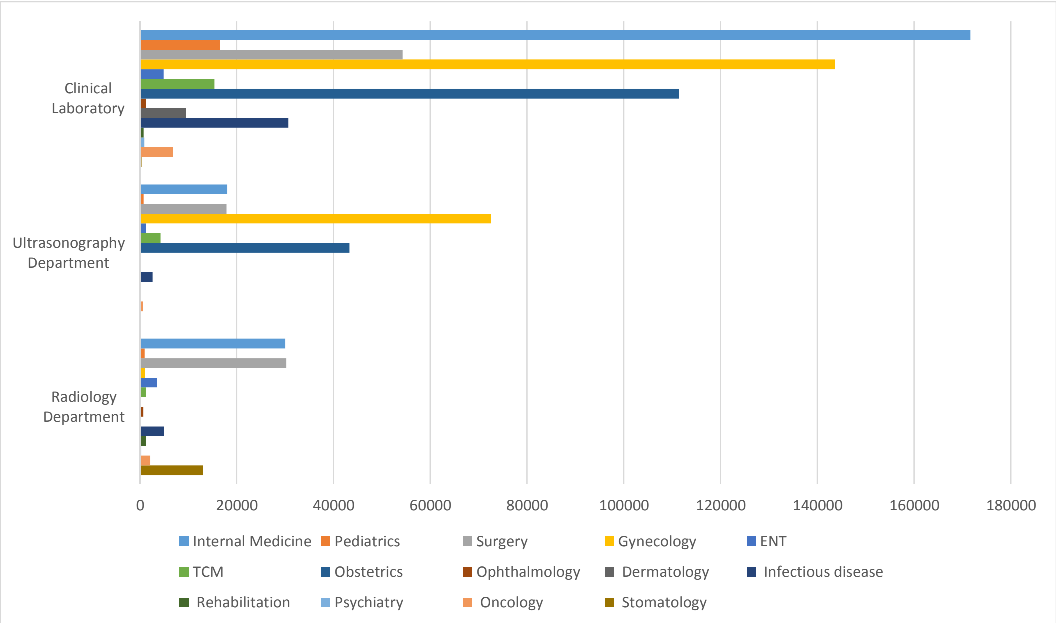


FIG. 5.9 The gross number of outpatient visits to the major hotfloor departments in 2017
(Data source: Panyu Central Hospital)

Waiting area of the Pharmacy

There used to be five rows of chairs in the waiting area of the Pharmacy, but one row is enough now owing to the introduction of the auto-dispensing system in October 2017 (Figure 5.10).

FIG. 5.10 The waiting area of Pharmacy (Top: before the renovation; Bottom: after the renovation) *(Provided by Panyu Central Hospital)*

After checking in at the terminal located at the entrance of the Pharmacy, outpatients can find their names on the screen that shows at which windows they can pick up their medicine. The process takes around 3-5 minutes, as opposed to more than 10 minutes before (Kingdee, 2017: website). As a result, few patients stay in the waiting area of the Pharmacy, and the rate of patient satisfaction is high on the aspects of both service and procedure (Ark Marketing Consulting, 2018:13,15; Ark Marketing Consulting, 2018a:16,18).

B) Patient traffic system and wayfinding

One escalator, three groups of elevators, and four staircases located along the 150-meter internal street of the outpatient clinics, constitute the main structure of the outpatient traffic system (Figure 5.11). As illustrated in the outpatient journey mapping, all patient movements take place on the first three floors. Outpatients are able to complete the clinical process of diagnosis and the administrative process of payment and even some tests on the same floor. In addition, the three most popular hotfloor departments are located in the same position on each floor where a group of elevators and a staircase are nearby. Consequently, outpatients can easily reach them in a short time. According to the observation, the waiting time for elevators in the outpatient clinics is short. This situation is also proved by the results of Patient Satisfaction Surveys. Outpatients complained neither about the waiting time for elevators nor about the distribution of departments (Ark Marketing Consulting, 2018:15,18; Ark Marketing Consulting, 2018a:18,22).

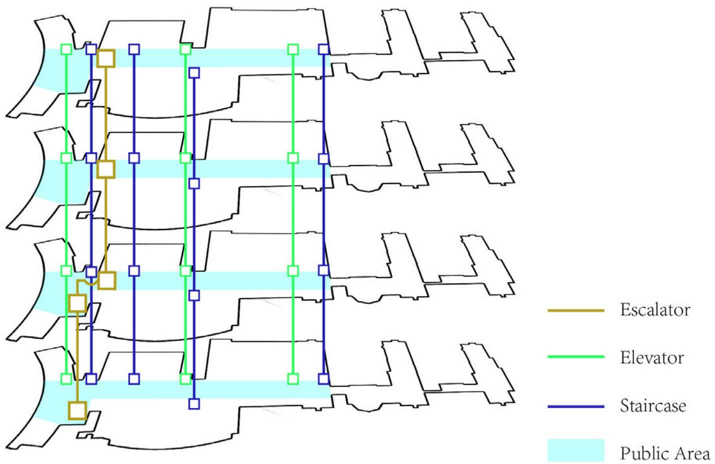


FIG. 5.11 Patient traffic system in the outpatient clinics

In the outpatient clinics and those parts of the hotfloor visited by outpatients, a signage and orientation system for wayfinding has been designed in the very beginning. The main area is divided into 9 zones on each floor. With both the floor number and zone number, outpatients are expected to find their destinations easily. However, even though the signs of zones are three-dimensional and can be recognized far away, there are still complaints on wayfinding (Ark Marketing Consulting, 2018a:23).

5.3.3 Inpatient journeys in the hospital

5.3.3.1 Major inpatient journeys

At the facility level, the total number of inpatient discharges was 59,056 in 2017. Table 5.9 shows that the number of discharges in the Top 5 inpatient departments accounted for 81.34% of the total number and 95.46% in the Top 10 departments. Compared to the national statistics (Table 3.4), the weighting of the Departments of Gynecology & Obstetrics was twice the national average and the Surgery Department was 10% higher.

Even though the inpatient departments in Panyu Central Hospital are subdivided into wards which are distributed in three buildings, all wards belonging to the same inpatient department share similar clinical processes as well as administrative processes. Therefore, these Top 5 inpatient departments are considered representative. If the inpatient journeys of these departments could be improved, the overall inpatient experience in the hospital would be enhanced, too.

Approximately 130 medical records of inpatients from the Top 5 inpatient departments in 2017 were collected randomly; 96% of the data were valid (Table 5.10). The invalidity of some sets was caused by missing. Accordingly, the inpatient journeys of these Top 5 departments can be described as follows (Table 5.11):

The Top 5 inpatient departments share similar clinical processes and administrative processes. The way to distinguish patient journeys among departments is to compare the Average Length of Stay (ALOS) and the average number of clinical processes in the hotfloor.

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The bar chart compares the average number of clinical processes in the hotfloor among the Top 5 inpatient departments in the sampling test in 2017, including ultrasound test, imaging, and surgery where inpatients have to visit the hotfloor departments themselves (Figure 5.12). Clinical check-ups are excluded because the samples are taken bedside and delivered to Clinical Laboratory by nurses. It shows that on average, inpatients from the Departments of Surgery and Internal Medicine had the highest average number of clinical processes in the hotfloor, while the parturient women from the Obstetrics Department had the lowest average number, but 90% of whom went to operation/delivery rooms to give birth. On the contrary, inpatients from Pediatrics seldom required surgeries.

TABLE 5.9 Number of discharges in major inpatient departments in Panyu Central Hospital in 2017

No.	Department	Number of visits	Percentage (%)
1	Surgery	15538	26.31
2	Internal Medicine	15103	25.57
3	Obstetrics	6448	10.92
4	Pediatrics	5508	9.33
5	Gynecology	5437	9.21
6	Oncology	2280	3.86
7	ENT	2170	3.67
8	Communicable Disease	1591	2.69
9	Ophthalmology	1213	2.05
10	Rehabilitation	1088	1.84
11	Comprehensive	843	1.43
12	Intervention	827	1.40
13	ICU	589	1.00
14	Stomatology	388	0.66
15	Nuclear Medicine	33	0.06
Top 5 departments		48,034	81.34
Top 10 departments		56,376	95.46
Total		59,056	100

(Data source: Panyu Central Hospital)

TABLE 5.10 Samples and valid samples

	Samples	Valid samples
Surgery	40	38
Internal Medicine	50	47
Obstetrics	10	10
Pediatrics	10	10
Gynecology	20	20
Total number	130	125

TABLE 5.11 Major inpatient journeys in Panyu Central Hospital

Patient Journeys

Inpatient dept. Surgery

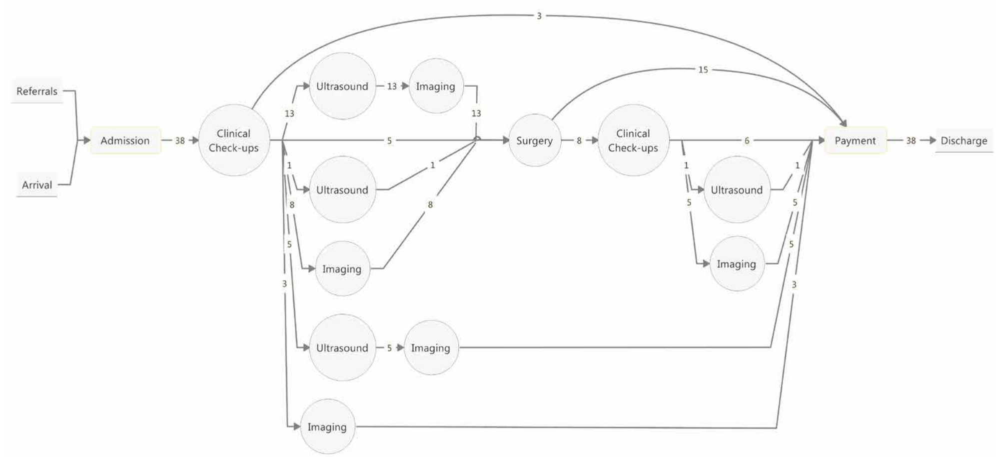

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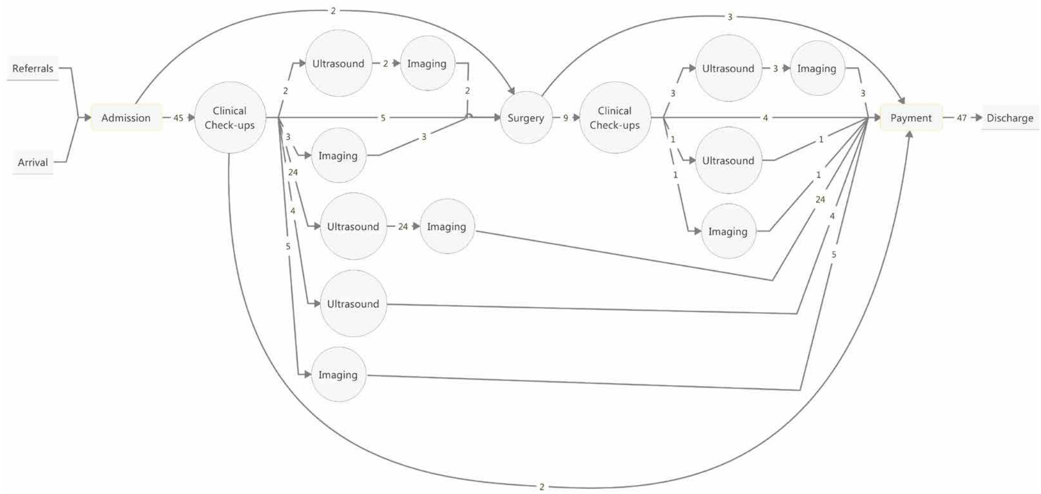
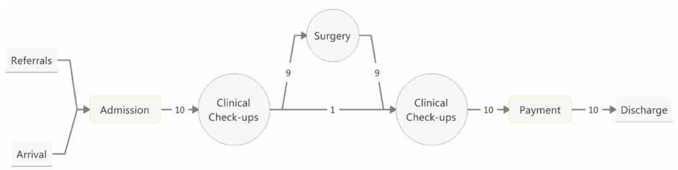
TABLE 5.11 Major inpatient journeys in Panyu Central Hospital

Patient Journeys

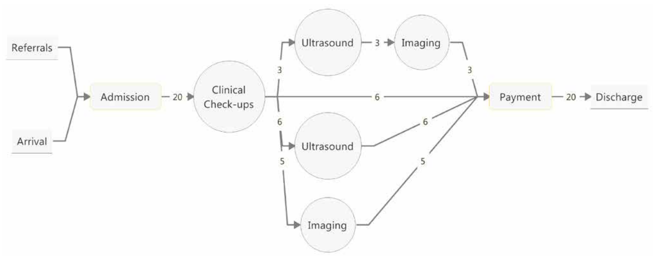
Inpatient dept. Internal Medicine



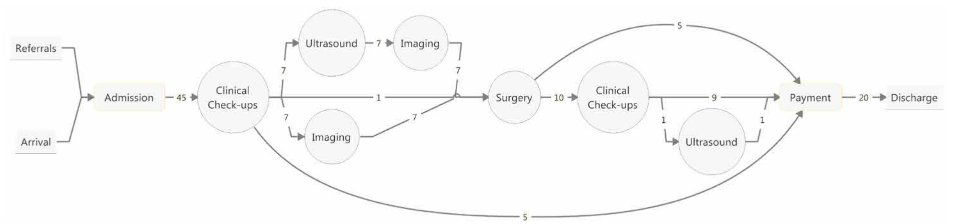
Inpatient dept. Obstetrics

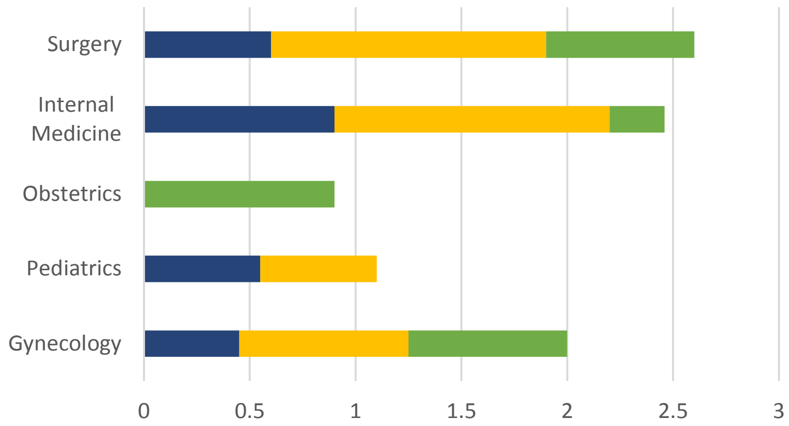


Inpatient dept. Pediatrics



Inpatient dept. Gynecology





	Gynecology	Pediatrics	Obstetrics	Internal Medicine	Surgery
Ultrasound test rate	0.45	0.55	0	0.9	0.6
Imaging test rate	0.8	0.55	0	1.3	1.3
Surgery rate	0.75	0	0.9	0.26	0.7

FIG. 5.12 The average number of clinical processes in hotfloor among inpatient departments

Combining the average number of clinical processes in the hotfloor with the data of Average Length of Stay (ALOS), it was found that even though the Internal Medicine Department had great needs of clinical processes in the hotfloor, the load of its inpatients per hospitalization day was lighter than that from the Surgery Department. Inpatients from the Departments of Obstetrics and Pediatrics had the lightest load per hospitalization day, which implies that they may have more leisure time during their stay in the hospital (Figure 5.13).

In Panyu Central Hospital, inpatient departments are subdivided into several wards that are distributed in different buildings. Even in the same inpatient department, the number of clinical processes differed. Take the Surgery Department as an example. The department includes Wards of Urology, Thyroid Breast Surgery, and General Surgery, which had a similar need for ultrasound tests and surgeries, but the distinct need for imageing test. The number of imaging tests in the Thyroid Breast Surgery Ward was only a quarter of the ones in the Urology Ward (Figure 5.14). The Internal Medicine Department includes the Wards of Endocrinology, Pulmonary Medicine, Neurological Medicine, Cardiovascular, and Digestive Internal Medicine.

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The operation theater is rarely visited by inpatients from the Neurological Medicine Ward, but more often by inpatients from the Digestive Internal Medicine Ward. However, the Digestive Internal Medicine Ward had the lowest number of clinical processes in total, and also the lowest need for ultrasound tests among the wards in the Internal Medicine Department (Figure 5.15). The Pediatrics Department rarely required surgeries, and it seems that the Neonatology Ward had much more connections with the Ultrasonography Department in hotfloor than the Pediatrics Ward (Figure 5.16).

Briefly, inpatients from the Departments of Obstetrics and Pediatrics might have more leisure time during their stays in the hospital owing to the light load of clinical processes in their patient journeys. That may imply that their need for a supportive environment is relatively high.

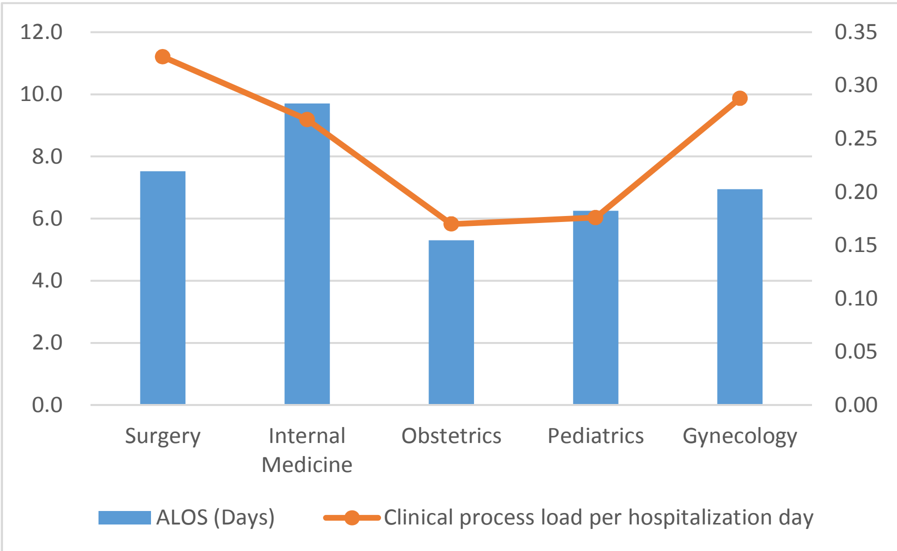
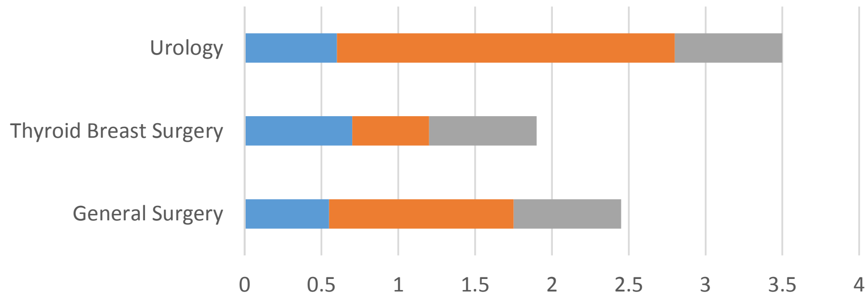
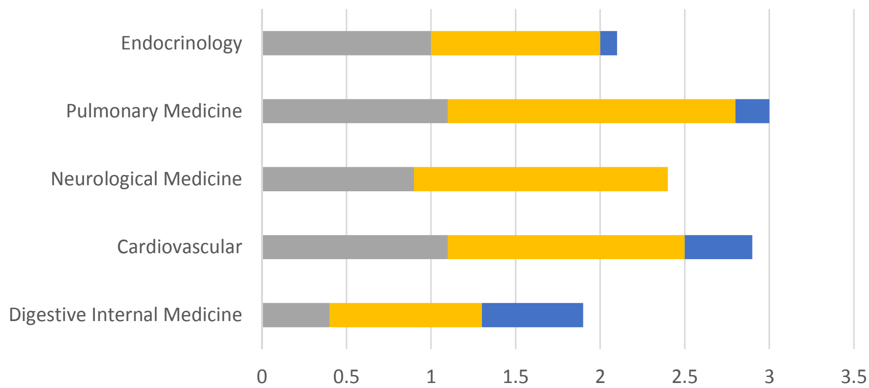


FIG. 5.13 Average Length of Stay (ALOS) and clinical process load per hospitalization day in the Top 5 inpatient departments



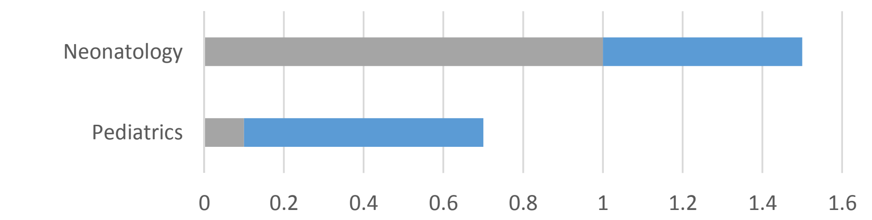
	General Surgery	Thyroid Breast Surgery	Urology
Ultrasound test rate	0.55	0.7	0.6
Imaging test rate	1.2	0.5	2.2
Surgery rate	0.7	0.7	0.7

FIG. 5.14 The average number of clinical processes in wards in the Surgery Department



	Digestive Internal Medicine	Cardiovascular	Neurological Medicine	Pulmonary Medicine	Endocrinology
Ultrasound test rate	0.4	1.1	0.9	1.1	1
Imaging test rate	0.9	1.4	1.5	1.7	1
Surgery rate	0.6	0.4	0	0.2	0.1

FIG. 5.15 The average number of clinical processes in wards in the Internal Medicine Department



	Pediatrics	Neonatology
Ultrasound test rate	0.1	1
Imaging test rate	0.6	0.5
Surgery rate	0	0

FIG. 5.16 The average number of clinical processes in wards in the Pediatrics Department

5.3.3.2 Major inpatient journeys mapping

For the purpose of visualization, inpatient journeys of the Top 5 departments in Panyu Central Hospital are mapped on the floor plans (Table 5.12). As can be seen, all of the areas where inpatients from the Top 5 departments have to visit are located on the first four floors (GF-3F) of the hospital buildings, while the wards where the inpatients stay are distributed on different floors of the three Ward Buildings (Table 5.13). The Inpatient Admission and Discharge Center on the ground floor is both the starting point and the endpoint of all inpatient journeys, given that all the administrative processes an inpatient has to go through take place here, including not only admission and discharge but also payment.

TABLE 5.12 Major inpatient journeys mapping in Panyu Central Hospital

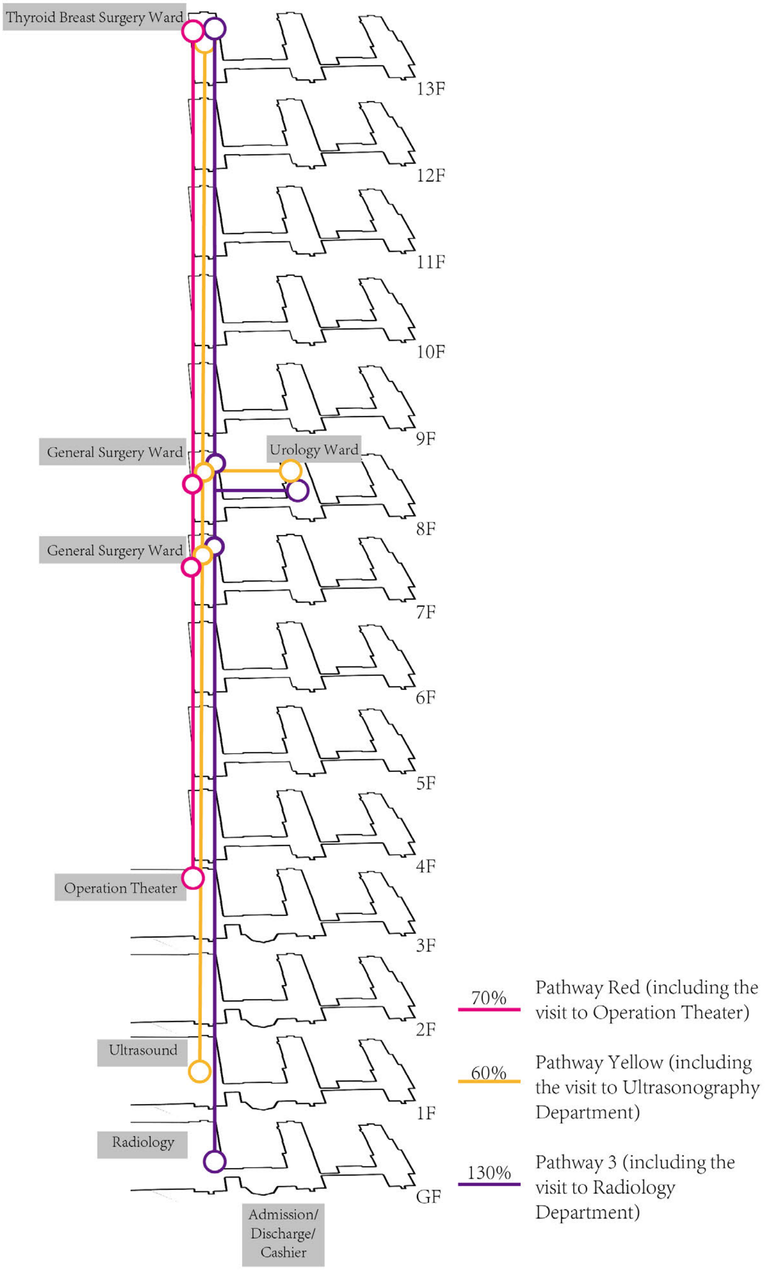
Inpatient dept.	Patient Journeys Mapping
Surgery	

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TABLE 5.12 Major inpatient journeys mapping in Panyu Central Hospital

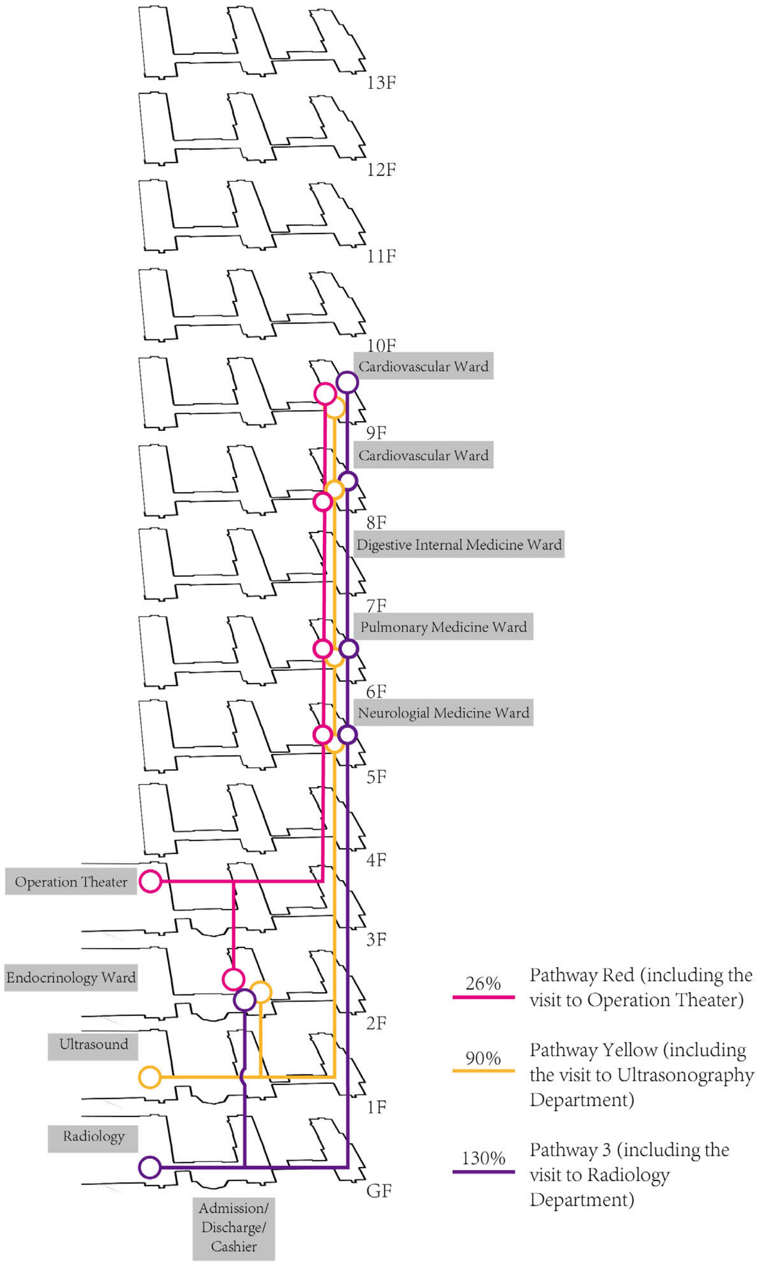
Inpatient dept.	Patient Journeys Mapping
Internal Medicine	

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TABLE 5.12 Major inpatient journeys mapping in Panyu Central Hospital

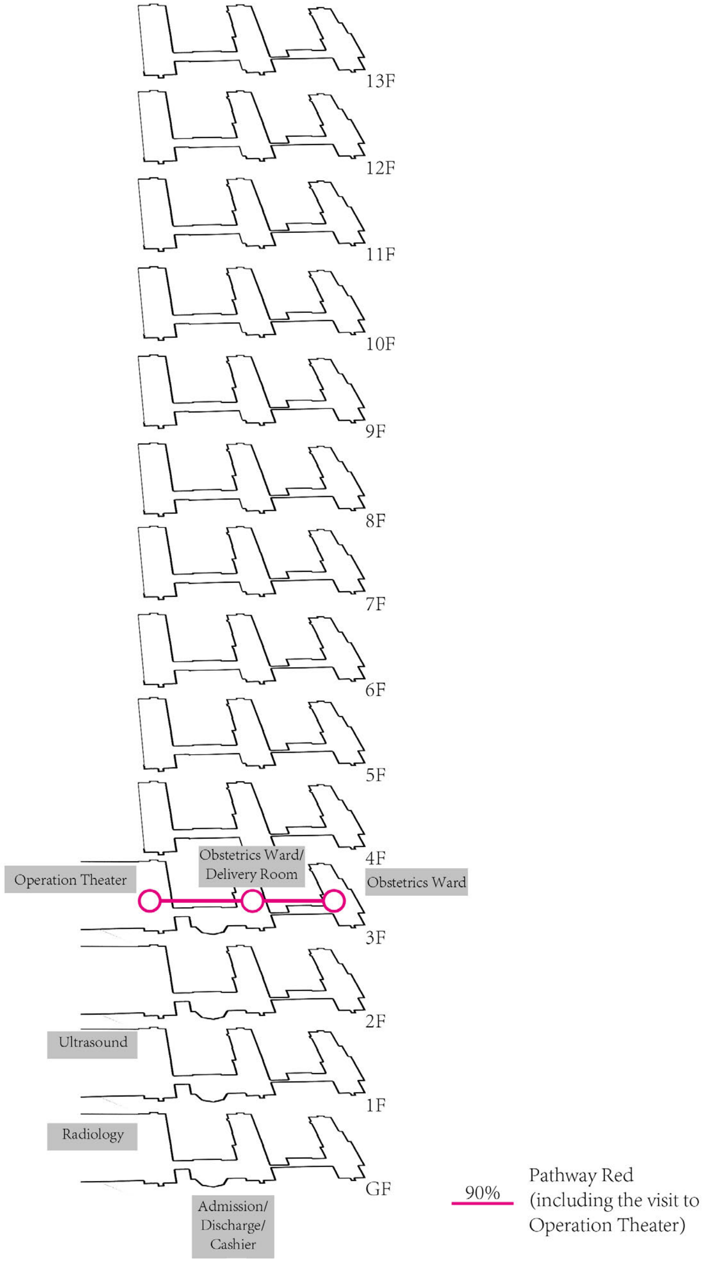
Inpatient dept.	Patient Journeys Mapping
Obstetrics	

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TABLE 5.12 Major inpatient journeys mapping in Panyu Central Hospital

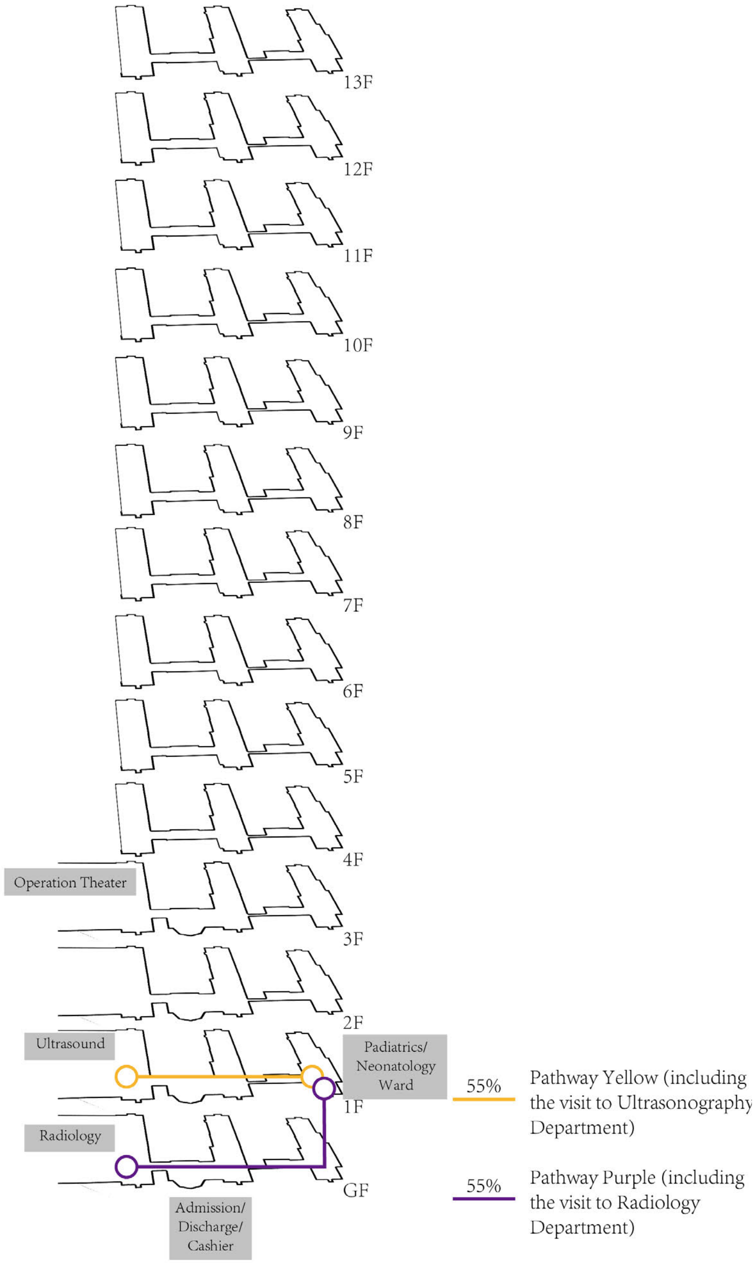
Inpatient dept.	Patient Journeys Mapping
Pediatrics	

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TABLE 5.12 Major inpatient journeys mapping in Panyu Central Hospital

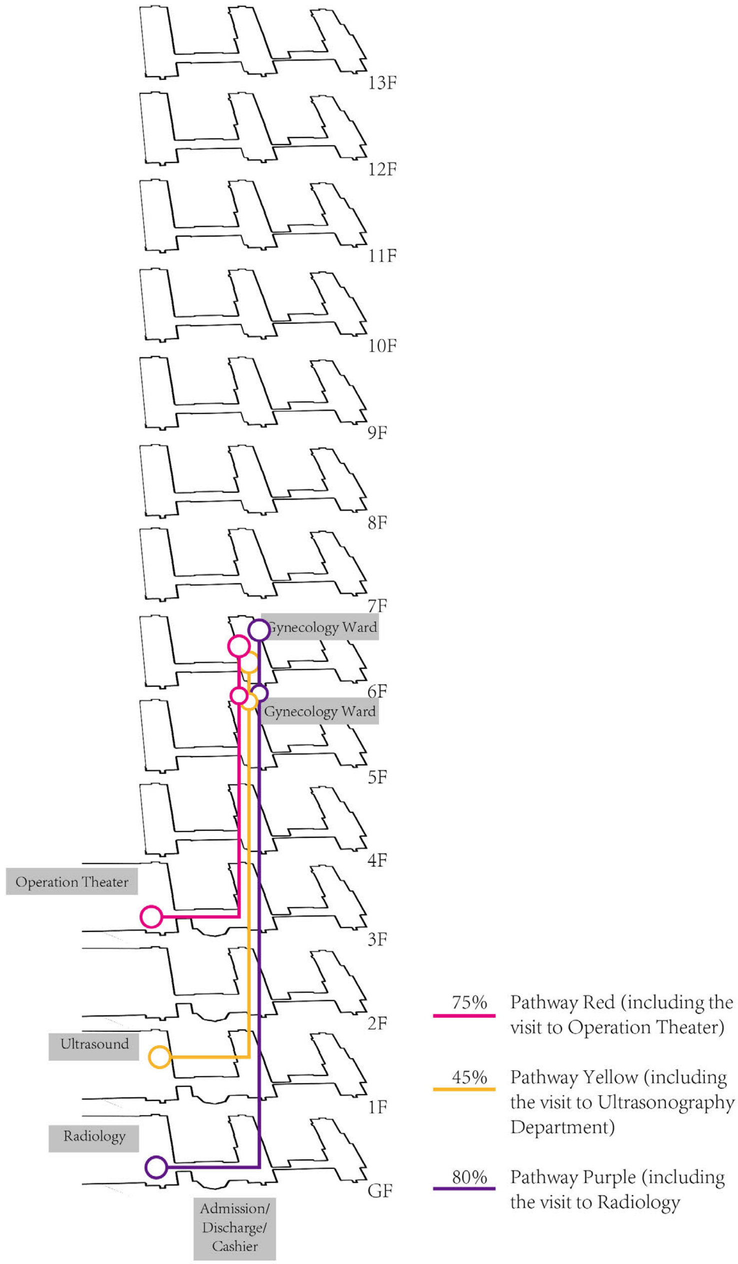
Inpatient dept.	Patient Journeys Mapping
Gynecology	

TABLE 5.13 Distribution of the areas where inpatients from the Top 5 departments stay and visit

	Hotfloor departments	Ward Building 1	Ward Building 2	Ward Building 3
13F		Thyroid Breast Surgery Ward	-	-
12F		-	-	-
11F		-	-	-
10F		-	-	-
9F		-	Urology Ward	Cardiovascular 2 Ward
8F		General Surgery Ward	-	Cardiovascular 1 (CCU) Ward
7F		General Surgery Ward	-	Digestive Internal Medicine Ward
6F		-	Gynecology Ward	Pulmonary Medicine Ward
5F		-	Gynecology Ward	Neurological Medicine Ward
4F	Operation Theater	Operation Theater	-	ICU
3F	-	-	Obstetrics Ward	Obstetrics Ward
2F	Clinical Laboratory	-	Endocrinology Ward	-
1F	Ultrasonography	-	-	Pediatrics/Neonatology Ward
GF	Radiology	-	Admission/Discharge/ Cashier	-

Surgery

The spatial pathways of inpatient journeys in the Surgery Department are similar to the ones in the Internal Medicine Department. All the wards of the Department are distributed in Ward Building 1 except the Urology Ward. The spatial pathways of surgical inpatients are kept very short, so they only need a short walk after taking the elevators before reaching the hotfloor departments. The proximity between wards, the Operation Theater, as well as the Radiology Department is crucial.

Internal Medicine

The analysis of the spatial pathways of inpatient journeys in the Internal Medicine Department shows that all the wards of the Department are vertically distributed on nearby floors of Ward Building 3, except the Endocrinology Ward. The wards seem to have much stronger connections with the Ultrasonography Department and the Radiology Department than with the Operation Theater in general, but the inpatients from the Department go far away to the hotfloor and walk through the Ward Building 2 on the way.

Obstetrics

The spatial pathways of inpatient journeys in the Obstetrics Department are the simplest among the Top 5 Department for the reason that nearly all the clinical processes that the inpatients have to complete in person are on the 4th floor. Parturient women move horizontally on the same floor.

Pediatrics

The spatial pathways of inpatient journeys in the Pediatrics Department are the second simplest among the departments. Pediatric inpatients can complete all the clinical processes on the same floor or the floor below. There are few procedural connections between the Care Unit and the Operation Theater. They have fewer chances to visit the Operation Theater in their patient journeys.

Gynecology

The complexity level of spatial pathways of inpatient journeys in the Gynecology Department is moderate. The two wards of the department are located on the upper and lower floors in Ward Building 2. The wards have connections with the Ultrasonography Department, the Radiology Department, and the Operation Theater.

Maps clarify the complexity level of the pathways of inpatient journeys in the Top 5 inpatient departments.

1. There are 3 common pathways of inpatient journeys except for the ones from the Departments of Pediatrics and Obstetrics. The Pediatrics Department has few connections with the Departments of Ultrasonography and Radiology, and the Obstetrics Department lacks connections with the Operation Theater.

2. Unlike the linear pattern of spatial pathways of outpatient journeys, there are separate circular pathways in an inpatient journey, both the starting points and endpoints of which are the wards where inpatients stay. In other words, the pattern of spatial pathways of inpatient journeys places wards at the core.

3. More often than not, the wards within the same department are distributed vertically on nearby floors in the same Ward Building.

5.3.3.3 Experience of inpatients on their journeys

Throughout all patient journeys of the Top 5 inpatient departments, major processes are linked by three key points, which are fewer than those of the outpatient journeys because appointments have been made before the visits.

1) Key points

Admission and Discharge Center

All the inpatients (or their companions) need to visit the Admission and Discharge Center twice on their patient journeys, one in the very beginning and the other in the end. Inpatients or their companions check in at a terminal first when they enter the center. Then they fill in forms and wait for the announcement on the screen. The center has a waiting area of its own. There are two rows of chairs and two tables for form filling. According to observation, chairs are available most of the time.

Based on the reports of patient satisfaction surveys, it seems that it does not take inpatients a long time to wait for these administrative processes of admission, payment, and discharge (Ark Marketing Consulting, 2018:14-15; Ark Marketing Consulting, 2018a:17-18).

Wards

There are two typical models of wards in the hospital. The layout of wards in Ward Building 1 and Ward Building 2 is Model A, and the one in Ward Building 3 is Model B. The two models are similar in their spatial configuration: on one end is the residential area for staff, the other end is the medical support area surrounded by inpatient bedrooms. The only differences between the two models are that Model B has more inpatient bedrooms, and certain section in Model B has additional passageways. A small leisure space for inpatients is found opposite to the nursing station in Model A but not in Model B (Figure 5.17).

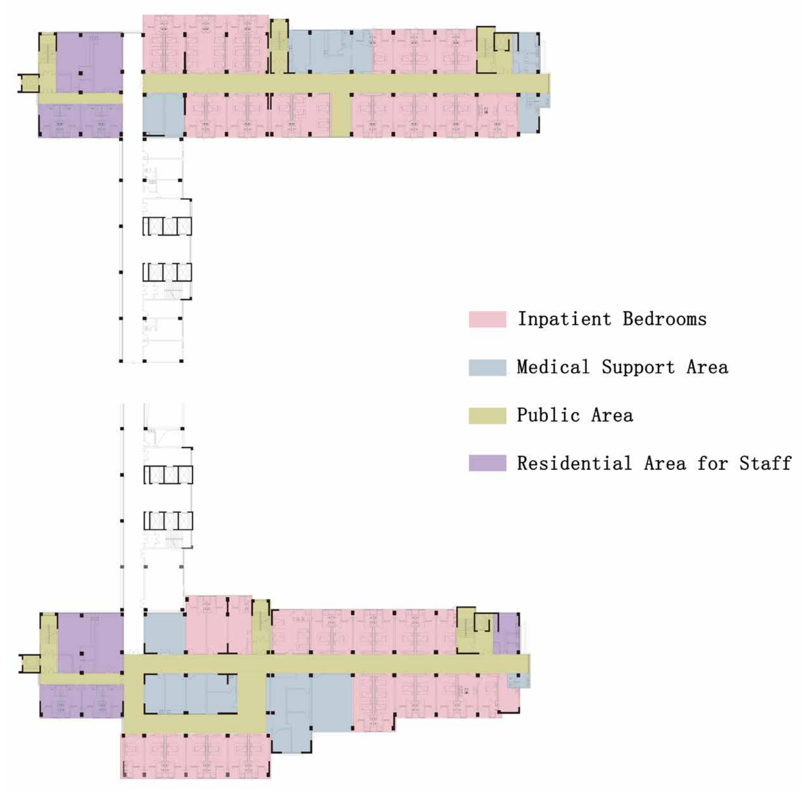


FIG. 5.17 Floor plans of wards (Up: Model A; Down: Model B)
(Adapted from the floorplans provided by the hospital)

Wards are the places where inpatients spend most of their time during hospitalization. That may help to explain why, according to the patient satisfaction surveys, inpatients had a large number of complaints on the aspects of service and the environment. Regarding the service, one of the complaints was about the poor attitude of medical teams (i.e. doctors and nurses). What is worth noting is that inpatients often mentioned that "Doctors and nurses are too busy". Evidently, on account of the heavy workload of medical teams in China, there is not enough interaction and communication between inpatients and medical team members. Additionally, inpatients were not satisfied with the taste of the food provided by the canteen (Ark Marketing Consulting, 2018:16,19; Ark Marketing Consulting, 2018a:19,24). In terms of the environment, inpatients' complaints focused on the cleanliness of patient bedrooms and the toilets. Besides, a small number of complaints touched upon the lack of facilities and the small size of the bedrooms (Ark Marketing Consulting, 2018:18; Ark Marketing Consulting, 2018a:22).

Access to the hotfloor

According to the statistical analysis, a large number of inpatients that were seen in the Ultrasonography Department were from the Departments of Internal Medicine, Surgery, and Obstetrics. In the Radiology Department, over 70% of the inpatients came from the Departments of Internal Medicine and Surgery (Figure 5.18). According to the patient journey mapping, inpatients, especially those from the Departments of Surgery and Obstetrics, have easy access to the hotfloor. Nevertheless, inpatients complained about the time they lost waiting when visiting the hotfloor for tests. The dissatisfaction rate was much higher than for the time wasted waiting for payment, bed allocation, admission, and surgery in the surveys (Ark Marketing Consulting, 2018:15; Ark Marketing Consulting, 2018a:18). This problem is primarily caused by understaffing; since inpatients need appointments for visits to the hotfloor, the procedures cannot be blamed for the waiting times.

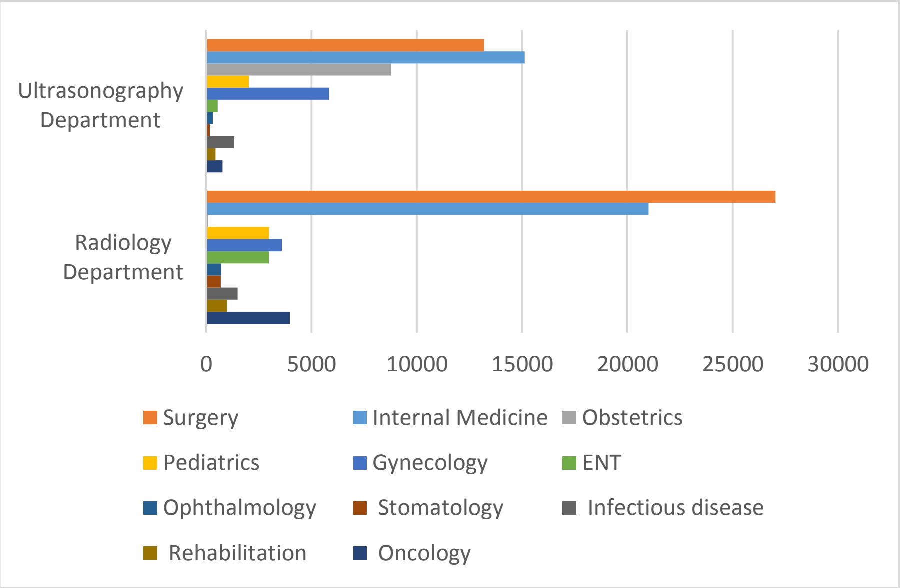


FIG. 5.18 The gross number of inpatient visits to the major hotfloor departments in 2017
(Data source: Panyu Central Hospital)

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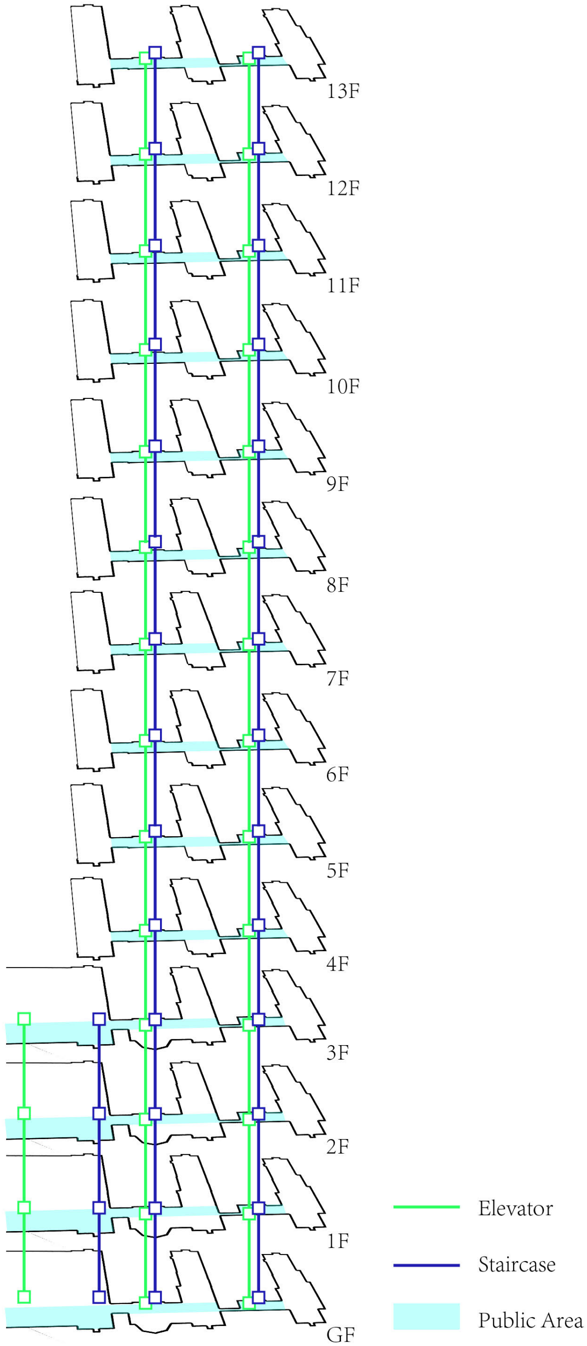


FIG. 5.19 Patient traffic system in inpatient departments

2) Patient traffic system

Two groups of elevators, staircases, and corridors in the public area of the Ward Buildings constitute the main structure of the inpatient traffic system (Figure 5.19). It is mainly vertical. While horizontal connections via corridors on each floor of the three Ward Buildings are essential, all the elevators and staircases can be shared, which makes it efficient and patient-friendly. What's more, there are separate lobbies and an elevator especially designed for inpatient delivery to the Operation Theater in each group of the elevators, ensuring the effectiveness and the privacy of inpatients. As a result, no complaints related to long-time waiting for an elevator were found in the Patient Satisfaction Surveys (Ark Marketing Consulting, 2018:15,18; Ark Marketing Consulting, 2018a:18,22).

5.3.4 Acute patient journeys in the hospital

5.3.4.1 Major acute patient journeys

In Panyu Central Hospital, adult acute patients visit the Emergency Department (ED) while children are referred to the Emergency Pediatrics, which has been merged with the Pediatric Outpatient Clinic next to ED. Over 115 acute patients' samples were collected, 108 of which are valid (Table 5.14). Accordingly, acute patient journeys of the two departments at one time are described as follows (Table 5.15):

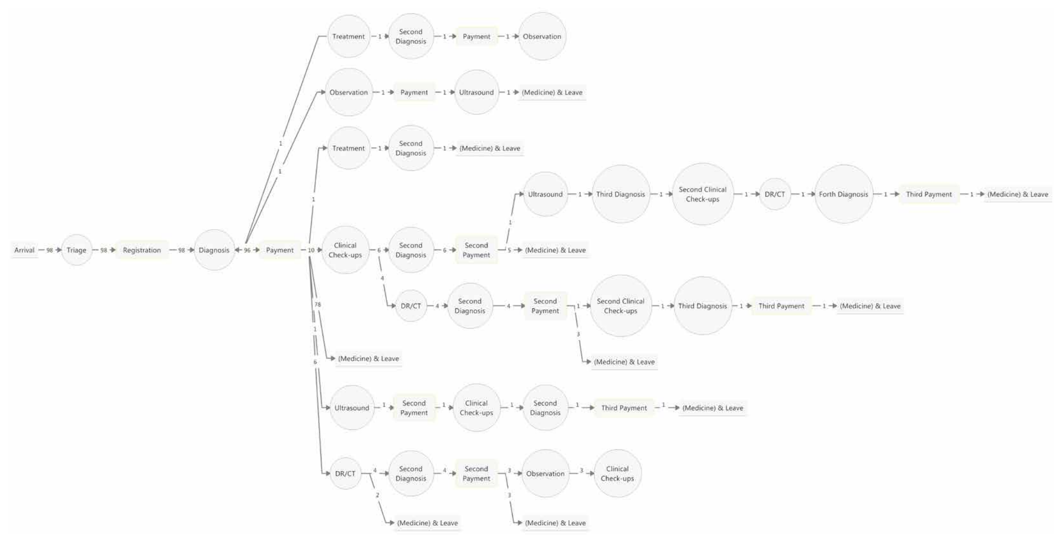
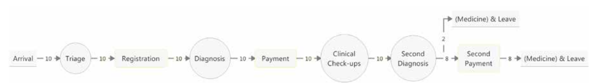
TABLE 5.14 Samples and valid samples

	Samples	Valid samples
Adult	105	98
Pediatric patient	10	10
Total number	115	108

The requirements of clinical processes are totally different between adult acute patients and pediatric acute patients. The sampling test in 2017 demonstrates that adult acute patients required more types of clinical processes while most of the pediatric acute patients only needed clinical check-ups (Figure 5.20). The rate of follow-up diagnostic procedures for pediatric patients, however, was much higher than that for adult patients (Figure 5.21). Nearly 80% of adult acute patients saw doctors only once and left with a prescription. It seemed that most of them were not in emergency situations.

It is hard to quantify and identify exactly how many acute patients met the high acuity criteria (i.e. level 1 or Level 2) because the decisions were made by the triage nurses and no data were collected in this process. A 10-minute waiting period is the norm in the triage system in China[9], which means that acute patients who meet the high acuity criteria should see a doctor within 10 minutes, while acute patients who meet the low acuity criteria might wait for a longer time. On the basis of this norm, the bar chart (Figure 5.22) compares the waiting times for diagnosis in the Emergency Department. It was found that 13% of the adult acute patients and 40% of pediatric acute patients waited less than 10 minutes. To some extent, it suggests that a large number of adult acute patients were not in need of urgent care.

TABLE 5.15 Major acute patient journeys in Panyu Central Hospital

Patient Journeys
Adult patients

Pediatric patients


9 Have explained in Section 3.3.3 and Table 3.7

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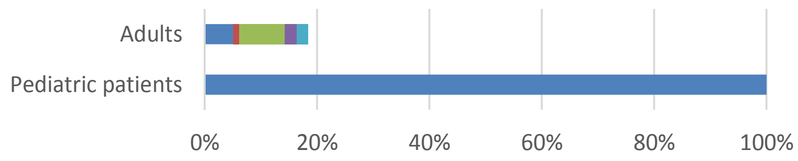
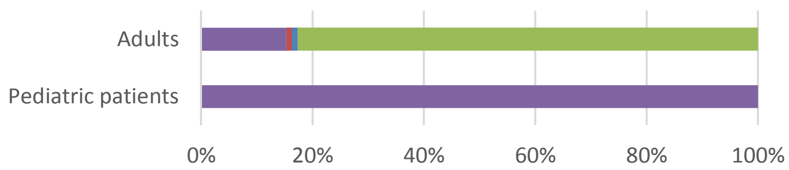


	Pediatric patients	Adults
Clinical check-ups	100%	5%
B-ultrasound test	0%	1%
Imaging	0%	8%
Clinical check-ups + B-ultrasound test	0%	2%
Clinical check-ups + Imaging	0%	2%

FIG. 5.20 The average number of clinical processes in hotfloor in the Emergency Department



	Pediatric patients	Adults
Second diagnosis	100%	15%
Third diagnosis	0%	1%
Forth diagnosis	0%	1%
No follow-up diagnosis	0%	83%

FIG. 5.21 The frequency of follow-up diagnostic procedures on the same day in the Emergency Department

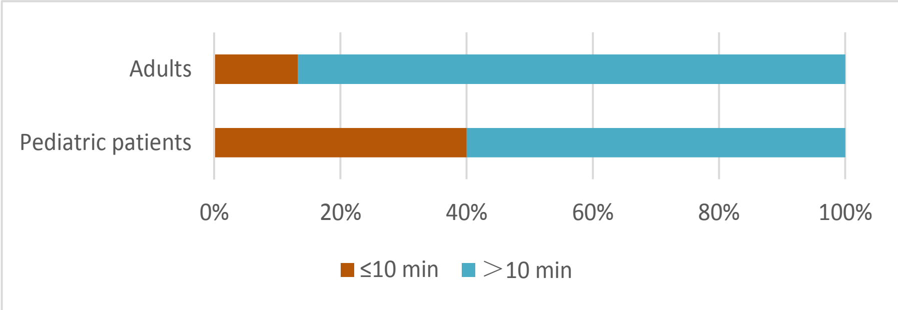
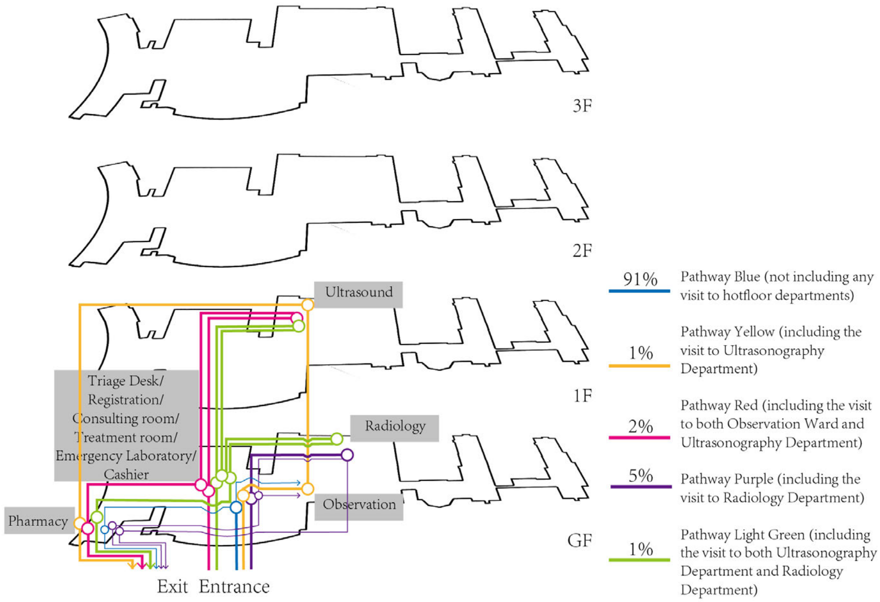
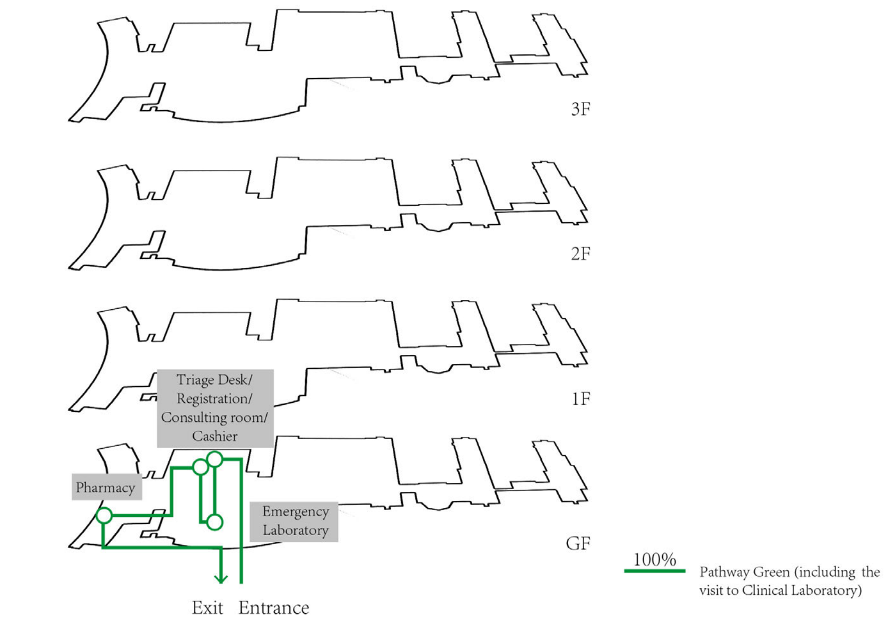


FIG. 5.22 The waiting time for diagnosis in the Emergency Department

5.3.4.2 Major acute patient journeys mapping

For the purpose of visualization, acute patient journeys of both the Emergency Department and the Emergency Pediatrics in Panyu Central Hospital are mapped on the floor plans (Table 5.16). Compared with the outpatient journeys, the number of places acute patients have to visit is smaller for the reason that many clinical and administrative processes take place in the same area. The emergency entrance is the starting point of an acute patient journey. Acute patients have priority access to all clinical processes so that most of them can complete their patient journeys in a short time. The Emergency Pharmacy is located next to the Emergency Laboratory but is only open at night and on weekends. During working hours, there is a service window in the Main Pharmacy, especially for acute patients.

TABLE 5.16 Major acute patient journeys mapping in Panyu Central Hospital

Patients	Patient Journeys Mapping
Adults	
Pediatric patients	

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For adult acute patients

There are five spatial pathways of adult acute patient journeys. Most of the areas adult acute patients have to visit are located on the ground floor, except for the Ultrasonography Department, which is located on the first floor. Some of the spatial pathways end in observation wards due to the seriousness of their symptoms.

For pediatric acute patients

There is only one spatial pathway of pediatric acute patient journeys. All the areas pediatric acute patients have to visit are located on the ground floor and integrated into the pediatric outpatient department. Priority is given to acute patients.

5.3.4.3 Experience of acute patients in their journeys

In the whole adult acute patient journeys, there is one main key point of waiting areas in the consulting area. Adult acute patients who meet the low acuity level criteria usually sit and wait after the triage and registration are completed. When their names appear on the screen, they are permitted to enter the designated consulting rooms. The waiting area used to be a beautiful small garden with daylight, but now the garden has been replaced by a waiting area (Figure 5.23). It is neither crowded nor noisy. In the pediatric acute patient journeys, the key points are the same as the ones in Pediatric outpatient journeys, which have been outlined in Section 5.3.2. Based on patient satisfaction surveys, acute patients were satisfied with their experience in the Emergency Department, and no complaints were voiced on the aspects of functional processes, service, environment, or procedure. One acute patient asked for a more intelligent queue management system and one asked for more staff in Emergency Pediatrics (Ark Marketing Consulting, 2018a:17).

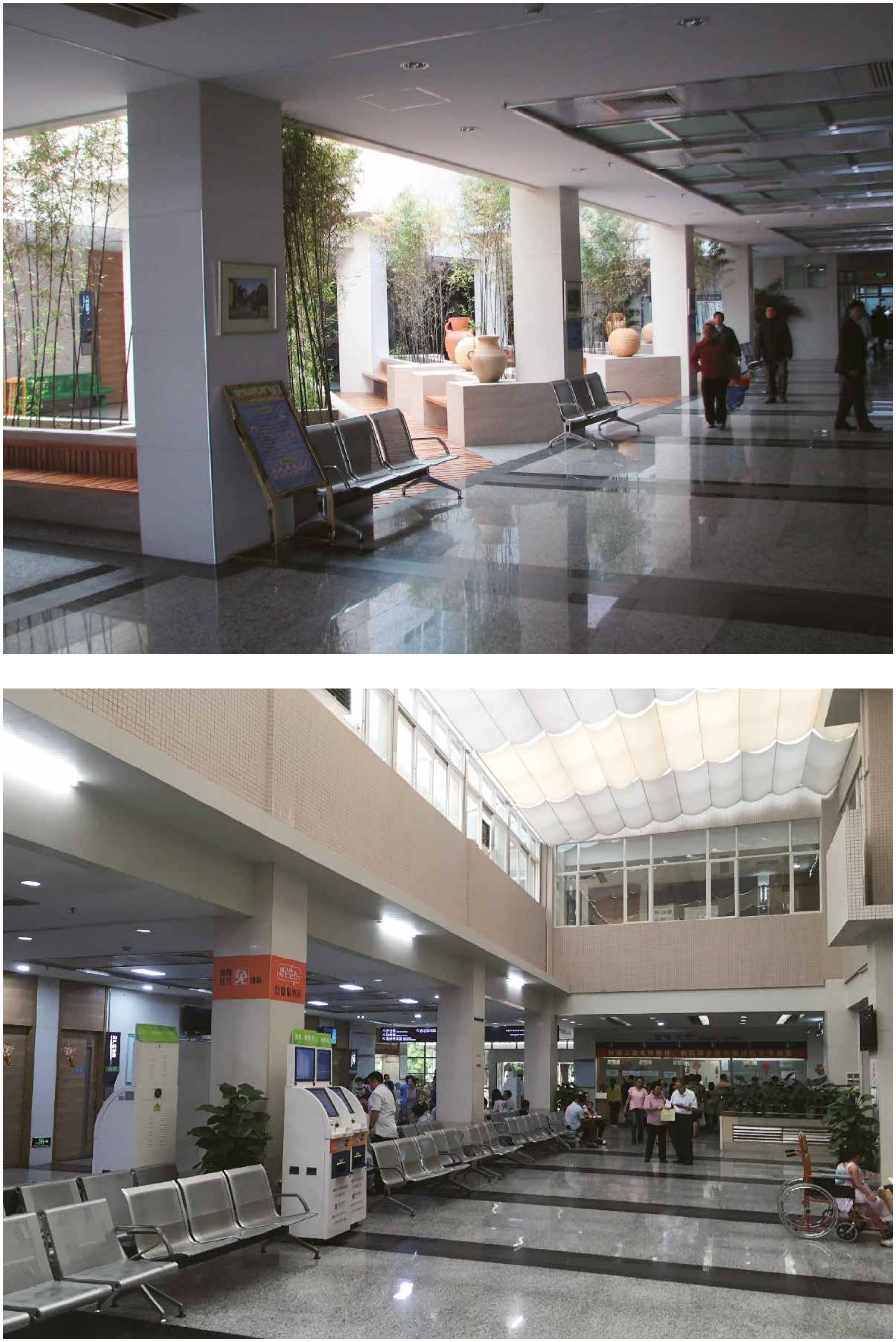


FIG. 5.23 The waiting area in the consulting area of the Emergency Department
(Photo by the author (T) & Wenyu Zhang (B))

5.3.5 Discussion and suggestions

The patient journey analysis above provides evidence that the patient experience can be improved in Panyu Central Hospital regarding procedure and environment, and architecture can make a difference.

Procedure

It is found that the procedures of outpatient journeys, inpatient journeys, and acute patient journeys function reasonably well. The consulting area in both outpatient clinics and the Emergency Department, as well as the wards in inpatient departments, have easy access to the hotfloor. The whole patient traffic system is efficient and convenient. There are no complaints on long waiting times for elevators thanks to the effective use of escalators and staircases. There are some complaints about wayfinding. Maps at the main registration station, which could also be used as the information center, might help. With the assistance of maps, it is easier for hosts and hostesses to explain the routes to patients on their first visits.

There is another aspect that needs improvement: the relationship between wards in the same inpatient department. As indicated in Table 5.12, most of the wards of the Departments of Internal Medicine and Surgery are distributed in the same position of different, but nearby floors. The vertical connections between them would certainly bring better logistics and added convenience for sharing medical resources. Take the General Surgery Wards as an example. If the General Surgery Ward on the 8th floor, Ward Building 1 was moved to the 7th floor, Ward Building 2, inpatient beds and medical devices can be shared more efficiently and medical teams can cooperate and help each other in emergencies. In addition, the corridor between the two Wards would become a shared area for both the Wards, which can be decorated as a leisure area for reading or fitness.

Environment

As illustrated above, three groups of patients may have higher expectations and stronger desires about the hospital on the facilities and the environment because they have more leisure time to wander around. One group of patients comes from the Outpatient Departments of Gynecology and Surgery, who may have to spend long days in the hospital. Another group of patients comes from the Outpatient Department of Internal Medicine, many waiting for a second diagnosis after getting the results of clinical check-ups and imaging tests. The third group of patients comes from the Inpatient Departments of Obstetrics and Pediatrics, who on average have lighter daily loads of clinical processes. As a result, they might benefit from a higher-quality architectural environment.

The indoor facilities are distributed along the internal street including a 24-hours convenient store, a restaurant, a canteen, and a supermarket that sells toys, and infant and maternal goods (Figure 5.24). Panyu Central hospital is one of the pioneers that introduced commercial facilities into the hospital, and they run well until now.

The outdoor gardens are distributed on both the south and east sides of the main buildings: two are located between the Ward Buildings (i.e. A1 & A2), another is on the east side near the river (i.e. B). A parking lot in the shade is on the south (i.e. C). As can be seen in Table 5.17, in summer the crowd seeks its way from the gardens to and from their destinations in the morning and the afternoon. It shows a busy crowd at the main entrance of the outpatient clinics in the morning, and only a few of them choose to stay in the outdoor gardens. While in the afternoon, the number of people who stay in outdoor gardens increased. Some of them wear hospital gowns, which means they are probably inpatients. Others might be their friends or companions. They walk around, chat on chairs or do exercises in the fitness facilities.

Therefore, the hospital can improve the outdoor environment, which would especially benefit patients from the Outpatient Department of Gynecology, Surgery, and Internal Medicine as well as those from the Inpatient Department of Obstetrics and Pediatrics, who have more leisure time while staying in the hospital.

The indoor environment of the waiting area in the Ultrasonography Department should be improved, too, for the reason that over 70% of the outpatients came from the Departments of Gynecology and Obstetrics; the outpatients would normally spend a long time staying there and waiting for tests. Even though wifi, drinking water machine, TV, chairs, and toilets are well available, it calls for a more humanized environment. The waiting area can be enlarged and divided into several areas such as a TV watching area equipped with a comfortable sofa, a magazine reading area with tables, and an area for chatting that provides comfortable chairs. More sunshine is always welcome.

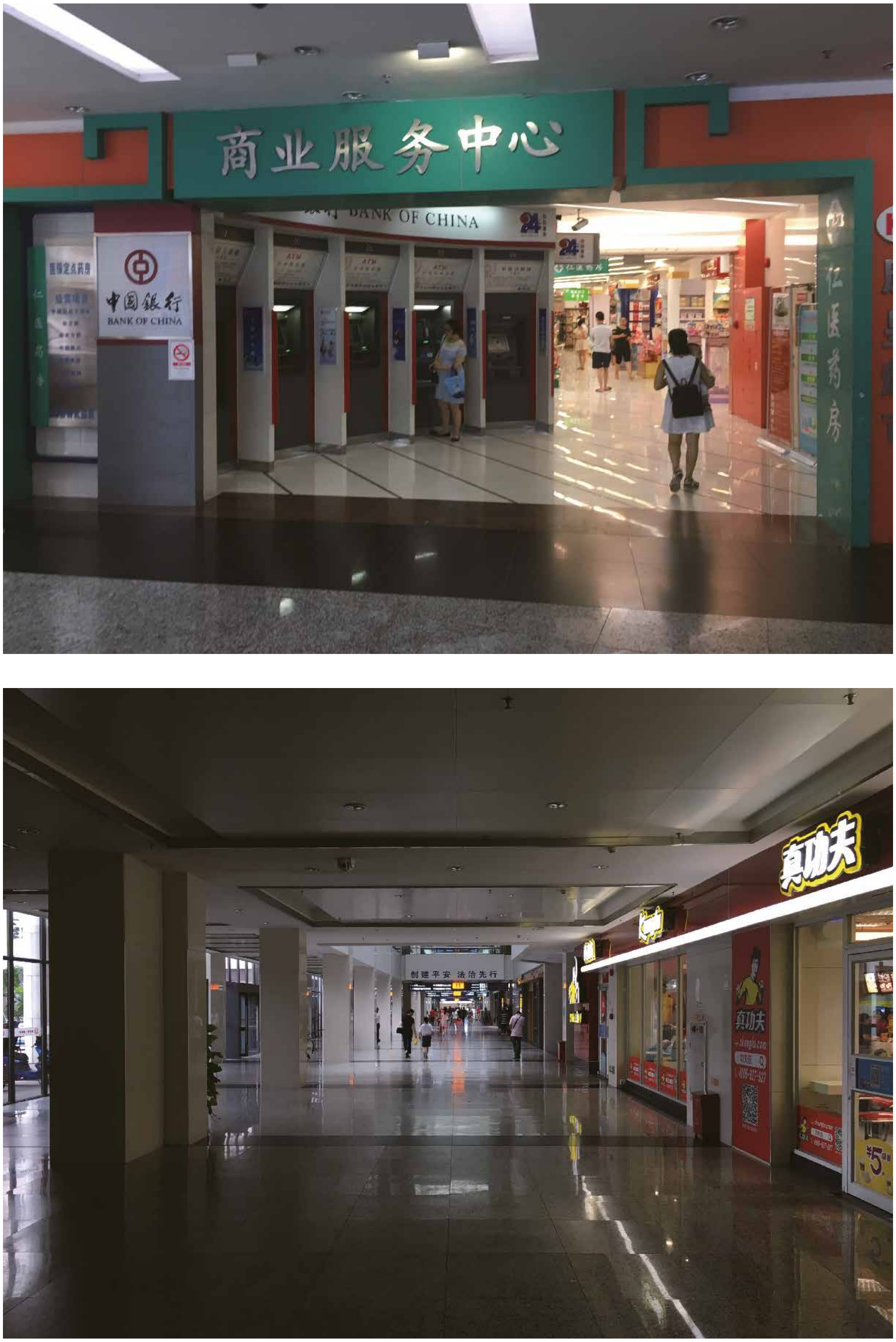
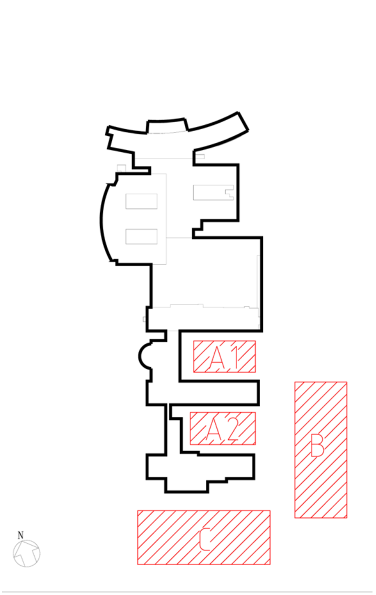
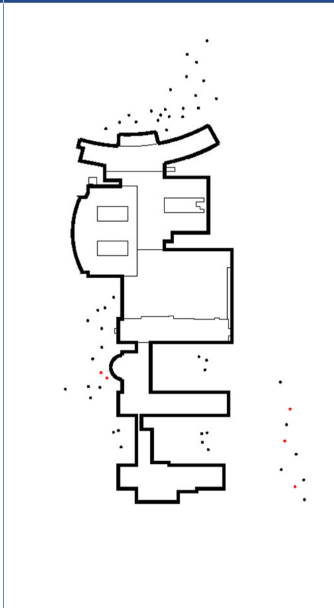
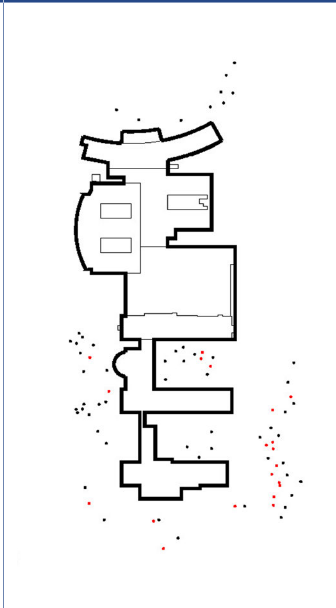


FIG. 5.24 Indoor facilities in Panyu Central Hospital
(Photo by Wenyu Zhang)

TABLE 5.17 Garden distribution and crowd distribution in Panyu Central Hospital

Spatial Distribution of the gardens	Crowd Distribution at 10:00	Crowd Distribution at 16:00
		

PS: The red points represent inpatients who wear hospital gowns.

Other measures the hospital is implementing to improve patient journeys

1. The hospital is promoting systems of online appointment and mobile payment. When patients are proficient in using them, some administrative processes could be skipped and the overall distance of patient movement in a journey will be reduced.

2. The hospital has established some disease treatment centers such as the National Metabolic Management Center (MMC) and the Respiratory Medical Center, which combine consulting areas and clinical treatment areas in outpatient clinics with frequently used hotfloor facilities. Outpatients receive one-stop medical services in the centers. The hospital plans to create more disease treatment centers in the outpatient clinics.

5.4 Case B

5.4.1 Case description

The 6th Affiliated Hospital of Sun Yat-sen University, well known in the field of Gastroenterology, is one of the biggest general hospitals in Guangzhou. It attracts patients not only from Guangzhou but also nearby cities. The hospital has two campuses: one in Yuancun, and the other in Shougouling. In this case study, the Yuancun Campus is discussed. It covers an area of around 1.8 hectares and has a built-up area of 117,585 square meters. The construction of the campus and the complex of main buildings were completed in 2012.

Hospital architecture

FIG. 5.25 Overview of the Yuancun Campus of the Hospital
(Provided by the 6th Affiliated Hospital of Sun Yat-sen University)

Owing to the land shortage in the downtown area, the complex of main buildings of the 6th Affiliated Hospital of Sun Yat-sen University is designed as “Breitfuss”. All the main medical functions, including outpatient clinics, hotfloor departments, and inpatient wards, are located in a single 25-story skyscraper, with exceptions of a three-story temporary building for the Emergency Department at the front and a nine-story building for some inpatient wards and laboratories at the back (Figure 5.25).

Patient traffic system

In the main building of the hospital, a group of seven elevators in the public area form the main structure of the patient traffic system. From the basement to the 5th floor, an additional group of two elevators and an escalator serves mainly outpatients. All the connections in the main building are vertical. There are no horizontal connections between buildings except for the ground floor (Figure 5.26).

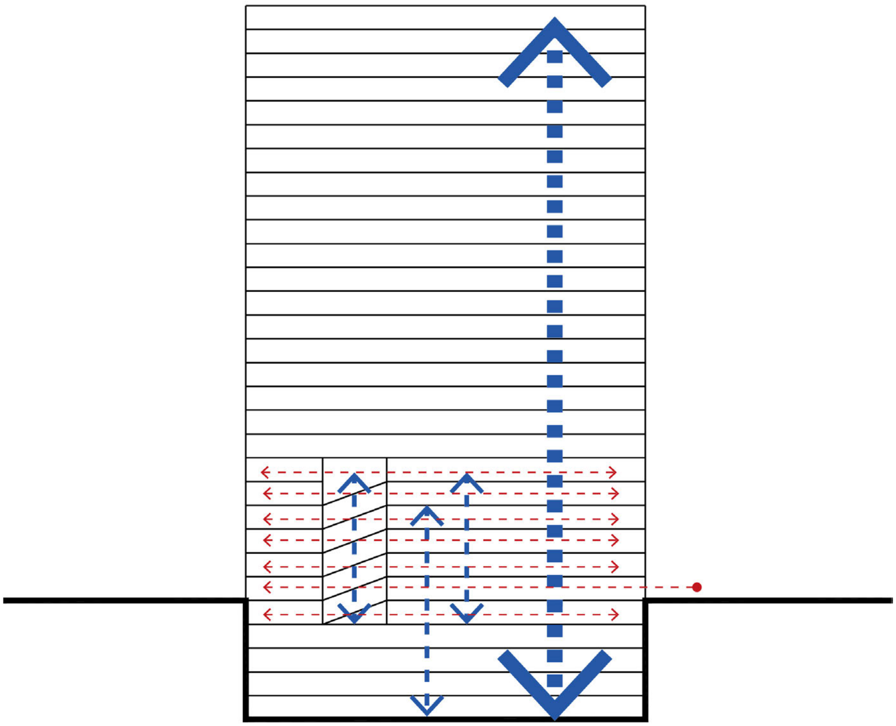


FIG. 5.26 Patient traffic system of the 6th Affiliated Hospital of Sun Yat-sen University

Latest achievements

The 6th Affiliated Hospital of Sun Yat-sen University is one of the top leaders in applying information technology, ranking 4th out of 33 large general hospitals in Guangzhou. It provides various mobile services for registration, diagnosis, hospitalization, and payment (Yu & Yang, 2018, website).

5.4.2 Outpatient journeys in the hospital

5.4.2.1 Major outpatient journeys

The total number of outpatient visits to the hospital was 866,223 in 2017, namely around 2,400 per day on average. Table 5.18 shows that the number of outpatients in the Top 5 Departments accounted for over 67% of the total number of visits. Compared to the data nationwide (Table 3.2) and Panyu Central Hospital (Table 5.4), the 6th Affiliated Hospital of Sun Yat-sen University has its own characteristics. Its Departments of Gastroenterology and Simple Clinic[10] rank 2nd and 3rd of 15 outpatient departments.

In this case study, the Top 5 outpatient departments are considered as representative for outpatient journeys. If the outpatient journeys of these departments could be improved, so would the overall outpatient experience in the hospital.

Over 200 outpatients from the Top 5 outpatient departments were selected at random. Among all these samples, 212 samples had valid data (Table 5.19) The outpatient journeys of the Top 5 departments at one time have the following characteristics: (Table 5.20)

10 Simple Clinic serves outpatients with chronic disease who have been diagnosed and have stable conditions. They come for prescriptions and clinical check-ups regularly.

TABLE 5.18 Number of visits to major outpatient departments in the 6th Affiliated Hospital of Sun Yat-sen University in 2017

No.	Department	Number of visits	Percentage %
1	Internal Medicine	230,089	26.56
2	Gastroenterology	147,655	17.05
3	Simple Clinic	77,155	8.91
4	Obstetrics	70,318	8.12
5	Surgery	59,197	6.83
6	Gynecology	53,108	6.13
7	Stomatology	45,886	5.30
8	Dermatology	43,628	5.04
9	Ear, Nose and Throat (ENT)	28,957	3.34
10	Neurology/Rehabilitation	26,228	3.03
11	Ophthalmology	21,707	2.51
12	Traditional Chinese Medicine (TCM)	19,870	2.29
13	Child health care	18,329	2.12
14	Pediatrics	12,724	1.47
15	VIP	8,750	1.01
Top 5 departments		584,414	67.47
Top 10 departments		782,221	90.30
Total		866,223	100

(Data source: The 6th Affiliated Hospital of Sun Yat-sen University)

TABLE 5.19 Samples and valid samples

	Samples	Valid samples
Internal Medicine	89	87
Gastroenterology	38	38
Simple Clinic	27	27
Obstetrics	13	13
Surgery	49	47
Total number	216	212

TABLE 5.20 Major outpatient journeys in the 6th Affiliated Hospital of Sun Yat-sen University

Patient Journeys
Outpatient dept. Internal Medicine

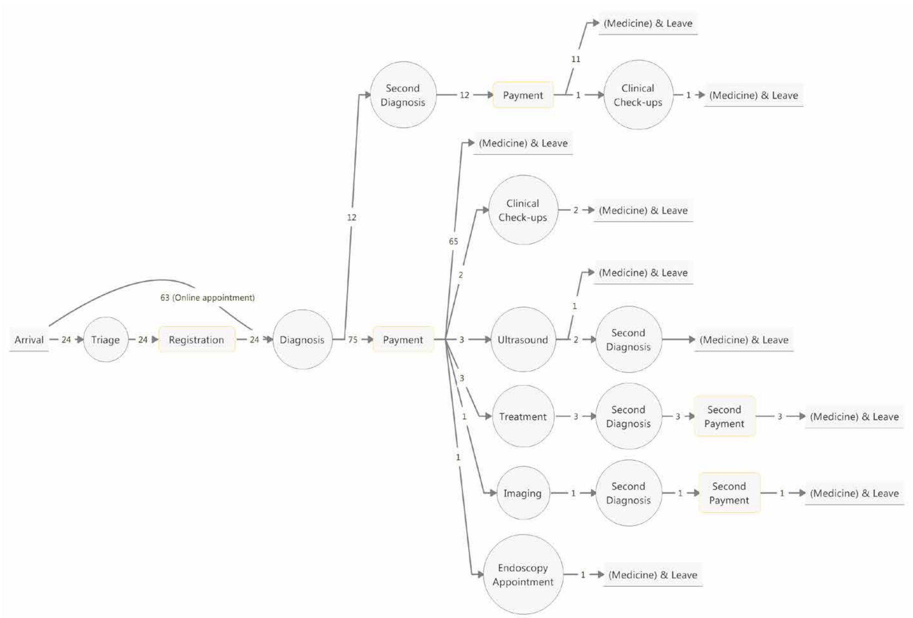


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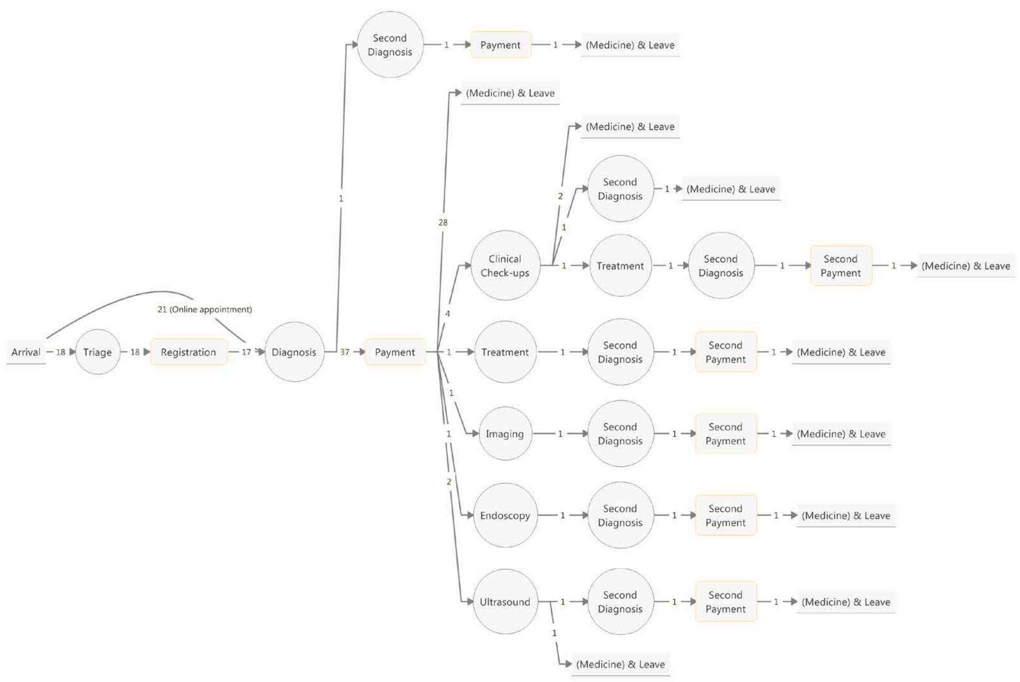
TABLE 5.20 Major outpatient journeys in the 6th Affiliated Hospital of Sun Yat-sen University

Patient Journeys

Outpatient dept. Gastroenterology



Outpatient dept. Simple Clinic

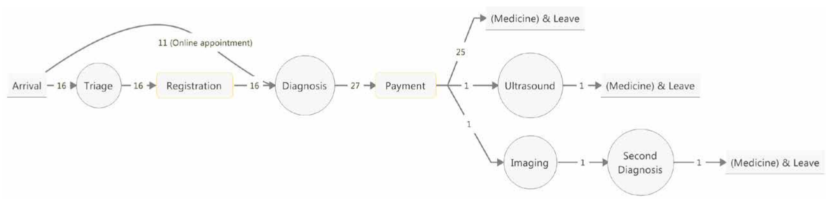


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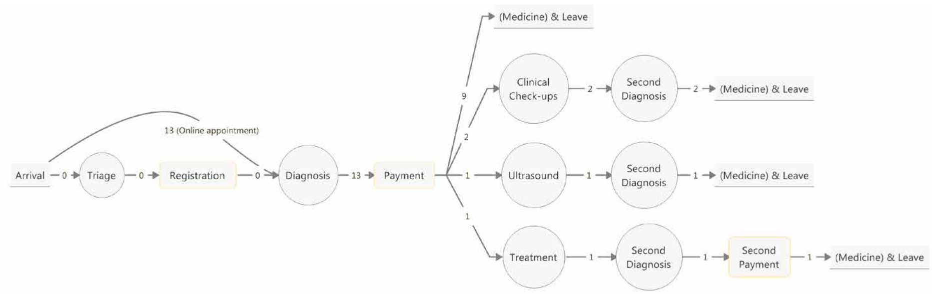
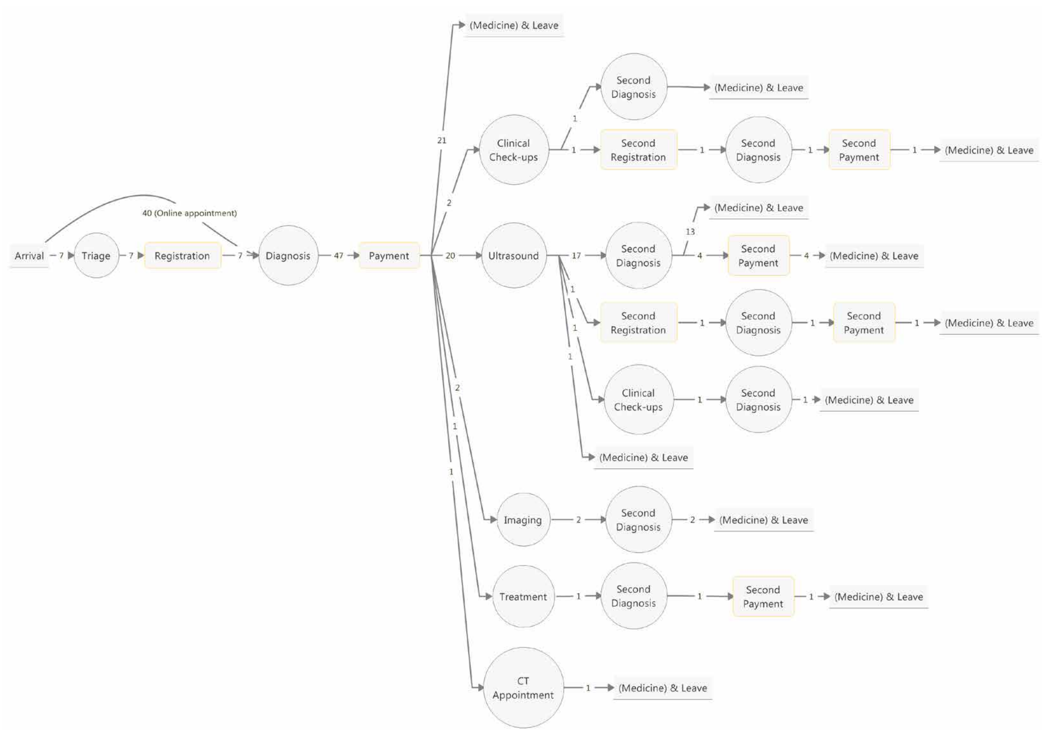
TABLE 5.20 Major outpatient journeys in the 6th Affiliated Hospital of Sun Yat-sen University

Patient Journeys

Outpatient dept. Obstetrics



Outpatient dept. Surgery



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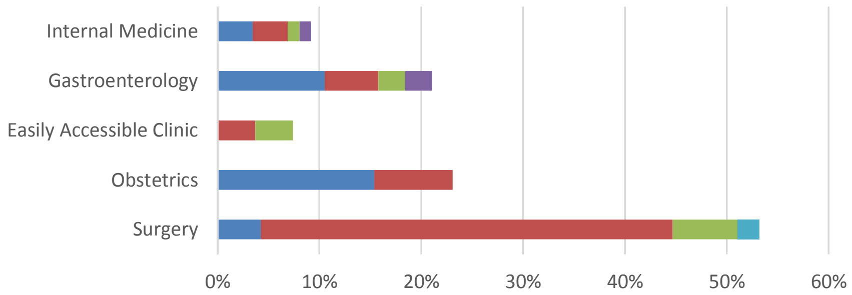
In this case study, the term “endoscopic test” is added to the statistical analysis of clinical processes for the reason that many patients with diseases of the stomach and intestines prefer this hospital. The average number of clinical processes of the Top 5 outpatient departments in 2017 in the hotfloor has been ranked (Figure 5.27). In the Departments of Surgery, 52% of the outpatients need clinical processes in the hotfloor. The percentage halves in the Department of Obstetrics (23%) and Gastroenterology (22%). Of the Top 5 requirements, the Department of Internal Medicine and Simple Clinic has the minimum requirement of clinical processes (less than 10%) on the hotfloor. Therefore, it seems that outpatients from the Departments of Surgery may have to stay longer in the hospital owing to the largest number of clinical processes in their patient journeys.



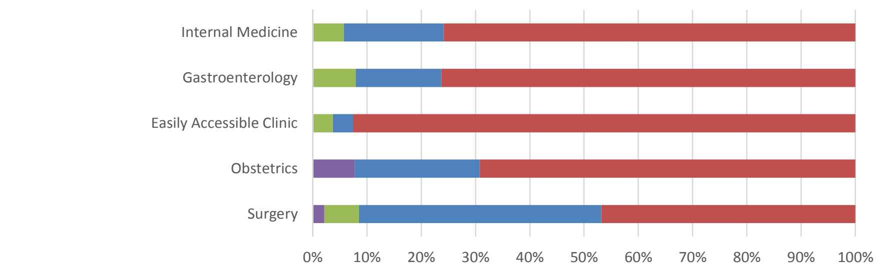
	Surgery	Obstetrics	Easily Accessible Clinic	Gastroenterology	Internal Medicine
Clinical check-ups	4%	15%	0%	11%	3%
B-ultrasound test	40%	8%	4%	5%	3%
Imaging	6%	0%	4%	3%	1%
Endoscopic test	0%	0%	0%	3%	1%
Clinical check-ups + B-ultrasound test	2%	0%	0%	0%	0%

FIG. 5.27 The average number of clinical processes in hotfloor among outpatient departments

This conclusion is partly confirmed by the statistical analysis of the frequency of follow-up diagnostic procedures on the same day (Figure 5.28). The bar chart proves that most of the outpatients can complete their patient journeys on the same half-day. No patients from the Obstetrics Department had to visit the hospital again on another day, and the rate of second diagnosis on another day is 6% on average in the other four outpatient departments. Only 2% of outpatients from the Surgery

Department and 8% from the Obstetrics Department had second diagnoses on the same day. According to the medical records, long-time waiting for ultrasound tests causes the delay for outpatients from the Departments of Surgery and Obstetrics.

However, it does not necessarily mean that the hospital performs better than Panyu Central Hospital in Case A. On the one hand, both the total outpatient visits and the volume of the total requirement of clinical processes in the hotfloor in outpatient journeys are smaller in the 6th Affiliated Hospital of Sun Yat-sen University. On the other hand, few doctors stay in the outpatient clinics both in the morning and the afternoon on the same day so that an outpatient who saw a doctor in the morning and had the need of second diagnosis in the afternoon would need to register again for another doctor. As a result, some patients prefer to come again on another day looking for the same doctors.



	Surgery	Obstetrics	Easily Accessible Clinic	Gastroenterolo gy	Internal Medicine
Second diagnosis on the same day	2%	8%	0%	0%	0%
Second diagnosis on another day	6%	0%	4%	8%	6%
Second diagnosis within the same half day	45%	23%	4%	16%	18%
No follow-up diagnosis	47%	69%	93%	76%	76%

FIG. 5.28 The frequency of follow-up diagnostic procedures on the same day

To sum up, outpatients from the Departments of Surgery and Obstetrics might stay longer in the 6th Affiliated Hospital of Sun Yat-sen University owing to more clinical processes in their patient journeys. It takes most of the outpatients less than a half day to complete their patient journeys.

5.4.2.2 Major outpatient journeys mapping

For the purpose of visualization, outpatient journeys of the Top 5 outpatient departments in the 6th Affiliated Hospital of Sun Yat-sen University are mapped on the floor plans (Table 5.21). As can be seen, all the areas outpatients from the Top 5 departments have to visit are located on the first seven floors (-1F-5F) of the hospital buildings (Table 5.22) The entrance hall is not big because in many cases it is neither the starting point nor the endpoint of an outpatient journey even though it contains the Triage Desk and the Main Registration where the first clinical process and the first administrative process in an outpatient journey used to take place. And the Pharmacy where the last process takes place before outpatients leave is located on the 1st floor rather than in the entrance hall on the ground floor.

TABLE 5.21 Major outpatient journeys mapping in the 6th Affiliated Hospital of Sun Yat-sen University

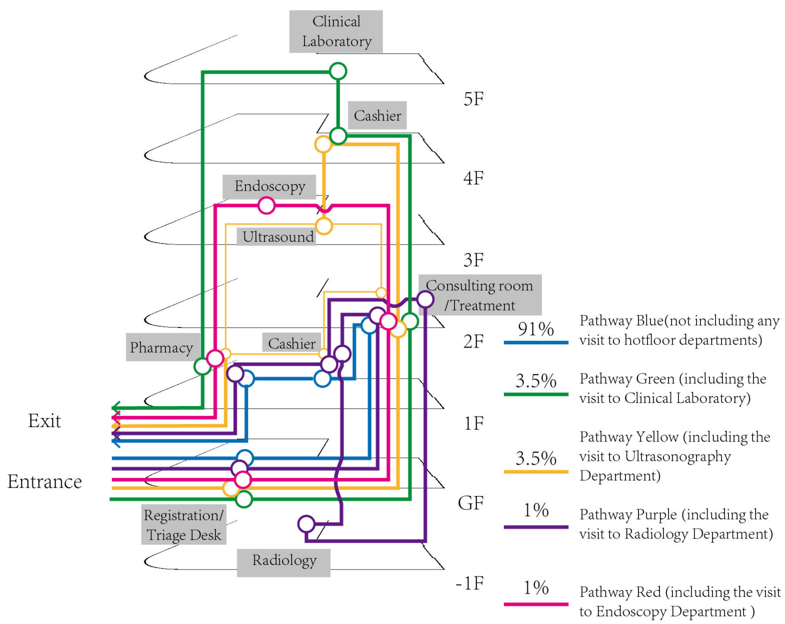
Outpatient dept.	Patient Journeys Mapping
Internal Medicine	

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TABLE 5.21 Major outpatient journeys mapping in the 6th Affiliated Hospital of Sun Yat-sen University

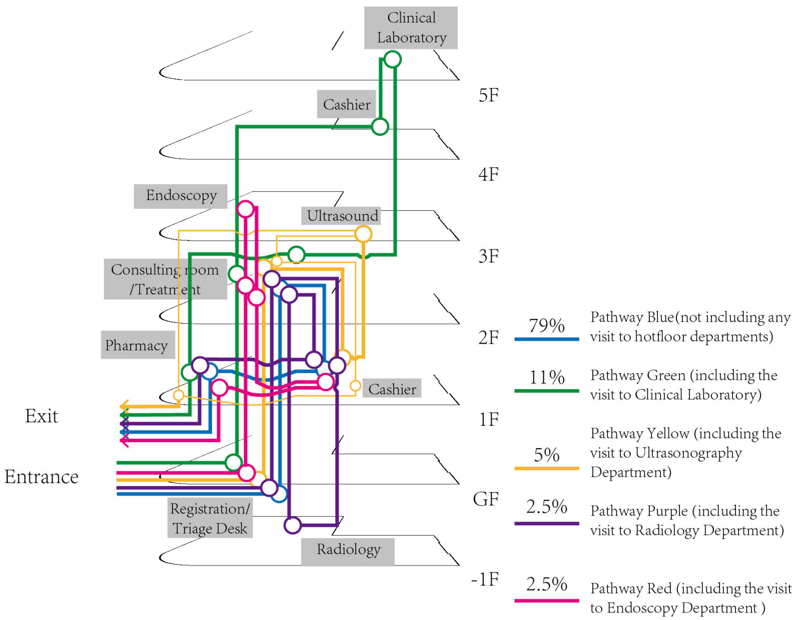
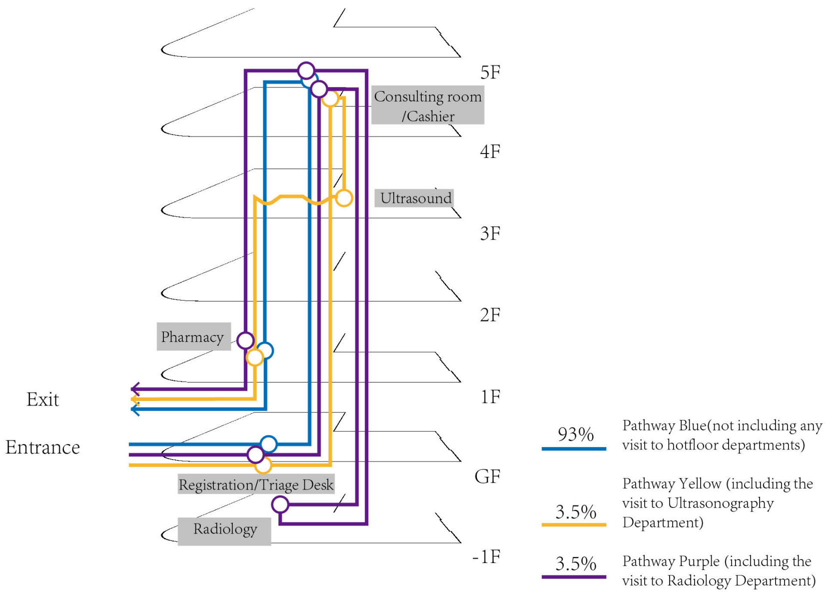
Outpatient dept.	Patient Journeys Mapping
Gastro-enterology	
Simple Clinic	

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TABLE 5.21 Major outpatient journeys mapping in the 6th Affiliated Hospital of Sun Yat-sen University

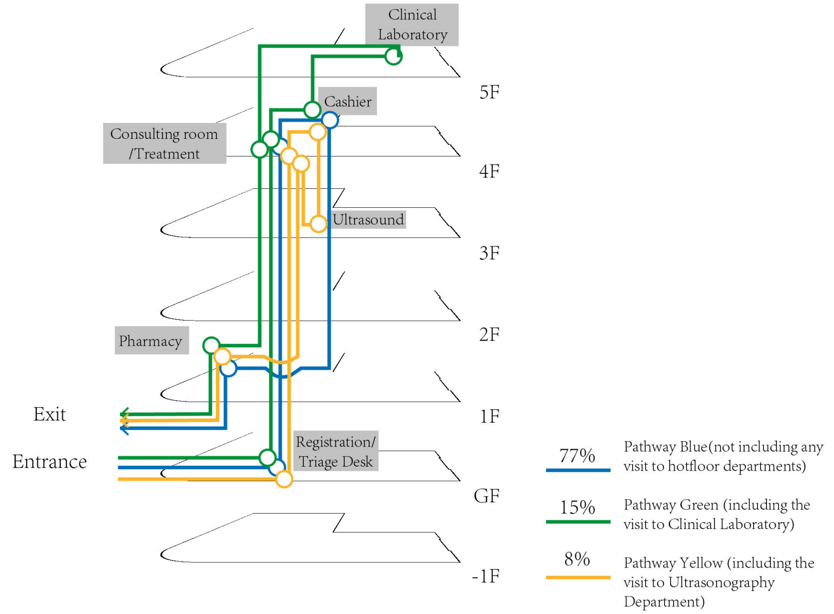
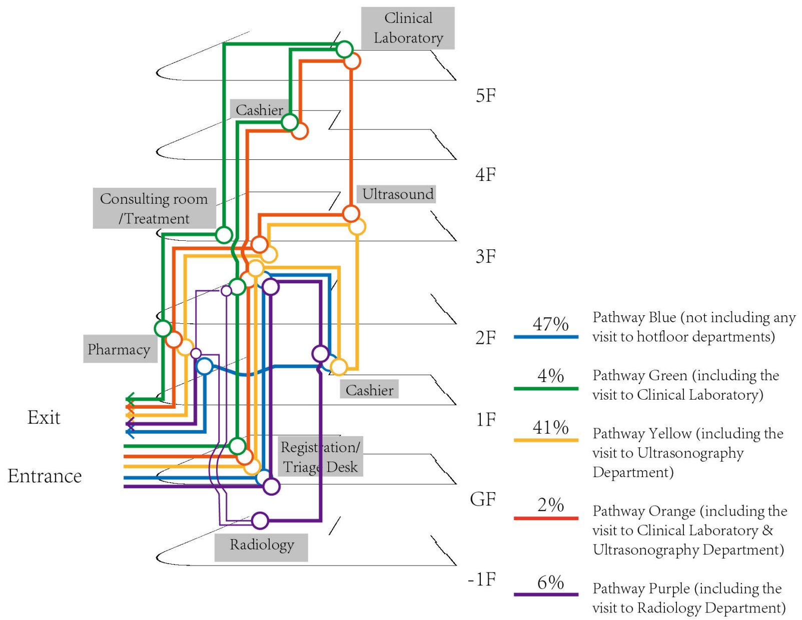
Outpatient dept.	Patient Journeys Mapping
Obstetrics	
Surgery	

TABLE 5.22 Distribution of the areas where outpatients from the Top 5 departments visit

	Area 1: Public area	Area 2: Consulting area	Area 3: Hotfloor departments for diagnosis	Area 4: Clinical treatment area
5F	-	-	Clinical Laboratory	-
4F	Cashier	Simple Clinic, Obstetrics,	-	Treatment rooms in each consulting area
3F	-	-	Endoscopy, Ultrasonography	-
2F	-	Internal Medicine, Gastroenterology, Surgery	-	Treatment rooms in each consulting area
1F	Pharmacy, Cashier, Registration	-	-	-
GF	Triage Desk, Main Registration	-	-	-
-1F	-	-	Radiology	-

Internal Medicine

The spatial pathways of outpatient journeys in the Internal Medicine Department show that outpatients who take ultrasound tests or radiological tests are more likely to go through relatively complicated journeys due to a second diagnosis. Over 75% second diagnoses in the sampling tests were completed within the same half-day except for 5 patients, one of whose results of clinical check-ups would come out the next day, and another of whom had to revisit the hospital for an endoscopic test. Although all the results and reports came out on the same day, the other three patients preferred to visit the hospital on another day rather than waiting in the hospital.

Gastroenterology

The complexity level of spatial pathways of outpatient journeys in the Surgery Department ranks 2nd among the Top 5 outpatient departments. Outpatients who take clinical check-ups, ultrasound tests, endoscopic tests, or radiological tests are more likely to go through relatively complicated journeys due to a second diagnosis. Around 67% second diagnoses were completed within the same half-day except for 3 patients. Although all of them got the results of their clinical check-ups and ultrasound tests on the same day, they would like to see the doctors again on another day.

Simple Clinic

The spatial pathways of outpatient journeys in the Simple Clinic are the simplest among the Top 5 departments due to the smallest number of clinical processes and the low probability of second diagnoses on an outpatient journey. Numerous patients with chronic diseases come for medicines only so that their patient journeys can be finished in a short time.

Obstetrics

The spatial pathways of outpatient journeys in the Obstetrics Department are simple, too. Only two clinical processes related to the hotfloor (i.e. clinical check-ups or ultrasound tests) are required during the outpatients' stay in the hospital. Though the rate of second diagnosis was 31% in the sampling test, 75% of patients who required second diagnosis could complete their journeys on the same half-day; only one patient completed her journey in a whole day and no one had to come again on another day. It makes sense to locate the consulting rooms, the cashier, and the Clinical Laboratory next to each other on two adjacent floors because some samples for clinical check-ups are collected by the doctors during the diagnoses, but outpatients can get the samples only after payment.

Surgery

The spatial pathways of outpatient journeys in the Surgery Department are most complicated among the Top 5 outpatient departments. As is shown, a large number of surgical outpatients had to visit the Ultrasonography Department, the Radiology Department, and/or the Clinical Laboratory Department, but only some of them visited the Endoscopy Department. Over half of the surgical patients in the sampling test needed a second diagnosis. Around 84% of the outpatients could have their second diagnoses within the same half-day except for five patients: one patient made an appointment for a DX test 7 days later; the other four outpatients received the results of clinical check-ups or ultrasound tests on the same day, but only one of them preferred to have the second diagnosis right away.

On the whole, the mapping shows us the complexity level of the pathways of outpatient journeys in the Top 5 outpatient departments in a visual overview:

1 The Departments of Internal Medicine and Gastroenterology have five pathways that look complicated owing to the requirement of endoscopic tests and second diagnosis on the same day. Most of the complicated pathways are followed by a small number of patients; Pathway 1, the simplest without any second diagnosis, turns out to be mainstream.

2 There are four pathways in the Surgery Department. It seems that generally speaking, the pathways are less complicated than the ones in the Departments of Internal Medicine and Gastroenterology; nevertheless, a large number of surgical patients follow the complicated Pathway 3, which leads to a high rate of second diagnosis.

3 The Simple Clinic and the Obstetrics Department only have three simple pathways. Most of the outpatients from the Top 5 departments can complete their patient journeys on the same half-day, and their demands for improvement are probably limited to smooth pathways and short waiting times. However, a small number of outpatients from the Departments of Surgery and Obstetrics may have to stay in the hospital for a whole day, and their experiences should be taken seriously, too.

5.4.2.3 Experience of outpatients in their journeys

In all patient journeys of the Top 5 outpatient departments, there are five key points in major processes where outpatients have to wait or queue up and the patient traffic system connects areas mainly in a vertical way.

1 Key points

Registration

Whether outpatients have to visit the registration area at the very beginning of their journeys depends on the appointment rate. The bar chart compares the appointment rate of the Top 5 outpatient departments in the sampling test according to the data in 2017 (Figure 5.29). It shows that the average appointment rate was high, especially in the Departments of Obstetrics, Surgery, and Internal Medicine.

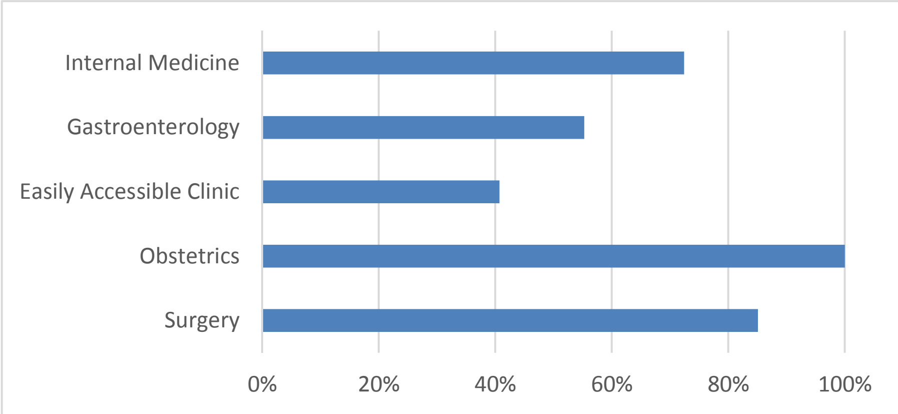


FIG. 5.29 Outpatient appointment rate in the sampling test

FIG. 5.30 Registration area in the entrance hall

That is to say, a large number of outpatients visited the hospital with prior appointments so that they could go to the consulting area directly without any stops at the Registration. The Main Registration is located in the entrance hall, and several self-service terminals for both registration and payment are distributed on the ground floor and the 1st floor, which few patients used (Figure 5.30). According to the outcome of the patient satisfaction survey conducted by the author, only one outpatient expected the area of registration to be more spacious.

Waiting area in the consulting function

There are two waiting areas in some large departments such as the Departments of Internal Medicine, Gastroenterology, and Surgery. Theoretically, outpatients from these departments would stay in the waiting area 1 when they arrive. If they see their names appear on the screen, they move to Waiting Area 2, which is located in the corridor near the consulting rooms. However, in practice, outpatients prefer to go to the Waiting Area 2 immediately. In small departments, on the other hand, such as the Departments of ENT and Ophthalmology, there is only one waiting area which looks similar to the waiting areas 2 in the large departments (Figure 5.31). As a result, it is always crowded outside the consulting rooms during rush hours. Many patients stand there and wait, looking anxious. In Waiting Area 1, no TV programs are displayed on the screen so outpatients chat quietly in small groups, or entertain themselves with their mobile phones. Drinking water and free wifi are provided.

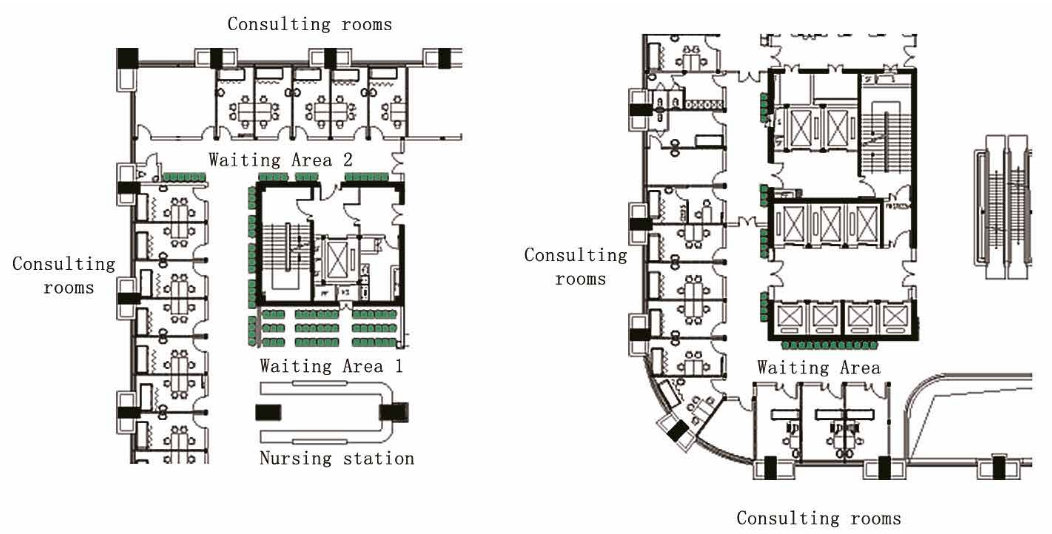


FIG. 5.31 Waiting areas in an outpatient department (Left: In large departments; Right: In small departments (Adapted from the floorplans provided by the hospital))

Based on the results of the patient satisfaction survey, many complaints concern the environment and the procedures. With respect to the environment, 30% of the outpatients complained about the lack of chairs in the waiting areas, the highest dissatisfaction rate of all the evaluation elements in the survey.

Around 13% of the outpatients said there were not enough consulting rooms, which is probably caused by the absence of generic consulting rooms and, which frustrates the effective use of the available spaces. Take the Gastroenterology Department as an example, the twelve consulting rooms belong to nine specialist clinics (Figure 5.31 left). With regard to the procedures, outpatients were not happy with the long waiting times, and around 20% of them criticized the queuing system. In comparison, less than 10% of the outpatients expressed their concerns about the decoration and daylight in the waiting areas and the consulting rooms.

Cashier

There are two cashiers in the entire outpatient wing, the one on the 1st floor is the Main Cashier and the one on the 4th floor is a supplementary one. Outpatients can also pay the bills via mobile phone or at any self-service terminal. Outpatients used to pay the bill at the manual cashiers so as to receive reimbursement from the medical insurance fund. But since June 2018, outpatients can get the reimbursement regardless of their payment method. More often than not, the staff of the cashiers would teach patients how to pay via mobile phone. Therefore, only 12% of the outpatients wanted more cashiers and self-service terminals. Placing more cashier points was not at the top of the list.

Waiting area in the hotfloor departments for diagnosis

Each hotfloor department for diagnosis usually has one separate waiting area, where outpatients find seats after check-in at department nursing stations.

According to the statistical analysis in 2017 (Figure 5.32), a large number of outpatients who were seen in the Clinical Laboratory were from the Departments of Internal Medicine, Obstetrics, Simple Clinic, and Gynecology. They did not have to wait in the Clinical Laboratory when delivering samples; it took only a few minutes waiting for blood drawing. Most of them waited for the results. Therefore, few patients stayed in the waiting area of the Clinical Laboratory because they could receive the results via mobile phone and print them at the self-service machines.

In the Ultrasonography Department, around 53% of the outpatients were from the Departments of Gynecology and Obstetrics. They waited for tests. As a consequence of the extra full-bladder requirement of some gynecological tests, outpatients always stayed in the waiting area, which was crowded all the time.

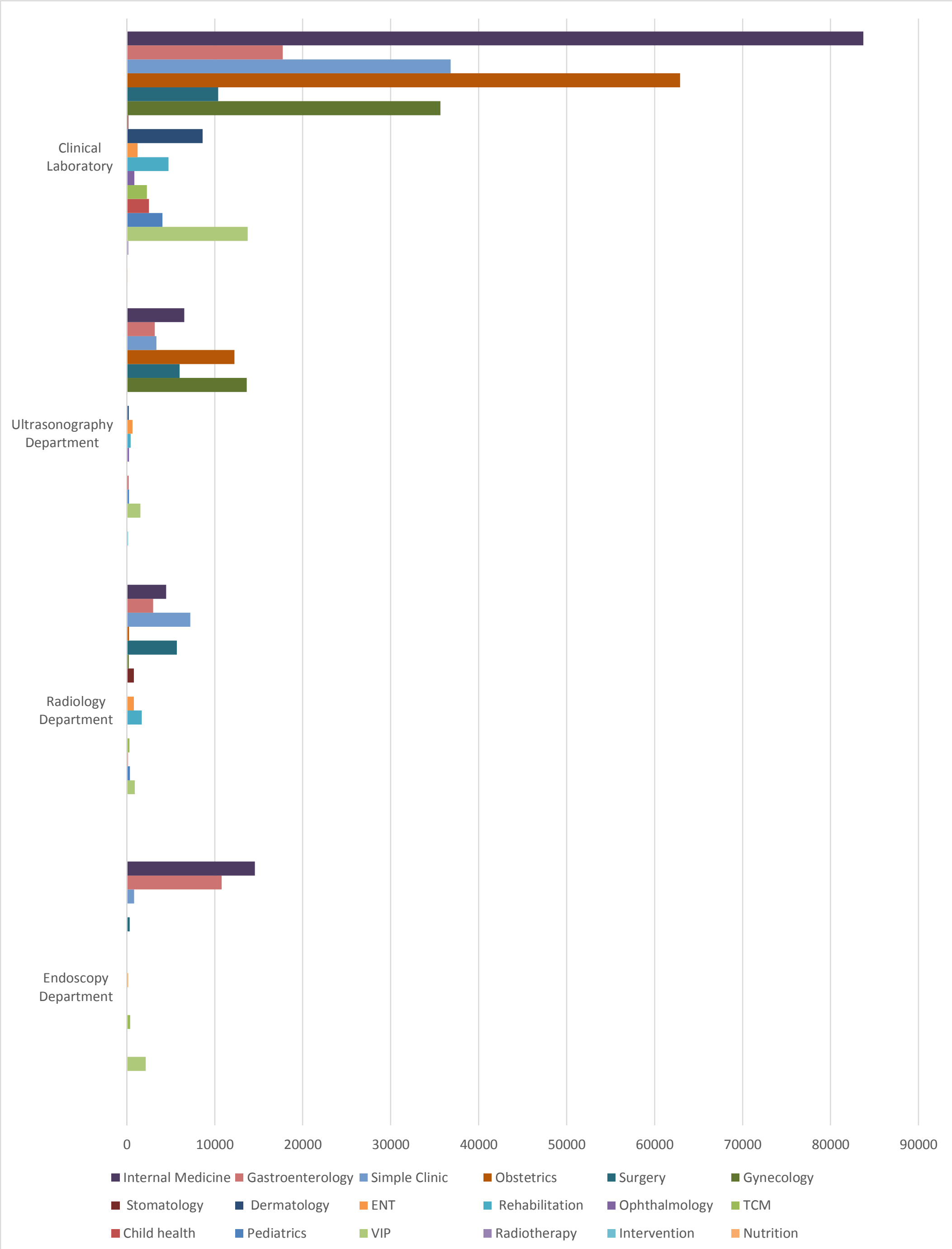


FIG. 5.32 The gross number of outpatient visits to the major hotfloor departments in 2017

In the Radiology Department, outpatients are mainly from the Simple Clinic, Surgery, Internal Medicine, and Gastroenterology. It usually takes less than an hour to complete the process of a DR test or a DX test and get the results, while it takes at least two hours to get the result of a CT test. Moreover, MRI tests require appointments the day before. Patients prefer to stay in the waiting area when waiting for tests, but would like to walk around or leave the hospital when waiting for results.

In the Endoscopy Department, almost 86% of the outpatients were from the Departments of Internal Medicine and Gastroenterology. Appointments and preoperative fasting were required before the tests. Therefore, only a small number of outpatients took the tests on the same day.

According to the outcome of the patient satisfaction survey, there are enough seats for patients in the Departments of Clinical Laboratory, Radiology, and Endoscopy, but not enough in the Ultrasonography Department. One outpatient strongly complained against the environment of the waiting area in the Ultrasonography Department, he/she said it should be larger and equipped with more chairs.

Waiting area of Pharmacy

Both the Main Pharmacy and Traditional Chinese Medicine Pharmacy are located on the 1st floor next to the main cashier. The waiting area has five rows of chairs for the Main Pharmacy and two for Traditional Medicine Pharmacy in the waiting area. When outpatients pay the bills, the Pharmacies will receive the orders immediately and prepare them automatically. Outpatients' names will appear on the screen showing in which windows they can pick up their medicine when it is ready. Outpatients only spend less than 5 minutes waiting for medicine and there are enough chairs for them. As a result, outpatients are rarely dissatisfied with the Pharmacy. It is worth noting that the distribution of chairs should be improved, as some chairs obstruct the queueing process (Figure 5.33).

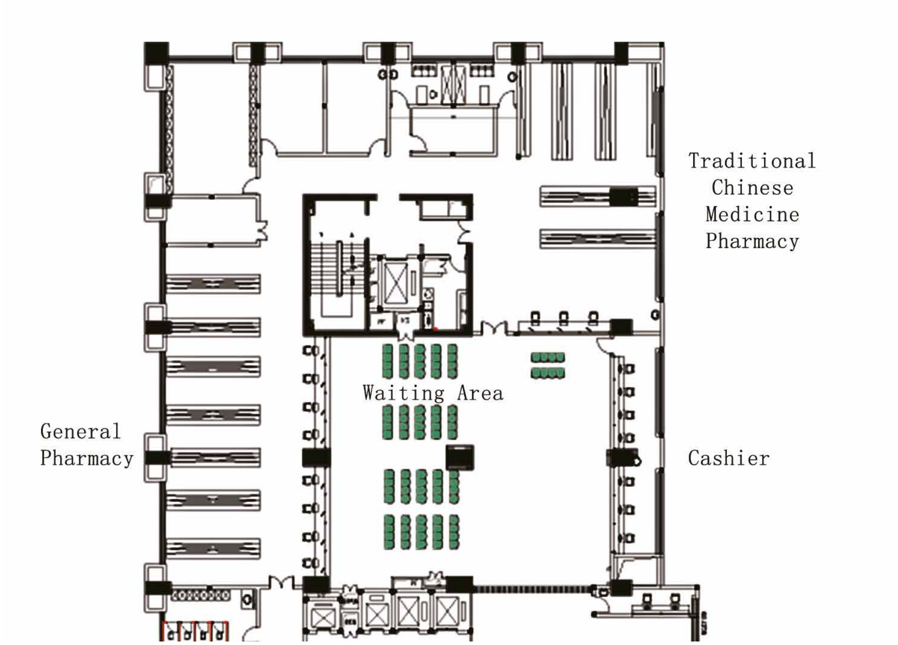


FIG. 5.33 The waiting area of the Pharmacies
(Adapted from the floorplans provided by the hospital)

2 Patient traffic system and wayfinding

One escalator, four groups of elevators, and one staircase are located in the public area of the outpatient clinics. One escalator, two groups of elevators (i.e. 9 elevators in total), and one staircase constitute the main structure of the outpatient traffic system. The other two groups of elevators are exclusively for staff and surgeries (Figure 5.34). According to the outpatient journey maps, the movements of outpatients from the Top 5 Departments take place on nearly all floors of the outpatient clinics. In other words, an outpatient has to visit 5-7 floors out of 7 in an outpatient journey. As a result, vertical transportation between floors plays a pivotal role in the outpatient traffic system. Observation made clear that many patients prefer to take the escalator rather than wait for elevators. Patient satisfaction surveys confirm that nearly all outpatients appreciated the escalators, while 25% of them complained about the long waiting times for elevators: the highest expression of serious dissatisfaction of all the evaluation elements in the survey.

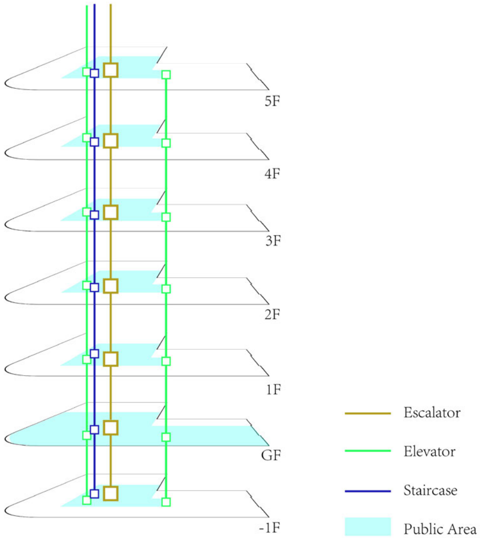


FIG. 5.34 Patient traffic system in the outpatient clinics

As the size of a floor is less than 3000 sqm and all the functional areas are located around the escalators, outpatients can find their destinations easily. In addition, indoor navigation is facilitated by wayfinding apps on mobile phones. Consequently, few outpatients in the survey complained about the signage and orientation system.

5.4.3 Inpatient journeys in the hospital

5.4.3.1 Major inpatient journeys

The total number of inpatient discharges in the 6th Affiliated Hospital of Sun Yat-sen University was 53,437 in 2017. It shows that the number of discharges in the Top 5 inpatient departments made up nearly 90% of the total number. Among the Top 5 departments, the number of inpatient discharges from the Departments of Internal Medicine and Surgery ranked highest: they accounted for over two-thirds of the total number (Table 5.23). Compared with the nationwide ranking (Table 3.4), the one in the 6th Affiliated Hospital of Sun Yat-sen University is similar to the Top 5 departments except for TCM, but the weighting of Internal Medicine Department and the Surgery Department was a bit higher.

TABLE 5.23 Number of discharges in major inpatient departments in the 6th Affiliated Hospital of Sun Yat-sen University in 2017

No.	Department	Number of visits	Percentage %
1	Internal Medicine	23,584	38.90
2	Surgery	20,166	33.26
3	Obstetrics	4,248	7.01
4	Fertility Center	3,513	5.79
5	Gynecology	1,926	3.18
6	Pediatrics	1,669	2.75
7	VIP	1,594	2.63
8	ENT	1,530	2.52
9	Neurology	1,101	1.82
10	Rehabilitation/Radiotherapy	1,044	1.72
11	ICU	206	0.34
12	Comprehensive Care	42	0.07
Top 5 departments		53,437	88.15
Top 10 departments		60,375	99.59
Total		60,623	100

(Data source: The 6th Affiliated Hospital of Sun Yat-sen University)

Similar to Panyu Central hospital, the inpatient departments in the 6th Affiliated Hospital of Sun Yat-sen University are subdivided into several wards, some of which contain multiple functions. Take Ward 2 of the Internal Medicine Department as an example. It combines Endocrinology, TCM, Rheumatology, and Nephrology, which share similar clinical and administrative processes. Therefore, these Top 5 inpatient departments are considered representative of the inpatient journeys in the case study. If the inpatient journeys of these departments could be improved, it would enhance the overall inpatient experience in the hospital would.

Over 160 medical records of inpatients from the Top 5 inpatient departments in 2017 were collected at random, 100% of which are valid samples (Table 5.24). Accordingly, inpatient journeys of these Top 5 departments can be described as follows (Table 5.25) :

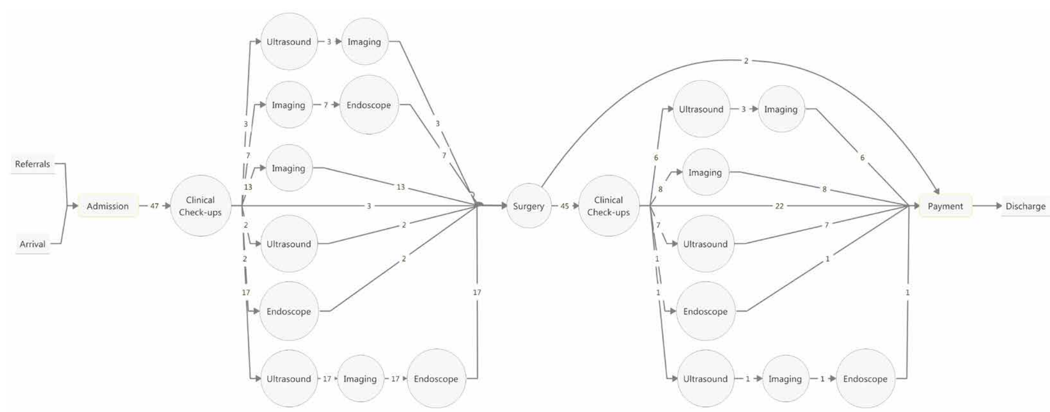
TABLE 5.24 Samples and valid samples

	Samples	Valid samples
Internal Medicine	47	47
Surgery	83	83
Obstetrics	12	12
Fertility Center	12	12
Gynecology	12	12
Total number	166	166

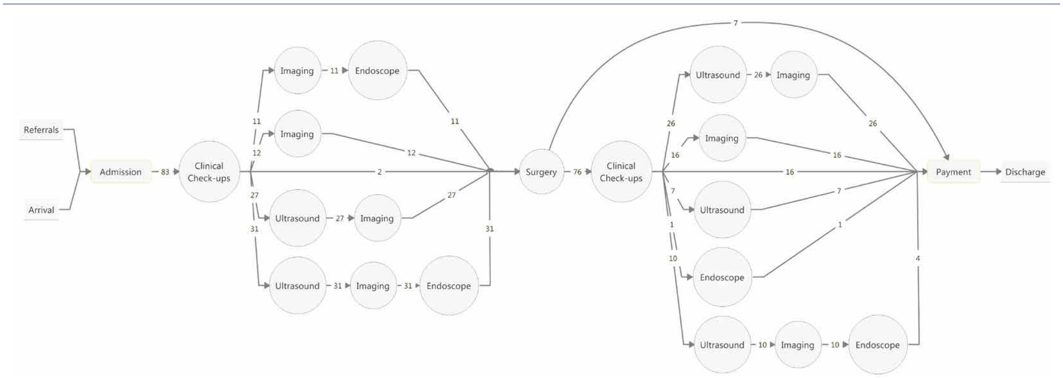
TABLE 5.25 Major inpatient journeys in the 6th Affiliated Hospital of Sun Yat-sen University

Patient Journeys

Inpatient dept. Internal Medicine



Inpatient dept. Surgery



Inpatient dept. Obstetrics

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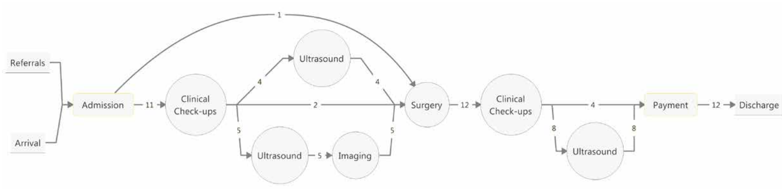
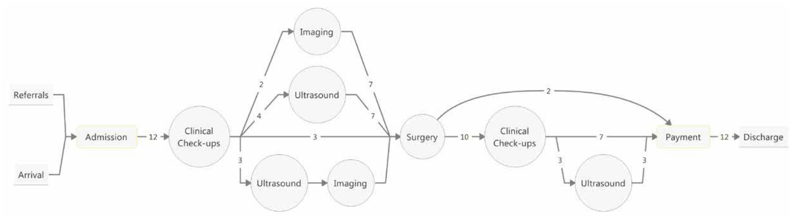
TABLE 5.25 Major inpatient journeys in the 6th Affiliated Hospital of Sun Yat-sen University

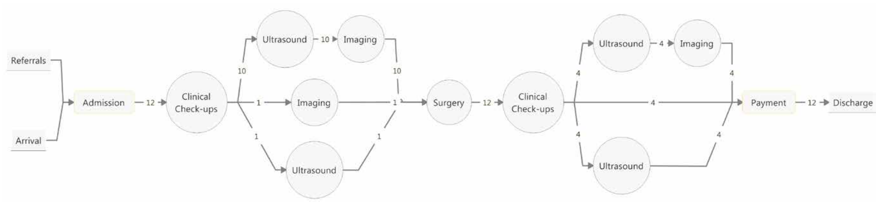
Patient Journeys



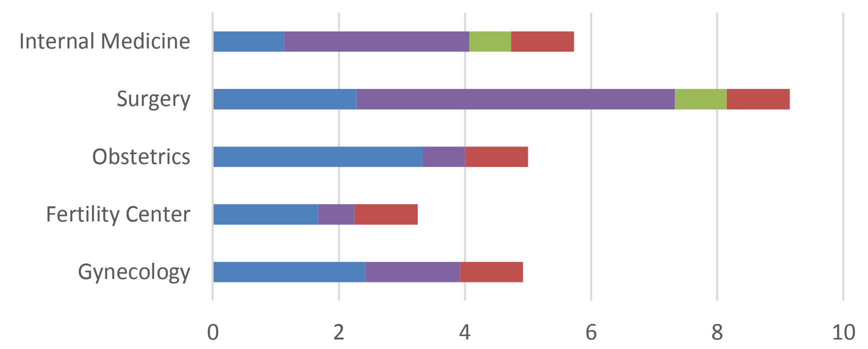
Inpatient dept. Fertility Center



Inpatient dept. Gynecology



The Top 5 inpatient departments share similar clinical and administrative processes, which can be divided into two parts: before and after surgery. The bar chart compares the average number of clinical processes in the hotfloor in the sampling test in 2017, including ultrasound, imaging, endoscopy, and surgery, where inpatients have to visit the hotfloor departments themselves (Figure 5.35). Clinical check-ups are excluded because the samples are taken bedside and delivered to the Clinical Laboratory by nurses. The chart shows that, on average, inpatients from the Departments of Surgery and Internal Medicine had the first and second highest average number of clinical processes in the hotfloor in their patient journeys, while the patients from Fertility Center had the lowest average number. The ALOS is much longer in the 6th Affiliated Hospital of Sun Yat-sen University than in Panyu Central Hospital, especially in the Departments of Surgery and Internal Medicine.



	Gynecology	Fertility Center	Obstetrics	Surgery	Internal Medicine
Ultrasound test rate	2.42	1.67	3.33	2.28	1.13
Imaging test rate	1.5	0.58	0.67	5.05	2.94
Endoscope rate	0	0	0	0.82	0.66
Surgery rate	1	1	1	1	1

FIG. 5.35 The average number of clinical processes in hotfloor among inpatient departments

Combining the average number of clinical processes in the hotfloor with the data of ALOS in the sampling test, it can be found that the Departments of Surgery and Internal Medicine, in spite of them having the highest average number of clinical processes in the hotfloor, ranked third and fourth respectively among the Top 5 departments in terms of the load per hospitalization day. By contrast, inpatients from Departments of Obstetrics and Fertility Center had the heaviest loads per hospitalization day. Therefore, inpatients from the Departments of Gynecology, Internal Medicine, and Surgery may have more leisure time during their stays in the hospital (Figure 5.36).

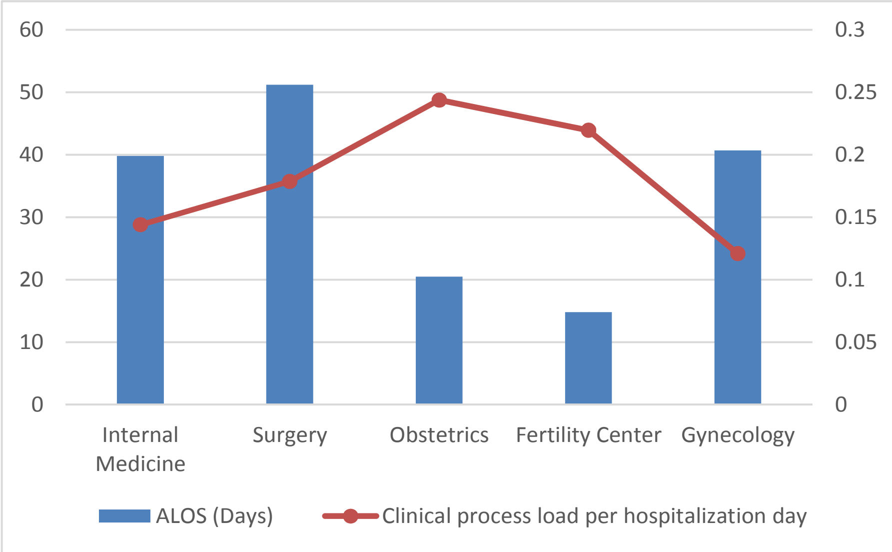


FIG. 5.36 Average Length of Stay (ALOS) and clinical process load per hospitalization day in the Top 5 inpatient departments

In the 6th Affiliated Hospital of Sun Yat-sen University, inpatient departments are subdivided into several wards, too. Even in the same inpatient department, the need for clinical processes differs among the wards. Take the Internal Medicine Department as an example. In the sampling test, the Oncology Ward required fewer ultrasound tests and endoscopic tests than the Digestive Internal Medicine Ward during patients' stays in the hospital (Figure 5.37). While in the Surgery Department, the Anus & Intestine Surgery Ward required the fewest ultrasound tests and imaging tests among the three wards (Figure 5.38).

On the whole, inpatients from the Departments of Gynecology, Internal Medicine, and Surgery may have more leisure time during their stays in the hospital owing to the light average daily load of clinical processes in their patient journeys. They may have higher expectations of the facilities and the environment in the hospital.

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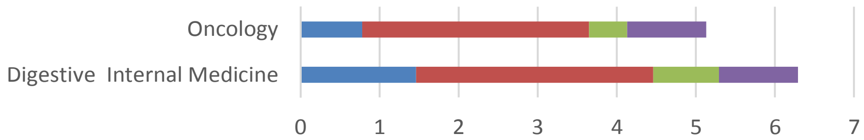
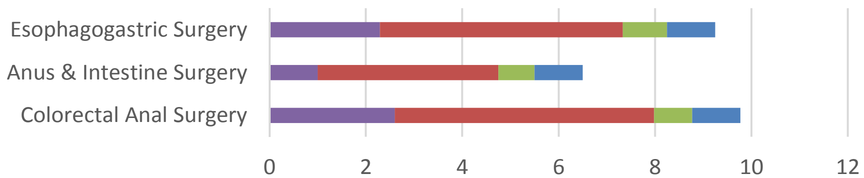


	Digestive Internal Medicine	Oncology
Ultrasound test rate	1.46	0.78
Imaging test rate	3	2.87
Endoscope rate	0.83	0.48
Surgery rate	1	1

FIG. 5.37 The average number of clinical processes in wards in the Internal Medicine Department



	Colorectal Anal Surgery	Anus & Intestine Surgery	Esophagogastric Surgery
Ultrasound test rate	2.6	1	2.29
Imaging test rate	5.38	3.75	5.04
Endoscope rate	0.79	0.75	0.92
Surgery rate	1	1	1

FIG. 5.38 The average number of clinical processes in wards in the Surgery Department

5.4.3.2 Major inpatient journeys mapping

For the purpose of visualization, inpatient journeys of the Top 5 departments in the 6th Affiliated Hospital of Sun Yat-sen University are mapped on the floor plans (Table 5.26). As can be seen, the floors inpatients from the Top 5 departments most visit are the basement, 3rd floor, and 8th floor. Additionally, the Admission and Discharge Center, which includes a cashier function, is located on the ground floor (Table 5.27). The visit to the Center is both the first and the last processes in the patient journey.

Internal Medicine

The spatial pathways of inpatient journeys in the Internal Medicine Department show that there is no discernible pattern of the distribution of wards in the Department except for Ward 5 and Ward 6. Ward 5 and Ward 6 concern Digestive Internal Medicine and are placed on the same floor so that medical resources can be shared between the Wards. However, even though both Ward 2 and Ward 9 concern nephrology, one of them is located on the 11th floor while the other one is on the 21st floor. The wards in the department have stronger connections with the Radiology Department than with the other departments in hotfloor.

Surgery

The spatial pathways of inpatient journeys in the Surgery Department are similar to the ones in the Internal Medicine Department. The distribution of wards seems to be logical. Some Wards with similar functions are placed on the same floor, such as Ward 11 and Ward 6, Ward 7 and Ward 8. The procedural connections between wards, the Radiology Department, as well as the Ultrasonography Department, are strong.

TABLE 5.26 Major inpatient journeys mapping in the 6th Affiliated Hospital of Sun Yat-sen University

Patient Journeys

Internal Medicine

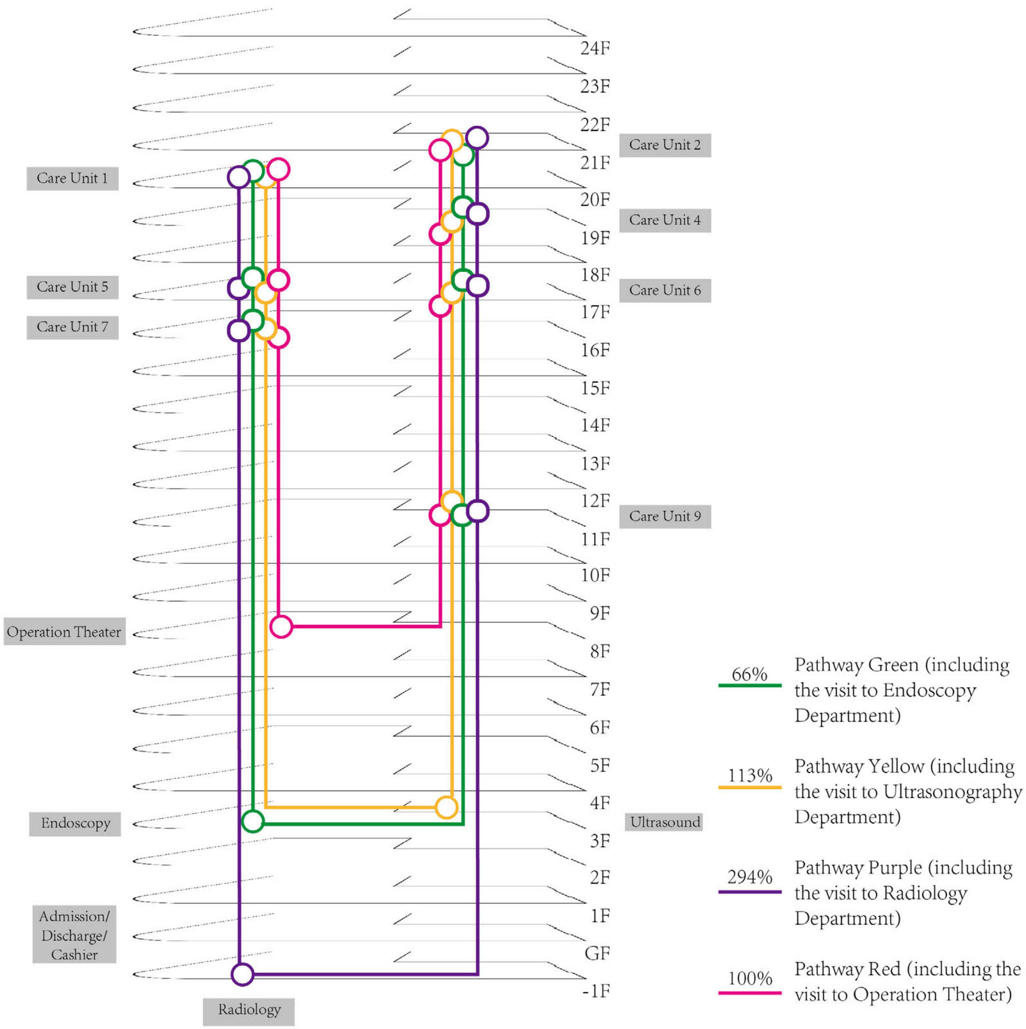


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TABLE 5.26 Major inpatient journeys mapping in the 6th Affiliated Hospital of Sun Yat-sen University

Patient Journeys

Surgery

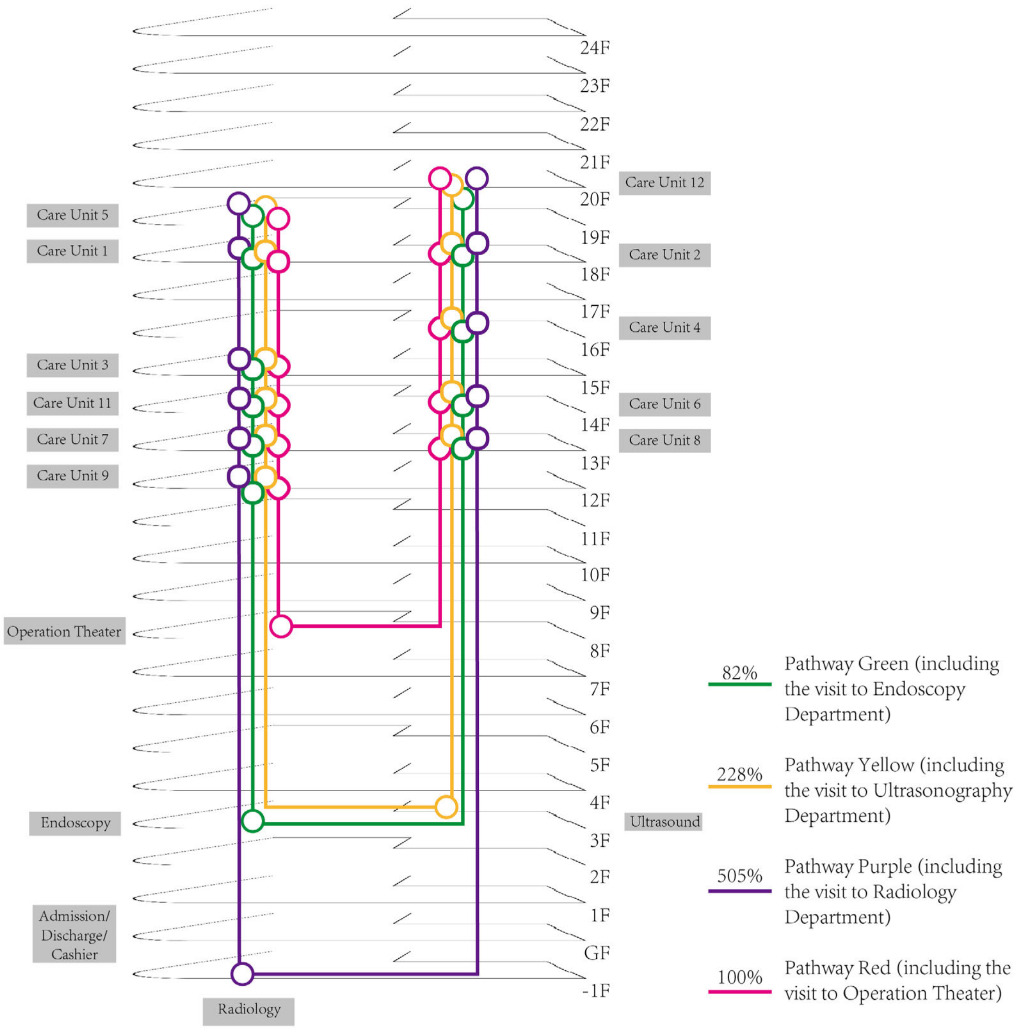

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TABLE 5.26 Major inpatient journeys mapping in the 6th Affiliated Hospital of Sun Yat-sen University

Patient Journeys

Obstetrics

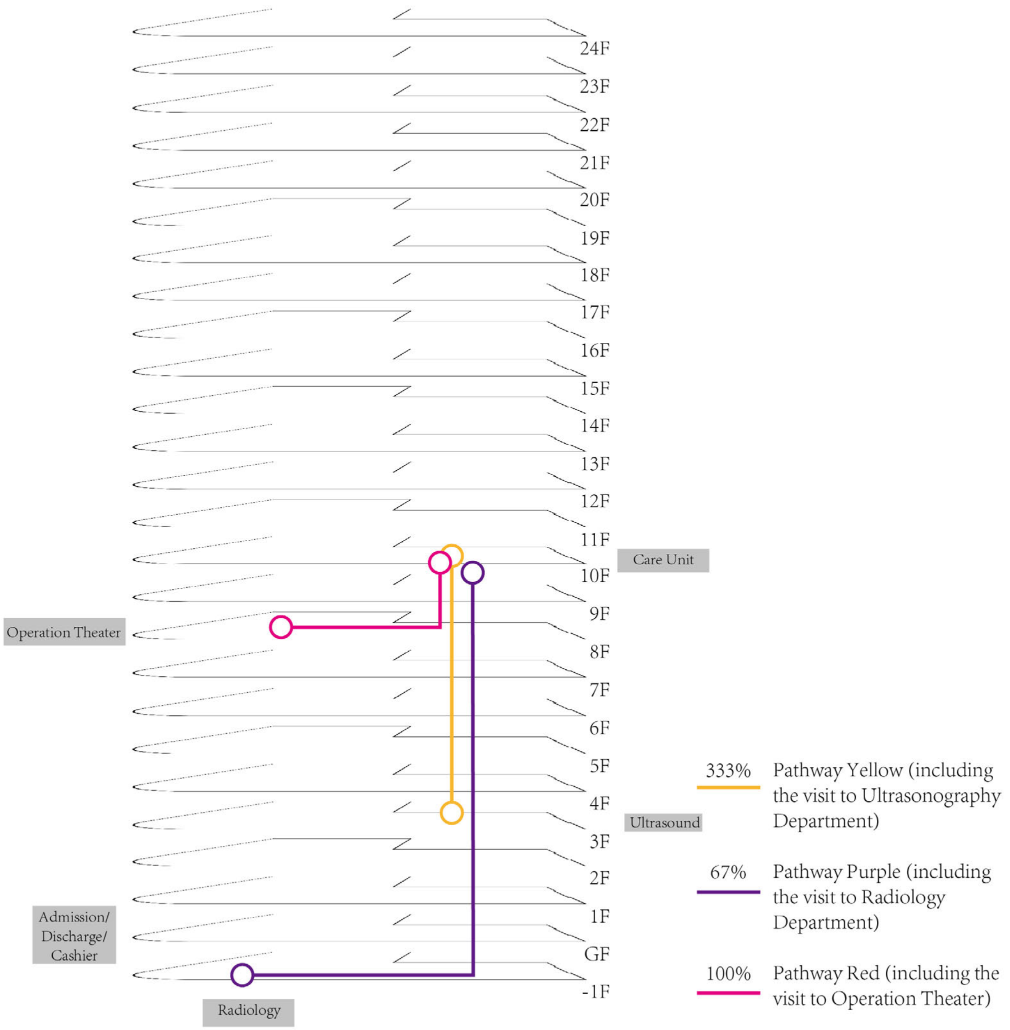

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TABLE 5.26 Major inpatient journeys mapping in the 6th Affiliated Hospital of Sun Yat-sen University

Patient Journeys

Fertility Center

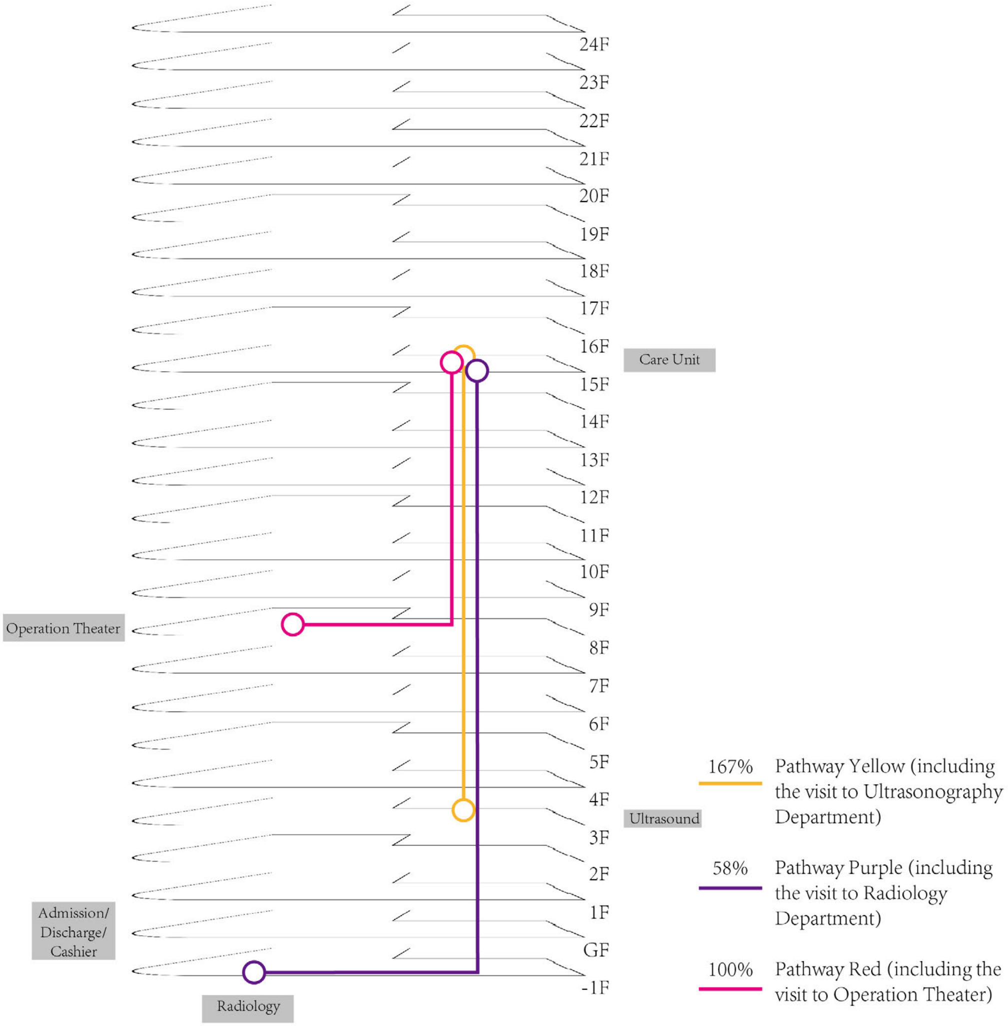

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TABLE 5.26 Major inpatient journeys mapping in the 6th Affiliated Hospital of Sun Yat-sen University

Patient Journeys
Gynecology

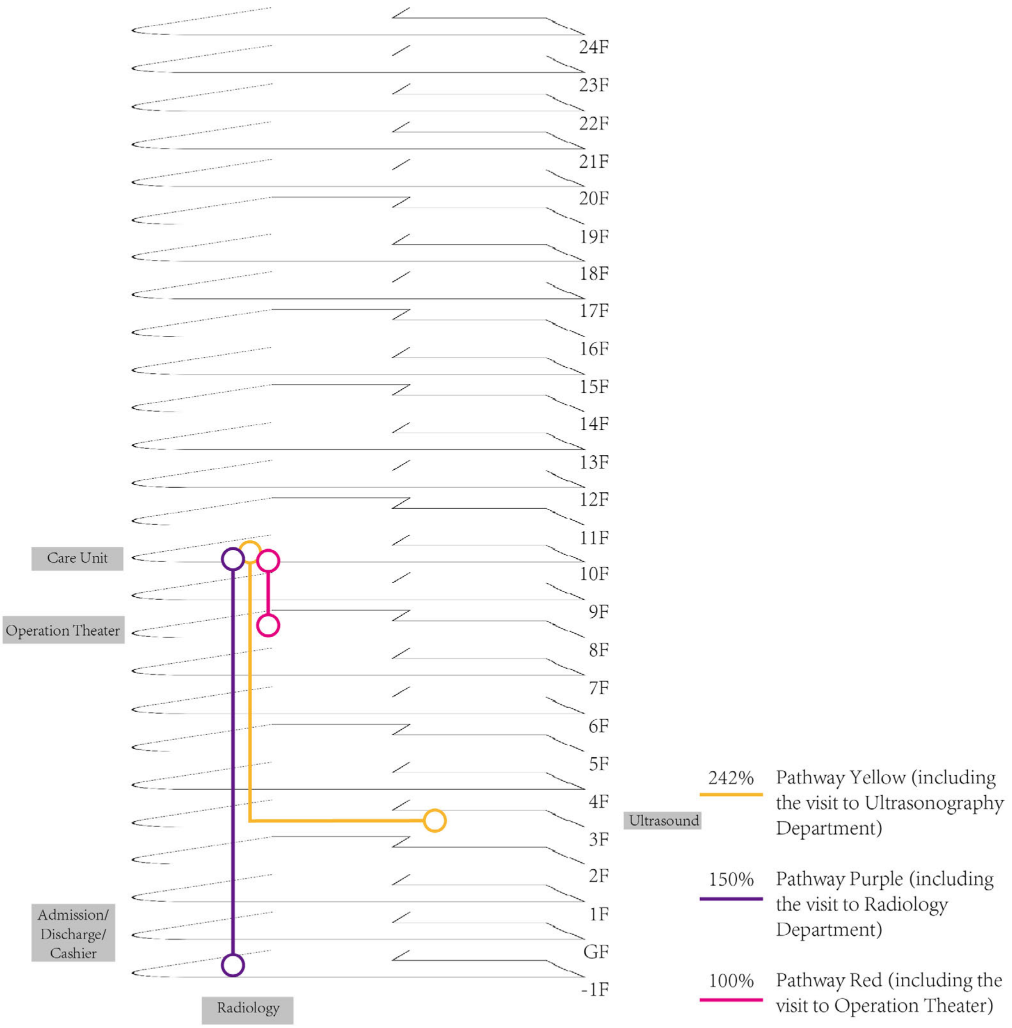


TABLE 5.27 Distribution of the areas where inpatients from the Top 5 departments stay and visit

	Hotfloor departments	Ward Model A	Ward Model B
25F		-	-
24F		-	-
23F		-	-
22F		-	-
21F		-	Internal Medicine
20F		Internal Medicine	Surgery
19F		Surgery	Internal Medicine
18F		Surgery	Surgery
17F		Internal Medicine	Internal Medicine
16F		Internal Medicine	Surgery
15F		Surgery	Fertility Center
14F		Surgery	Surgery
13F		Surgery	Surgery
12F		Surgery	-
11F		-	Internal Medicine
10F		Gynecology	Obstetrics
9F		-	-
8F	Operation Theater	-	-
7F	-	-	-
6F	-	-	-
5F	-	-	-
4F	-	-	-
3F	Endoscopy, Ultrasonography	-	-
2F	-	-	-
1F	-	-	-
GF	Admission/Discharge/ Cashier	-	-
-1F	Radiology	-	-

Obstetrics/ Fertility Center/ Gynecology

The spatial pathways of inpatient journeys in the Departments of Obstetrics, Fertility Center, and Gynecology are simpler than the ones in the Departments of Internal Medicine and Surgery. No patients have to visit the Endoscopy Department. Instead, they visit the Ultrasonography Department more frequently.

To summarize, the mapping shows us the complexity level of the pathways of inpatient journeys in the Top 5 inpatient departments in a visual overview.

1. There are four common pathways of inpatient journeys in the Departments of Internal Medicine and Surgery. There are three pathways of journeys in the Departments of Obstetrics, Fertility Center, and Gynecology.

2. Unlike the linear pattern of spatial pathways of outpatient journeys, both the starting point and endpoint of a pathway of an inpatient journey are the wards. That is to say, the pattern of spatial pathways of inpatient journeys places wards at the core.

3. There are no clear patterns of the distribution of wards which belong to the same inpatient department.

5.4.3.3 Experience of inpatients in their journeys

In the entire patient journeys of the Top 5 inpatient departments, there are three key points in major processes.

1 Key points

Admission and Discharge Center

All the inpatients (or their companions) need to visit the Admission and Discharge Center, which is located at the entrance hall on the ground floor twice: first at the very beginning of their journey, the second time before dismissal. Observation shows that inpatients or their companions have to queue up for admission or discharge. Several chairs are provided in the waiting area but a seat is not always available. In the patient satisfaction survey, an inpatient strongly suggested placing more chairs in this area.

Wards

There are two types of wards in the hospital. The number of inpatient beds is 54 in Model A and 49 in Model B. Both models are linear in their spatial configuration, placing the residential area for staff at one end and the medical support area at the core, surrounded by inpatient bedrooms. A shared leisure space for inpatients is found between the two wards (Figure 5.39).

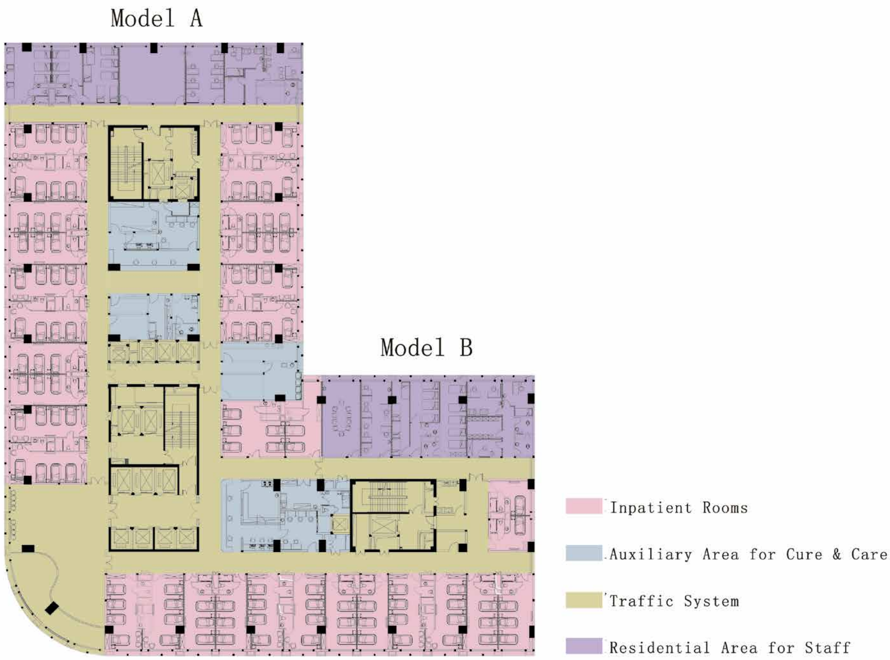


FIG. 5.39 Floor plans of wards (Top left: Model A; Bottom right: Model B)
(Adapted from the floorplans provided by the hospital)

Wards are the places where inpatients stay for a long time on the same day. As a consequence, in the patient satisfaction survey, inpatients complained about the aspects of environment and the traffic. On the aspect of environment, nearly half of the inpatients complained about the small size of laundry rooms. Moreover, one-fourth of them expressed serious dissatisfaction, which is the highest of all the evaluation elements in the survey. Around 20% of the inpatients were not satisfied with the small size of the storage space in inpatient rooms, the use of the shared leisure space, and the lack of commercial facilities in the hospital. Concerning the shared leisure space, one inpatient complained about the lack of chairs and another inpatient said there was no smoking area. According to the observation, even though the size of the shared leisure space is almost 180 sqm, few patients use it, due to the lack of facilities and its spatial configuration (Figure 5.40). Regarding the commercial facilities in the hospital, around 10% of the outpatients called for more facilities in the satisfaction survey, the percentage doubles for inpatients.

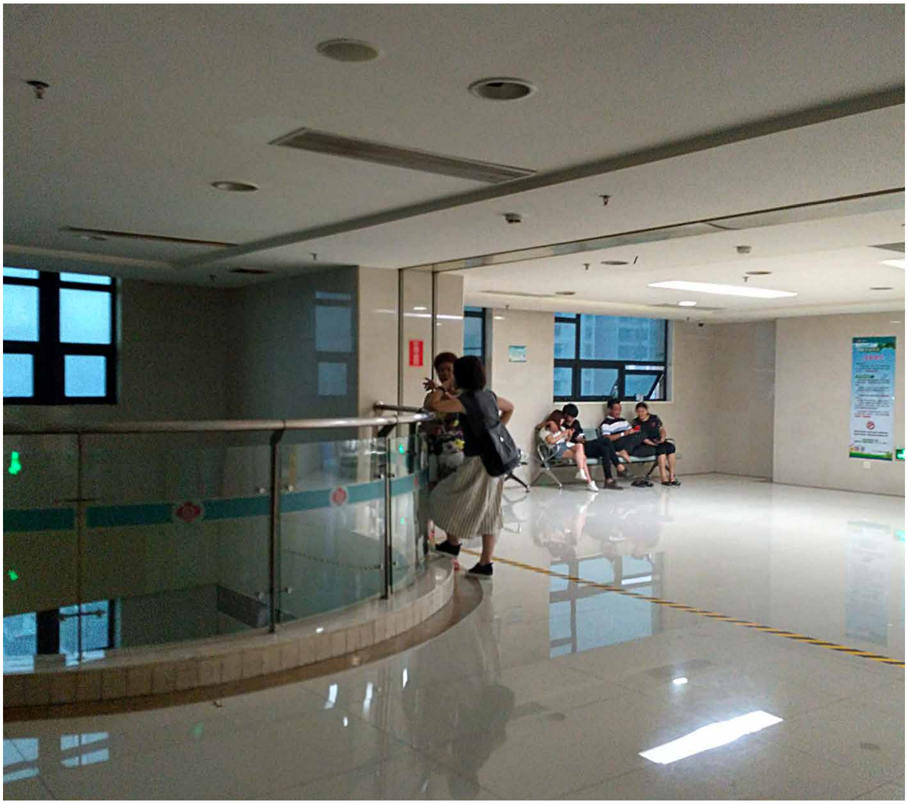


FIG. 5.40 Shared leisure space between two wards

Access to the hotfloor

Statistics show that the Surgery Department had the largest number of inpatient visits to the three major hotfloor departments (Figure 5.41). Internal Medicine Department ranked 2^{nd} of the Top 5 inpatient departments. The distinction between the Top Two and the other three was obvious. As a matter of fact, inpatients can easily reach the hotfloor no matter on which floor the wards are located thanks to the use of the same vertical traffic system. Furthermore, two elevators and separate lobbies are exclusively reserved for inpatients who visit the Operation Theater and hotfloor departments with appointments. Nevertheless, the problem is the long waiting times for elevators, which led to serious dissatisfaction.

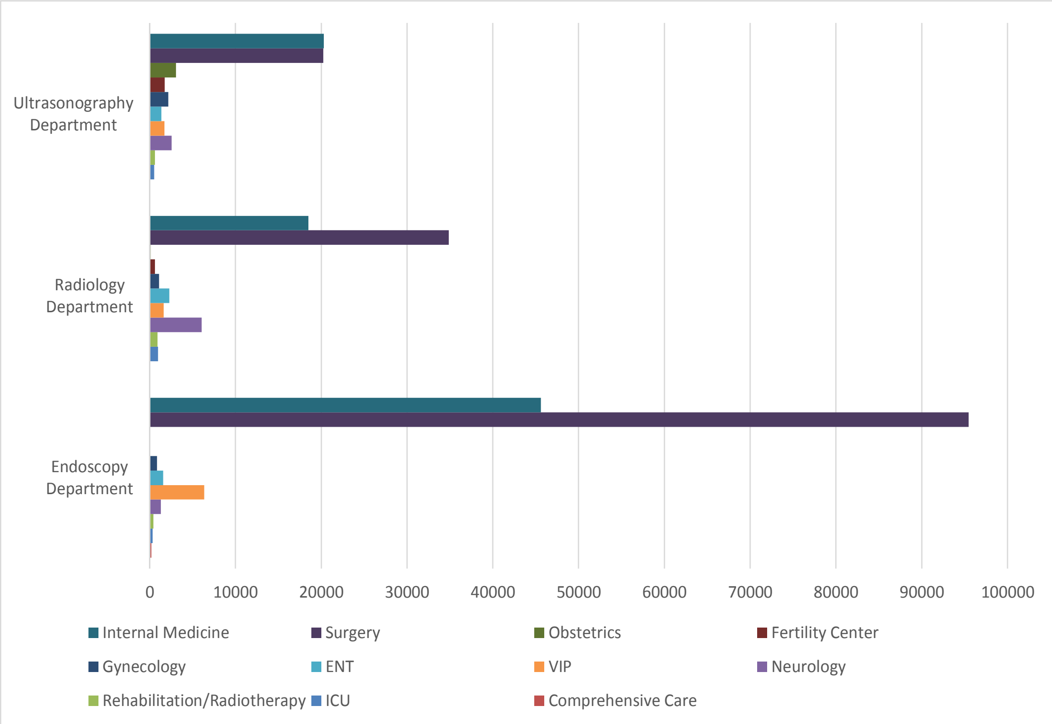


FIG. 5.41 The gross number of inpatient visits to the major hotfloor departments in 2017

2 Patient traffic system

A group of elevators and a staircase constitute the main structure of the inpatient traffic system (Figure 5.42). It is totally vertical. A large number of complaints are related to this system. 46% of the inpatients doubted whether the number of elevators was enough, and the rate of serious dissatisfaction ranked 2nd among all the evaluation elements in the survey. Additionally, almost 53% and 22% of the inpatients criticized the connection with the hotfloor. Hospital managers have tried to solve this problem. For example, there are different rules for the use of elevators in leisure time and during rush hours. Inpatients are allowed to book dinner via mobile phone, then the canteen staff will deliver the food to the inpatient rooms on time so as to reduce the number of people taking the elevators. But the elevators for patients are still crowded and there are long-time waiting times, especially during rush hours.

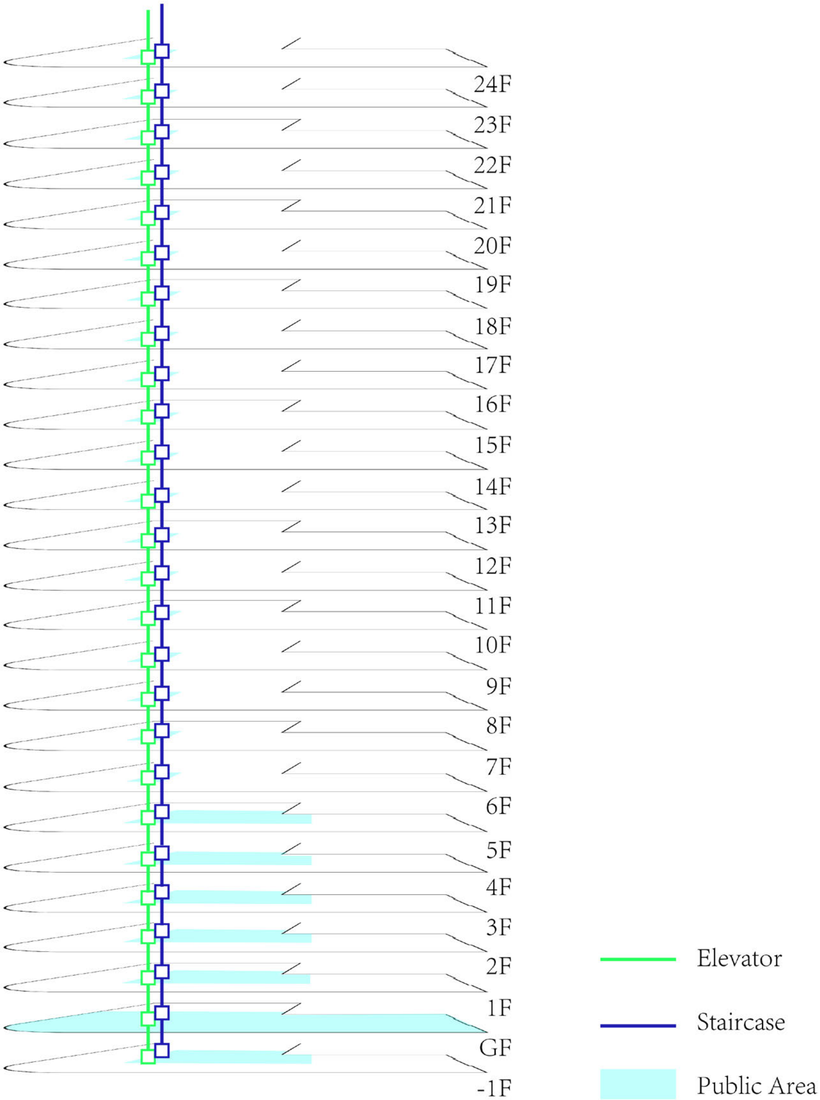


FIG. 5.42 Patient traffic system in inpatient departments

5.4.4 Acute patient journeys in the hospital

5.4.4.1 Major acute patient journeys

In the 6th Affiliated Hospital of Sun Yat-sen University, the Emergency Department is located on the ground floor in a three-story temporary building where only medical acute patients, surgical acute patients, and pediatric acute patients are accepted. Other acute patients, usually only a small number, would be delivered to the wards directly. The data of 72 acute patients in the Emergency Department were collected, and all of them are valid. Therefore, the acute patient journeys of the Emergency Department can be described as follows: (Figure 5.43)

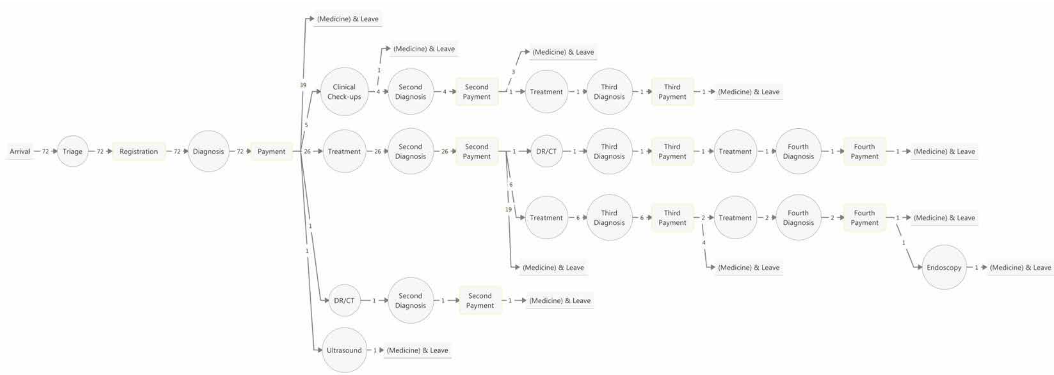
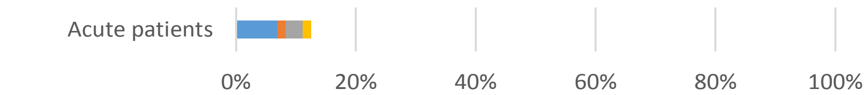


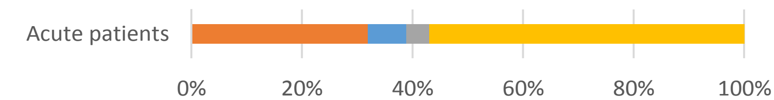
FIG. 5.43 Major acute patient journeys in the 6th Affiliated Hospital of Sun Yat-sen University

The bar chart shows that acute patients require a small number of clinical processes in general (Figure 5.44). Sampling for clinical check-ups is conducted in the Emergency Department. Only ultrasound tests, imaging, and endoscopic tests require acute patients to visit the main building. In the sampling test, 43% of the acute patients needed follow-up diagnoses, the rate of which was higher in comparison with Panyu Central Hospital (Figure 5.45). It seems that more acute patients who visited the hospital were in emergencies. This is confirmed by the statistical analysis of the waiting time for diagnosis. Near 30% of them saw the doctors in 10 minutes. To some extent, it shows that they might meet the high acuity criteria (i.e. level 1 or Level 2) (Figure 5.46).



	Acute patients
Clinical check-ups	7%
B-ultrasound test	1%
Imaging	3%
Endoscopic test	1%

FIG. 5.44 The average number of clinical processes in hotfloor in the Emergency Department



	Acute patients
Second diagnosis	32%
Third diagnosis	7%
Forth diagnosis	4%
No follow-up diagnosis	57%

FIG. 5.45 The frequency of follow-up diagnostic procedures on the same day in the Emergency Department

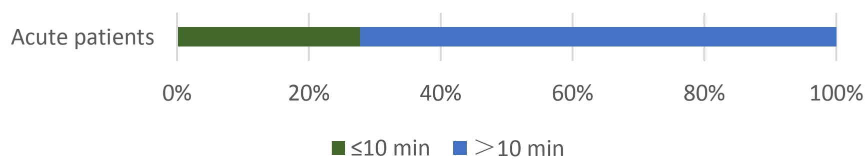


FIG. 5.46 The waiting time for diagnosis in the Emergency Department

5.4.4.2 Major acute patient journeys mapping

For the purpose of visualization, acute patient journeys of the Emergency Department are mapped on the floor plans (Figure 5.47). Compared with the outpatient journeys, the number of places acute patients have to visit is smaller, the reason being that many clinical and administrative processes take place in the same area. The emergency entrance is both the starting point and endpoint of an acute patient journey. Acute patients take priority when going through all the clinical processes so that most of them can complete their patient journeys in a short time.

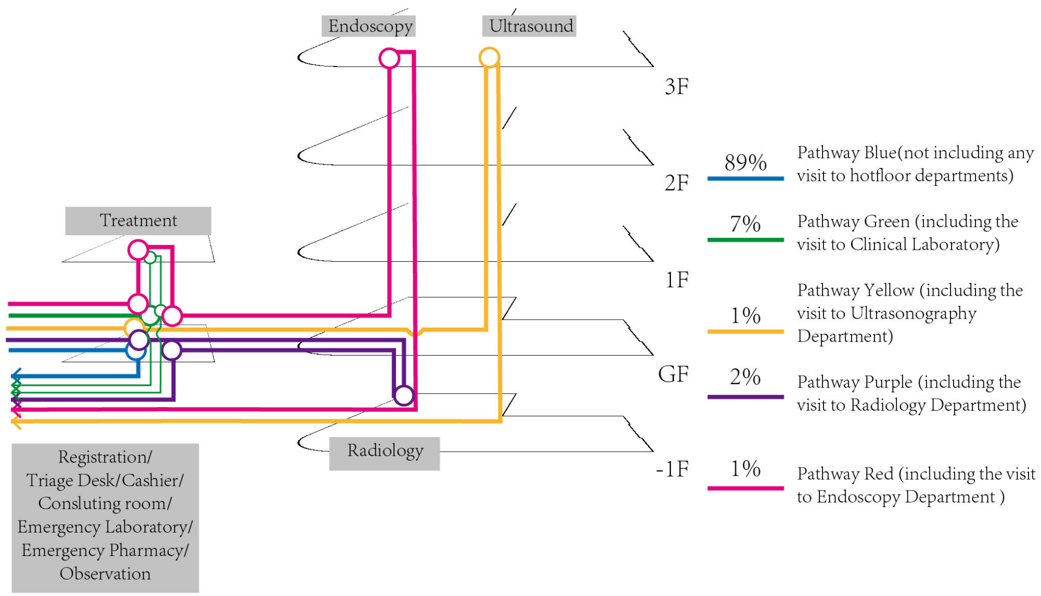


FIG. 5.47 Major acute patient journeys mapping in the 6th Affiliated Hospital of Sun Yat-sen University

There are five spatial pathways of acute patient journeys. Most of the areas acute patients have to visit are located in the three-story building. The outdoor corridor connecting the three-story building with the main building is sheltered, but Pathway 3 which includes a visit to the Ultrasonography Department is a bit too long. If an acute patient needs urgent surgery, a fast track to the Operation Theater is lacking.

5.4.4.3 Experience of acute patients in their journeys

Considering that the Emergency Department is small, all the functions are combined. There is no formal waiting area so that all the seats for acute patients are placed in the corridors. Acute patients who meet the low acuity level criteria (i.e. Level 3&4) usually find seats after triage and registration. Then they wait for diagnoses. Observation makes clear that the environment of the Emergency Department is unfriendly. However, this three-story building is temporary. When the second-stage construction is completed, the Emergency Department will be relocated to the new building.

5.4.5 Discussion and suggestions

The patient journey analysis above provides evidence as to what architecture can do to improve the performance of the 6th Affiliated Hospital of Sun Yat-sen University by enhancing the patient experience with respect to procedure and environment.

5.4.5.1 Procedure

First of all, the distribution of departments in the outpatient clinics and hotfloor can be improved. On the basis of outpatient journey mapping and the gross number of outpatient visits to the major hotfloor departments (Table 5.21 & Figure 5.32), it is found that the number of outpatient visits to the Clinical Laboratory is much higher than that to the other four major hotfloor departments. Many outpatients have to do clinical check-ups in their patient journeys, especially those from the Departments of Internal Medicine, Obstetrics, Simple Clinic, and Gynecology. The latter three departments are one floor apart from the Clinical Laboratory, while the Internal Medicine Department, which has the largest number (over 80,000) of outpatient visits to the Clinical Laboratory in 2017, is three floors away from the Clinical Laboratory. Therefore, outpatients from the Internal Medicine Department, whose patient journeys include the process of clinical check-ups, may prefer an elevator to an escalator or the stairs. It is advisable that the hotfloor departments which have a large number of outpatient visits (e.g. the Clinical Laboratory) should be placed on the middle floor of the outpatient clinics so that outpatients from different departments can visit them more easily. In contrast, the hotfloor departments which have a small number of outpatient visits (e.g. the Radiology Department) can be placed a little far away from the outpatient departments. The hotfloor departments which have a high percentage of outpatients from certain outpatient departments (i.e. the Ultrasonography Department and the Endoscopy Department) should be put closer to the relevant outpatient departments.

The relationship between wards in the same inpatient department should also be optimized. As indicated in Table 5.26, there is currently no logical rule governing the distribution of wards, which displays a lack of efficiency and effectiveness. If wards with similar functions would be located on the same floor and directed by the same manager, not only medical devices but also inpatient beds and medical teams would be shared more efficiently. Moreover, the shared leisure space between the two wards on the same floor could be functionalized and decorated more personalized and closer to the inpatients with similar needs. For example, if patients of the two wards of Surgery on the same floor need more exercises, the leisure space between the wards can be designed as a playground with fitness facilities. If patients of the two wards of Internal Medicine on the same floor want to relax, the leisure space between the wards can be designed as a garden with beautiful plants.

5.4.5.2 Environment

1) Indoor and outdoor facilities

As illustrated above, two groups of patients may have higher expectations with regard to the hospital environment, because they have more leisure time to wander around. One group of patients come from the Outpatient Departments of Surgery, who may have to spend much time in the hospital on the same day compared to outpatients from other departments. The other group of patients comes from the Inpatient Departments of Gynecology, Internal Medicine, and Surgery, who have a lighter daily load of clinical processes. This is confirmed by the patient satisfaction surveys conducted by the author. Only around 10% of the outpatients called for more facilities, the percentage of inpatients with the same demands was double. Not only the indoor facilities should be enhanced, but also the outdoor environment.

The indoor facilities are mainly distributed on the ground floor, which includes a 24-hour convenient store, a commercial pharmacy, and several automated teller machines (ATM) (Figure 5.48). Vacant spaces on the ground floor and the leisure space on each floor of inpatient departments are underused. These areas could be repurposed and redecorated in order to create a more convenient environment.

There is a small outdoor garden to the south of the main building. We observed that patients and their companions tend to have a rest there, both in the morning and in the afternoon. But facilities such as chairs and tables are lacking. Some patients have to sit on the fence or the lawn (Figure 5.48). In order to give patients a better outdoor environment, more facilities are required.

FIG. 5.48 Indoor and outdoor facilities in the 6th Affiliated Hospital of Sun Yat-sen University

2) Waiting area in the outpatient clinics and hotfloor

There is no room for more chairs in the waiting areas even though outpatients strongly require it. One of the approaches is to increase the utilization rate of chairs. It is suggested that consulting rooms can be shared by the entire clinic or even the entire department if it is located on the same floor. Waiting Area 1 which used to service the large departments can become accessible for all the patients; it can be redecorated and well-equipped so as to attract more patients. In addition, a more intelligent queue management system is needed. Patients can stay in these areas or wander around until they find their names on the screen or receive messages on their mobile phones.

3) Admission and Discharge Center

It is advisable to create a new Admission and Discharge Center with a waiting area of its own where inpatients and their companions can sit down and fill in forms. Only when their names are shown on the screen should they complete the administrative process of admission, discharge, or payment.

5.4.5.3 Other measures the hospital is implementing to improve patient journeys

1. The hospital is to promote electronic patient records to replace paper records in 2019. As a result, patients can check their medical records at any time via mobile phone. What’s more, the monitoring of patient journeys will be easier.

2. The hospital is going to apply face-scanning technology hospital-wide in the near future. Therefore, the administrative process of payment might be eliminated from outpatient journeys.

3. The second-stage construction of the hospital campus is going to start in two years. According to the regulatory plan, a 22-story tower will be built next to the existing main buildings, which could be an opportunity for the hospital to optimize patient journeys (Zhao, 2018: website).

5.5 Cross-case analysis and findings

In these two case studies, the approaches of patient journey

In this context, potential users of hospitals' outdoor and indoor facilities have to satisfy two categories of users: 1) Outpatients who have to stay long in hospitals on the same day; 2) Inpatients who have leisure time to access hospitals' indoor and outdoor facilities.

For outpatients, it depends on both the characteristics of specific departments and the policy about second diagnosis. In the case studies, the Departments of Surgery, Gynecology, and Obstetrics are more likely to ask outpatients to take more clinical check-ups, ultrasound tests and imaging, which will take a considerable amount of waiting time. However, the different policies regarding second diagnosis explain why fewer potential users of hospitals' outdoor and indoor facilities can be found in the 6th Affiliated Hospital of Sun Yat-sen University than in Panyu Central Hospital. In Panyu Central Hospital, outpatients can consult the same doctors again for second diagnoses on the same day. Therefore, outpatients who prefer to wait for results for second diagnoses have leisure time to wander around. In contrast, as doctors usually work half-day in the clinic of the 6th Affiliated Hospital of Sun Yat-sen University, outpatients can only have second diagnoses within the same half-day. If it is a long wait for results of clinical check-ups, outpatients might prefer to leave the hospital and have second diagnoses on another day.

For inpatients, it mainly depends on the clinical process load per hospitalization day. In the case studies, inpatients from the Departments of Obstetrics and Pediatrics in Panyu Central Hospital and inpatients from the Departments of Gynecology, Internal Medicine, and Surgery might have more leisure time during their stays in the hospital owing to the light load per day. They may have higher expectations of the facilities and the environment in the hospital.

There is no evidence of acute patients having the opportunity and the desire to wander around in hospitals.

According to these findings, architects and hospital managers can create a better indoor and outdoor environment especially catering to the needs of certain types of patients.

5.5.1 Research on patient journey helps to choose and improve patient traffic system

The biggest architectural difference between these two hospitals is that the Panyu Central Hospital gives priority to the horizontal movement while the 6^{th} Affiliated Hospital of Sun Yat-sen University values the vertical movement. Which one is better? It has been debated for a long time in the academic world. As Mayer and Cates (2004) pointed out, "The more horizontal the person, the more that person is a patient; the more vertical the person, the more that person is a customer." In other words, the horizontal patient traffic system benefits patients who have to be delivered to several places with gurneys or wheelchairs, which values good care in the patient journeys. In contrast, the vertical patient traffic system benefits patients who are able to walk without assistance, which values speed and convenience in the patient journey (Jensen, 2013:430). But this is only convenient when the waiting time for elevators is short.

The case studies show that the horizontal patient traffic system works quite effectively in Panyu Central Hospital. Three groups of elevators and four flights of stairs exclusively for outpatients are evenly distributed along the 150-meters internal street of the four-story outpatient clinic buildings so that outpatients don't have to spend time waiting for elevators. Occasionally, they prefer stairs instead. The only problem of the horizontal patient traffic system is that it is easy for new outpatients to get lost. They might have to take a long detour if they made a wrong turn in the very beginning.

On the contrary, patients never have complaints on wayfinding in the 6^{th} Affiliated Hospital of Sun Yat-sen University, where the patient traffic system is vertical. It was a good decision to introduce an escalator system for the lower floors for outpatients. But for inpatients, the number of elevators is too low. The problems can be mitigated somewhat by management measures such as allowing visitors to use staff elevators within certain hours, and optimizing care pathways. What's more, this problem might also be solved if the architects would factor it in during the second-stage construction. Some departments with have large numbers of patient visits could be moved to the new building.

TABLE 5.28 The findings of the two case studies in this Chapter

	Panyu Central Hospital			The6th Affiliated Hospital of Sun Yat-sen University		
	Outpatients	Inpatients	Acute patients	Outpatients	Inpatients	Acute patients
Top5departments	Internal Medicine/ Pediatrics/Surgery/ Gynecology/ENT	Surgery/Internal Medicine/Obstetrics/ Pediatrics/ Gynecology	Adult/ Pediatrics	Internal Medicine/ Gastroenterology/ Simple Clinic/ Obstetrics/ Surgery	Internal Medicine/ Surgery/Obstetrics/ Fertility Center/ Gynecology	-
Patients who have more leisure time in the hospital	1) Patients from the Departments of Gynecology/ Surgery; 2) Patients from the Internal Medicine Department who wait for results of clinical check-ups and imaging tests (large number but lowprobability).	Patients from the Departments of Obstetrics/ Pediatrics	-	A small number of patients from the Departments of Surgery/Obstetrics	Patients from the Departments of Gynecology/ Internal Medicine/ Surgery	-
Patient dissatisfaction	1) Difficulty inwayfinding; 2) Long-time waiting for diagnoses, ultrasound tests, and imagingtests.	1) The lack of interaction and communication between inpatients and medicalteams; 2) The bad taste offood; 3) Not Clean inpatient bedrooms andtoilets; 4) The lack of facilities and small size ofbedrooms; 5) Long-time waiting fortests.	1) Ineffective queue managementsystem; 2) The lack ofstaff.	1) Overcrowding and the lack of chairs in the waiting areas of outpatient clinics and the Ultrasonography Department inhotfloor.	1) The lack of chairs and queue management system in Admission and DischargeCenter; 2) The small size of the rooms for clothesdrying; 3) The small size of storage space in inpatientrooms; 4) The low utilization of the shared leisurespace; 5) The lack of commercial facilities in thehospital; 6) Long-time waiting forelevators.	1) Small size and unpleasantenvironment; 2) Long-distance to the UltrasonographyDepartment; 3) The lack of a green channel to the OperationTheater.

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TABLE 5.28 The findings of the two case studies in this Chapter

	Panyu Central Hospital			The6th Affiliated Hospital of Sun Yat-sen University		
	Outpatients	Inpatients	Acute patients	Outpatients	Inpatients	Acute patients
Improvement in an architectural way	1) Provide a better outdoor environment especially with the consideration of patients who have more leisure time staying in thehospital; 2) Improve the environment of the waiting area in the Ultrasono-graphyDepartment.	1) Place wards with similar functions on the samefloor.	-	1) Place hotfloor departments which have a large number of outpatient visits (e.g. Clinical Laboratory) on the middle floor of the outpatientclinics; 2) Shared consulting rooms clinic-wide or department-wide on the samefloor.	1) Place wards with similar functions on the samefloor; 2) Increase the number of facilities at the vacant space on the ground floor as well as the leisure space on each floor of inpatientdepartments; 3) Provide a better outdoorenvironment; 4) Build up a new Admission and Discharge Center with a waiting area of itsown.	-

6 Best practices in the Netherlands

Question

- What are the best practices of patient journey in the Netherlands?

Purpose

This chapter explains what Dutch hospitals have done and are going to do to improve hospital architecture from the perspective of patient journeys.

Approaches

1. Document analysis of publications and academic papers;
2. Case studies of typical hospitals in the Netherlands;
3. Site visits;
4. Interviews with hospital managers and architects.

Findings

1. The best practices on patient journey in Dutch hospitals;
2. Trends in the design of patient journeys, and changing patients' needs in the Netherlands;
3. Lessons that China can learn from the best practices in the Netherlands.

6.1 Introduction

— This part is largely based on *Health Systems in Transition - The Netherlands: Health System Review*, published by the European Observatory on Health Systems and Policies in 2016.

6.1.1 Performance of the Dutch healthcare system

The Netherlands won a silver medal in the 2018 Euro Health Consumer Index (EHCI). It is worth mentioning that their health system has never dropped out of the top 3 in the ranking since the EHCI was first published in 2005. The Index evaluates 35 European countries by defining six categories of 46 indicators including A) Patient Rights & Information, B) Accessibility, C) Outcomes, D) Range and reach of services provided, E) Prevention, F) Pharmaceuticals. The Netherlands is the only country that is always in the top 4 in all categories (Björnberg & Phang, 2019:9,28). It proves that the Dutch healthcare system is, on the whole, well-performing.

The Dutch healthcare system is based on five acts: *the Health Insurance Act 2006 (Zorgverzekeringswet), the Long-Term Care Act 2015 (Wet langdurige zorg), the Social Support Act 2015 (Wet maatschappelijke ondersteuning), the Public Health Act 2007 (Wet publieke gezondheid), and the Youth Act 2015 (Jeugdwet)* (VWS, 2018:3-4). All of the acts share the same principles (Dernison, 2016:7):

1. Access to healthcare for all;
2. Solidarity through medical insurance;
3. High-quality healthcare services.

The *Health Insurance Act* contains the financial arrangement that regulates access to health care; it has an enormous impact on both the medical care system and medical security system as it transformed the Dutch healthcare system from supply-driven to demand-driven (VWS, 2018:3-4).

6.1.1.1 Medical care system

The Dutch medical care system categorizes healthcare facilities according to the types of care provided (Figure 6.1) (Kroneman *et al.*, 2016:139-163). Healthcare facilities that provide primary care, secondary care, and emergency care play important roles in the Dutch medical care system. Compared with its Chinese counterpart (Figure 2.1), the institutional framework of healthcare facilities in the Netherlands is much flatter, and it makes no distinction between urban and rural areas.

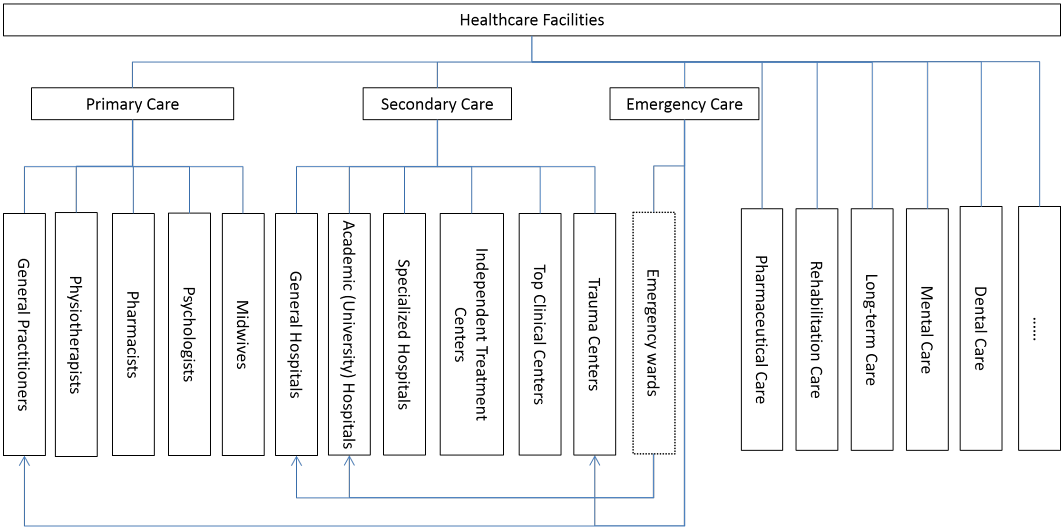

FIG. 6.1 Institutional Framework of Healthcare Facilities in the Netherlands
(Kroneman et al., 2016:139-163)

Primary care

The Dutch primary care has a good reputation in the world (De Bakker & Groenewegen, 2009:128). General Practitioners (GPs) play a gatekeeping role for access to all the secondary care in the Netherlands. It means that a patient cannot make an appointment with a specialist in a hospital without a referral from a GP (Kroneman *et al.*, 2016:139; Esmail, 2014: vi).

Secondary care

Secondary care contains all hospital services. As illustrated in Table 6.1, there are six types of hospitals with different functions in the Netherlands. All general hospitals including University Medical Centers and specialized hospitals are private but non-profit (Dernison, 2016:5). It seems that hospitals are gathered in big cities in the west (eg. Amsterdam, Den Haag, and Rotterdam) and regional centers in the east (eg. Maastricht, Nijmegen, and Groningen) (Figure 6.2). In addition, the map shows a tendency that more outpatient clinics related to hospitals are operating on the edge of their catchment area to compete with other hospitals in the neighborhood (Volksgezondheidenzorg.info, n.d.: website).

Since 2009 the number of hospitals has remained the same. Some new hospitals are built, and some hospitals are merged. Hospitals improve their healthcare networks by opening stand-alone outpatient clinics. It is proved that the number of hospital-affiliated outpatient clinics has increased rapidly. Specific functions are offered in a specific location, leaving some locations with more enhanced services than others (Kroneman *et al.*, 2016:107,108).

TABLE 6.1 Functions of different types of hospitals

Types of hospitals	Functions	Number in 2014
General hospitals	Provide general hospital care.	57
Academic hospitals (University Medical Centers)	Besides providing general hospital care to patients in complex conditions, they conduct research and provide education as well.	8
Specialized hospitals	Specialize in specific care or focus on a specific category of patients.	65
Independent treatment centers (ZBCs)	Offer daycare.	268
Top clinical centers	Provide both general hospital care and complex care. Most of them are part of a University Medical Center or are operated by a number of hospitals working cooperatively.	28
Trauma centers	Provide trauma care. Most of them relate to a University Medical Center.	11 (2011)

(Kroneman et al., 2016:144-145; Patientenfederatie Nederland, n.d.: website)

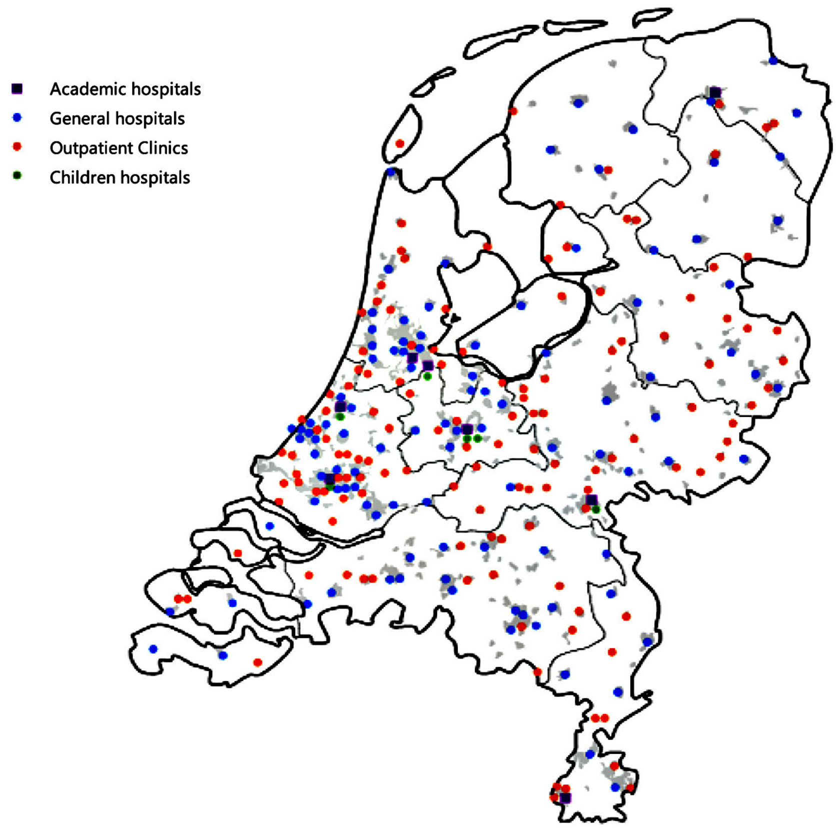

FIG. 6.2 Distribution of hospitals providing secondary care in 2018
(Volksgezondheidenzorg.info, n.d.: website)

Emergency care

Emergency care is provided by GPs, trauma centers, and hospitals with emergency wards. There were 91 hospital-based emergency wards and 11 trauma centers in the Netherlands in 2014. Normally, patients are required to contact their GPs or visit an out-of-hours facility before going to a trauma center or an emergency department in a hospital. Only in urgent situations are patients allowed to ask for an ambulance service (Kroneman *et al.*, 2016:147-148).

Governance

The Dutch Government used to manage healthcare facilities and services directly by supply-oriented planning. Since 2006 the government has adopted a supervisory role from a distance and focuses on setting priorities on healthcare, making legislative changes, monitoring access, quality, and costs in the healthcare system; apart from that, it contributes to financing the social health insurance (Wammes *et al.*, 2018:23).

Whereas the government is monitoring and managing the healthcare system in the background, the most active actors on the Dutch healthcare market are private individual/insured persons, healthcare providers, and health insurers (Figure 6.3). Insured persons have the right to choose a health insurer and can change to another one each year. They can make use of the healthcare providers on the list of the health insurer. Health insurers negotiate with healthcare providers about the price, the volume, and the quality of care. In this way, the system is meant to encourage competition among insurance companies and healthcare providers (Kroneman et al., 2016:23-24).

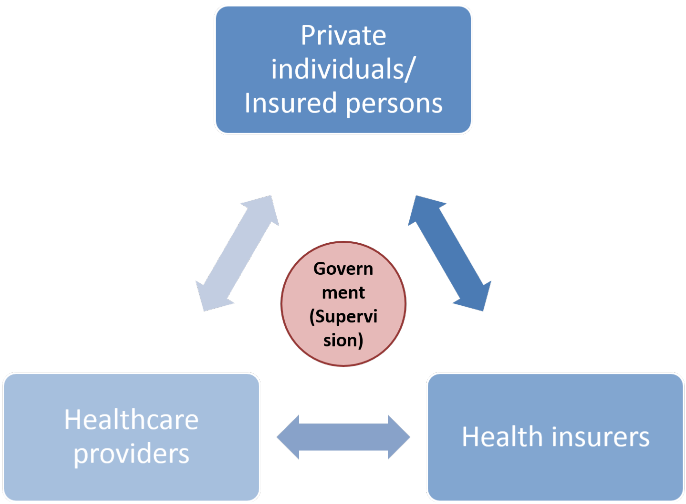

FIG. 6.3 Actors in the Dutch healthcare market since 2006
(VWS, 2016:23-24)

6.1.1.2 Medical security system

In order to guarantee that the medical security system functions smoothly, it has to respect the requirements of the *Health Insurance Act 2006*. Insurance is mandatory for private individuals, but only for a basic insurance package; everybody is free to choose any health insurer and apart from the basic package, all of them offer policies that cover medical care at different levels on top of the basic package. Insurers are required to accept everybody and charge the standard fees, irrespective of their age, gender, or health profile (VWS, 2018:7; Daley *et al.*, 2013:4). The basic insurance package must cover all the essential healthcare services a private individual needs including the following 11 types (VWS, 2018:9):

- Medical care
- District nursing
- Hospitalization
- Mental health services
- Medications
- Dental care up to the age of 18
- Therapeutic care
- Nutritional/dietary care
- Medical Aids
- Ambulance support/ sedentary medical transport
- Physiotherapy

The medical security system gives priority to care activities in connection with diagnostics and treatment in a patient journey (*Volksgezondheidenzorg.info*, n.d.: website). The foundation of the system is packages of care named Diagnosis Treatment Combinations (*Diagnose Behandeling Combinaties*, DBCs) which have been formulated for remuneration negotiations between healthcare providers and health insurers by defining care products in the purpose of monitoring the performance of healthcare facilities on the aspects of price and quality of health care. Each DBC corresponds with a specific health problem with a specific treatment. As a result, it represents a standardized and complete sequence of medical processes (as part of a patient journey at the regional level), which starts when the patient is sick and generally ends when the patient is recovered (Busse *et al.*, 2011:123, Westerdijk *et al.*, 2012:203).

Until now, there are around 4,400 DBCs in the Netherlands (Zorgwijzer,2019: website). Medical data that are essential to define DBCs can be collected easily via the Electronic Patient Record (*Electronisch Patienten Dossier*, EPD). However, the introduction of a national EPD system failed because it was seen as endangering people's right to privacy. Instead, a new EPD system on a voluntary basis, named Care Infrastructure (*Zorginfrastructuur*), has been established (Kroneman *et al.*, 2016:37).

6.1.1.3 Health performance of Dutch people

Life expectancy at birth

The life expectancy at birth of Dutch people reached 80.3 for males and 83.4 for females in 2018 (World Bank, 2018: website). It has been kept at a rather high level compared with that of Chinese people and the world average (Figure 6.4)[11].

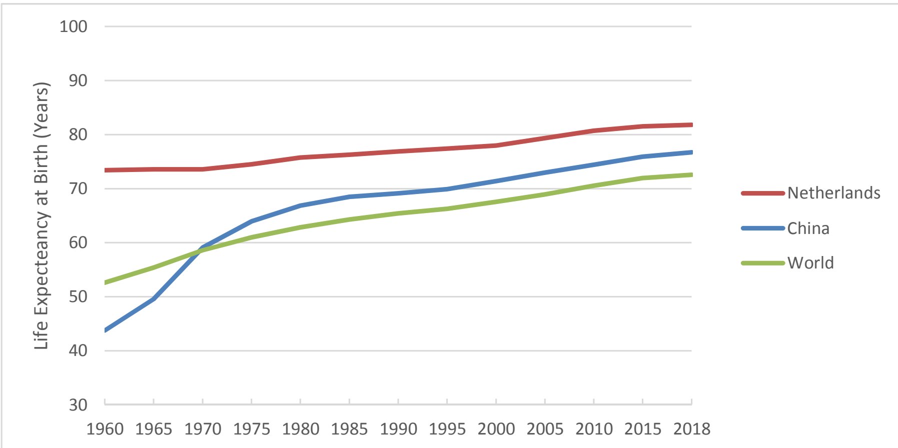

FIG. 6.4 Life Expectancy at Birth
(Data source: World Bank, World Development Indicators)

11 More details in Section 2.1.4

Major health resources

Both the number of hospital beds per thousand and the average length of hospital stay (ALOS) have been declining gradually in the Netherlands (Figure 6.5 & 6.6). This trend is driven by several factors, for instance, the need for cost-containment and the promotion of daycare. It results in more efficient use of the hospital bed capacity (Kroneman *et al.*, 2016:111). By contrast in China, the number of hospital beds per thousand is growing rapidly and the ALOS is around 9 days.

Although the number of physicians and nurses & midwives per thousand is increasing since 1990, it is still near the EU average. The density of nurses & midwives was even lower than that of the surrounding countries (Kroneman *et al.*, 2016:120). However, with the average level of density of physicians and nurses & midwives, the Dutch healthcare system has performed very well and gained one of the highest scores in EHCI since it was first published in 2005. Compared to the situation in the Netherlands, China has fewer doctors and nurses per thousand (Figure 6.7 & 6.8).

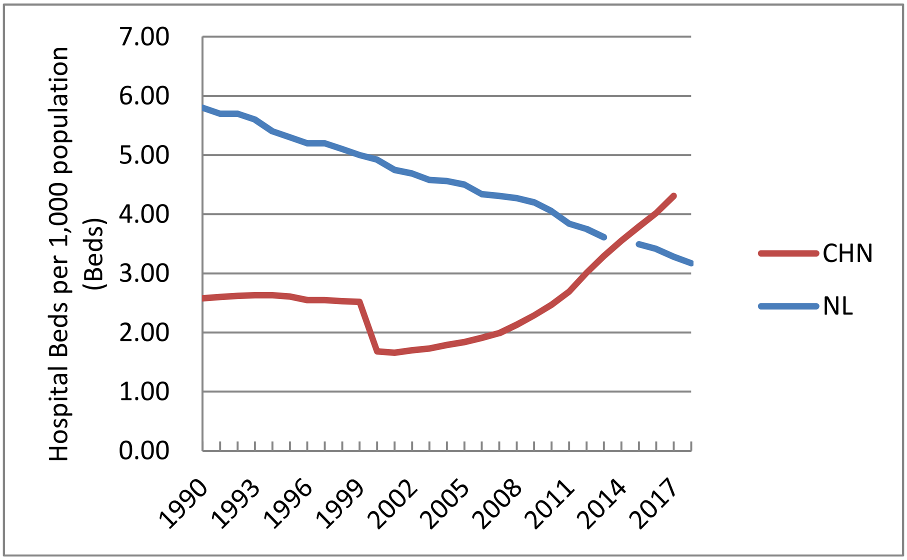

FIG. 6.5 Hospital beds per thousand in China and in the Netherlands
(Data source: World Bank, World Development Indicators)

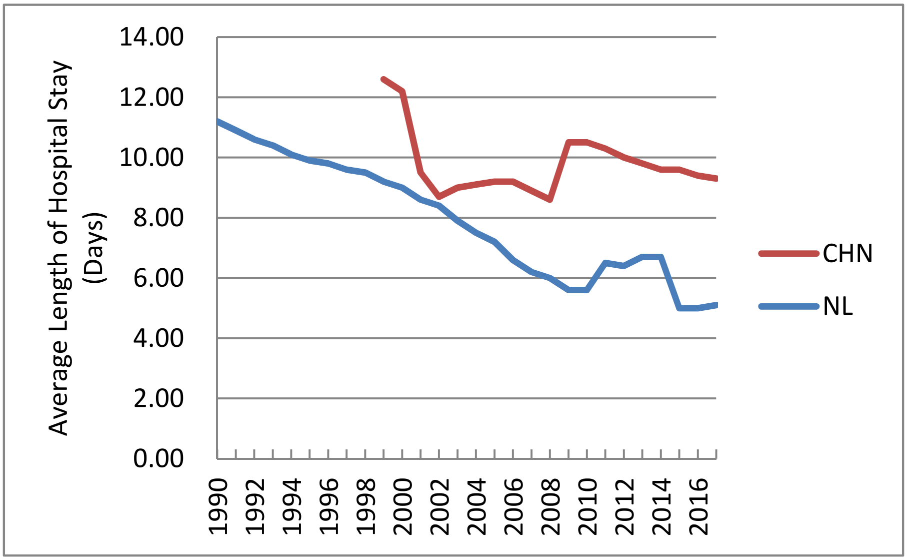

FIG. 6.6 Average length of hospital stay (ALOS) in China and in the Netherlands
(Data source: Statistical Bulletin on the Development of Health in China; OECD Health Statistics)

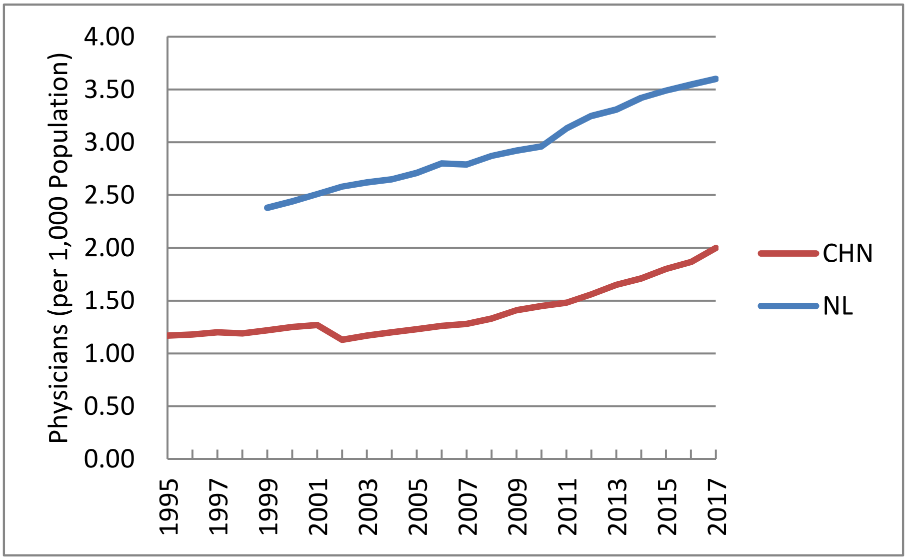

FIG. 6.7 Physicians per thousand in China and in the Netherlands
(Data source: World Bank, World Development Indicators)

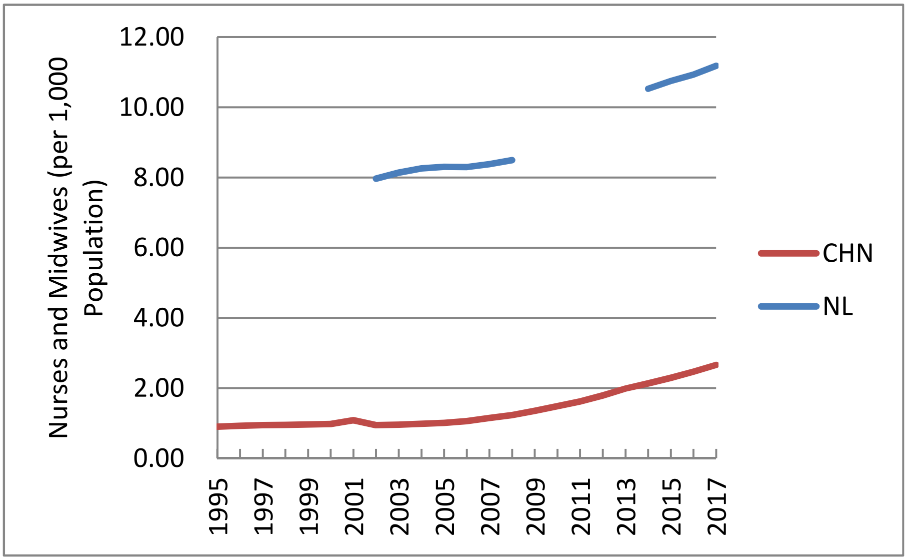

FIG. 6.8 Nurses and midwives per thousand in China and in the Netherlands
(Data source: World Bank, World Development Indicators)

6.1.2 Performance of Dutch hospitals

Although hospitals are not for profit, they have to fight for their survival in the context of fierce competition within the Dutch healthcare system, especially after the reform in 2006. The healthcare reform allows prices, volumes, and quality to be negotiated between insurers and hospitals on the basis of DBCs (Kroneman *et al.*, 2016:27). DBCs cover the total costs of treatment from the first consultation until patients are recovered, including all the direct costs (eg. The cost of medical specialist care, nursing care, and the use of medical equipment and diagnostic procedures) and indirect costs (eg. Education, research, and emergency care) (Kroneman *et al.*, 2016: 95). Insurers can easily find out whether the costs are reasonable by checking patients' bills. As a consequence, Dutch hospitals are forced to try their best to lower the rates of hospitalization and shorten the necessary length of stay in hospitals rather than increase the scale of hospitals. Hospital care is increasingly provided through outpatient and day treatment, which leads to a decrease in ALOS (Kroneman *et al.*, 2016: 108, 205).

6.2 Composition of a patient journey

6.2.1 Overall procedures

As stated in Section 3.2, the overall procedures of the patient journey can be reviewed at four levels. It can be found that there are great differences especially at the regional and facility levels between the Netherlands and China. Even though this research focuses on patient journeys at the healthcare facility level, the discussion of Dutch patient journeys at the regional level (eg. GPs) is helpful to get a better understanding of the overall procedures in the Netherlands and might lead to some better suggestions for China.

6.2.1.1 At the regional level

General practitioners (GPs) play an essential role in a patient journey. Except for emergency care, patients can only receive hospital care with permission from GPs. After hospitalization, patients are referred to GPs again so as to decide whether or not rehabilitation care is needed in a nursing home (Kroneman *et al.*, 2016:139-140). Hospitals provide a whole spectrum of cure and care including emergency care, outpatient care, daycare, and inpatient care. In contrast, independent treatment centers (ZBCs) only provide straightforward outpatient care and daycare (Busse *et al.*, 2011:428) (Figure 6.9). With the help of GPs, the pressure on hospitals reduces substantially.

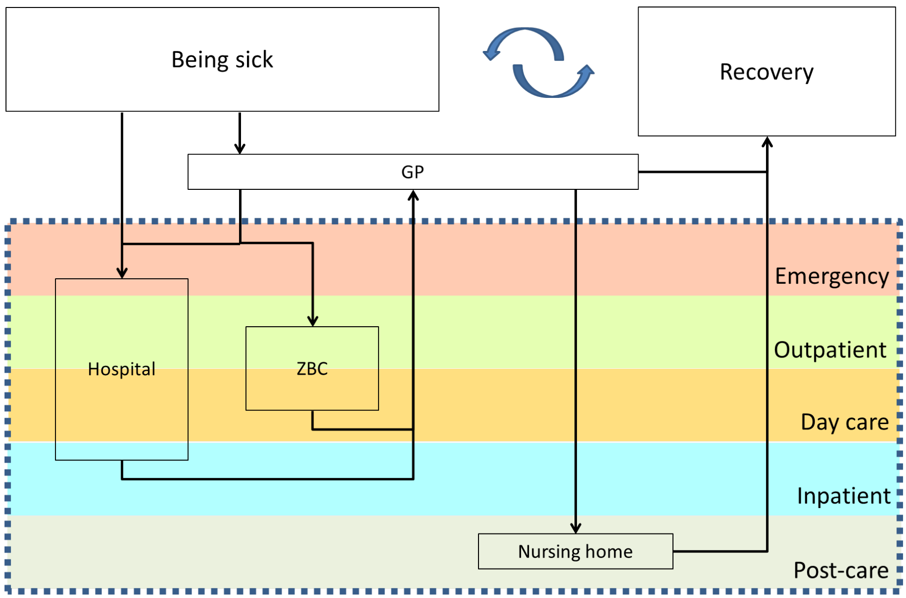

FIG. 6.9 Patient journey at the regional level in the Netherlands

6.2.1.2 At the healthcare facility level

A patient journey in a healthcare facility is an emergency visit, an outpatient visit, or an inpatient visit. Most of the patient journeys start from referrals of GPs, other care providers, or other departments. As can be seen in Figure 6.10, it coincides with the patient journey in China to some extent. In many cases, a patient has to come to the hospital several times to complete their journeys.

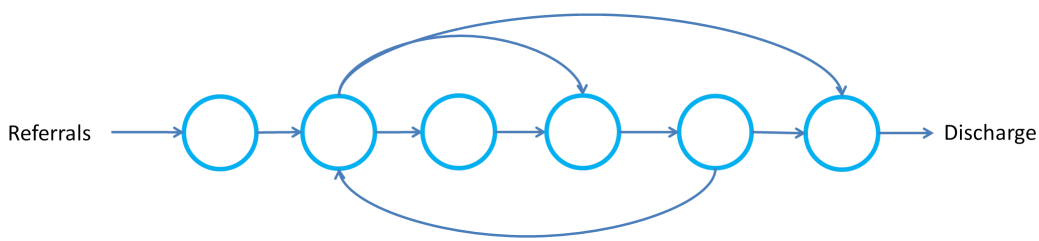

FIG. 6.10 Patient journey at the facility level in the Netherlands

6.2.2 Patient experience

At the macro level, there is a different understanding of the evaluation of patient experiences in the Dutch healthcare system as a whole. In a survey conducted by Faber et.al (2014: website), 49% of the Dutch people were positive about the system in 2013. On the contrary, another 43% of Dutch people believed that "fundamental changes are needed to make it work better." Only 5% of the people wanted the system to be rebuilt. Another survey, conducted by Westert *et al.* (2010:79), showed that nine-tenths of the Dutch people gave a favorable rating to the healthcare system. They were very satisfied with the positive interaction between patients and healthcare providers. Dutch people consider "the well-trained medical staff" (66% of the respondents), "treatment that works" (46% of the respondents), and "healthcare that keeps you safe from harm" (34% of the respondents) as the three main indicators to evaluate the quality of the healthcare system (TNS Opinion & Social, 2014:22).

At the facility level, the Top 3 reasons that lead to patient dissatisfaction are long waiting times (34%), the staff not taking the time to listen to patients (31%), and insufficient information (24%) (Figure 6.11) (Federatie, 2013:8). Moreover, emergency care usually receives a lower score of patient satisfaction than other departments in hospitals. Acute patients sometimes have to wait for hours before they receive first aid; however, they don't know why they have to wait so long. Acute patients become annoyed if the staff are unfriendly or uninterested. What they desire are "friendly and successful treatment" as well as a "short waiting time" (Redactie Zorgkaart Nederland, 2017: website).

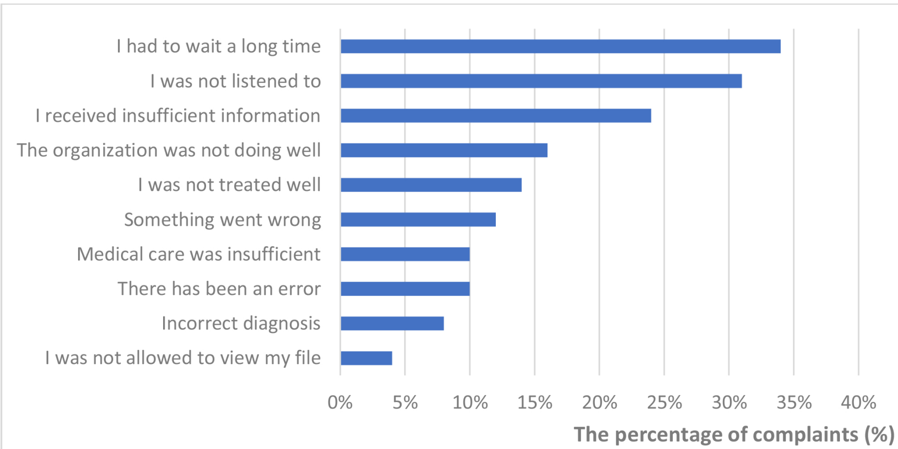

FIG. 6.11 Reasons for patient dissatisfaction in hospitals in the Netherlands
(Federatie, 2013: 8)

6.3 Outpatient journeys in hospitals

6.3.1 Outpatient journey and mapping in general

Outpatients can finish their outpatient journeys in one visit when clinical check-ups, functional tests, or imageing are not needed. In that case, outpatients can go through no more than four clinical processes and one administrative process at the facility level. Unlike the Chinese outpatient journeys, pharmacy is not an essential clinical process in the Netherlands because outpatients usually buy medicines in any pharmacy with a doctor's prescription. Due to the need for GP referrals and mandatory appointments before going to a hospital, the clinical process of triage is not part of outpatient journeys, and outpatients just have to check in at the clinic's counter or at a queuing machine if they already have medical cards of the hospitals they visit. Sometimes outpatients have clinical check-ups, functional tests, and imaging on their first visit before seeing specialists. The administrative process of payment does not exist in Dutch outpatient journeys, the reason being that there are no cashiers in Dutch hospitals, the bills are sent to the insurers and patients directly.

If clinical check-ups are necessary, outpatients have samples taken and hand them in to the clinical laboratory. Results can be checked later via electronic personal medical records online, mailboxes, their GPs, or the specialist in the follow-up visit. Functional tests, imaging, and several complicated check-ups need specific appointments, which means that patients might have to visit hospitals two or three times to complete the entire outpatient journey (Figure 6.12). Additional diagnosis does not take place in an outpatient visit in Dutch hospitals, whereas it is far from exceptional in China (stated in Case A, Chapter 5). Take the optimized cardiac outpatient journey in Deventer Hospital as an example (Box 6.1).

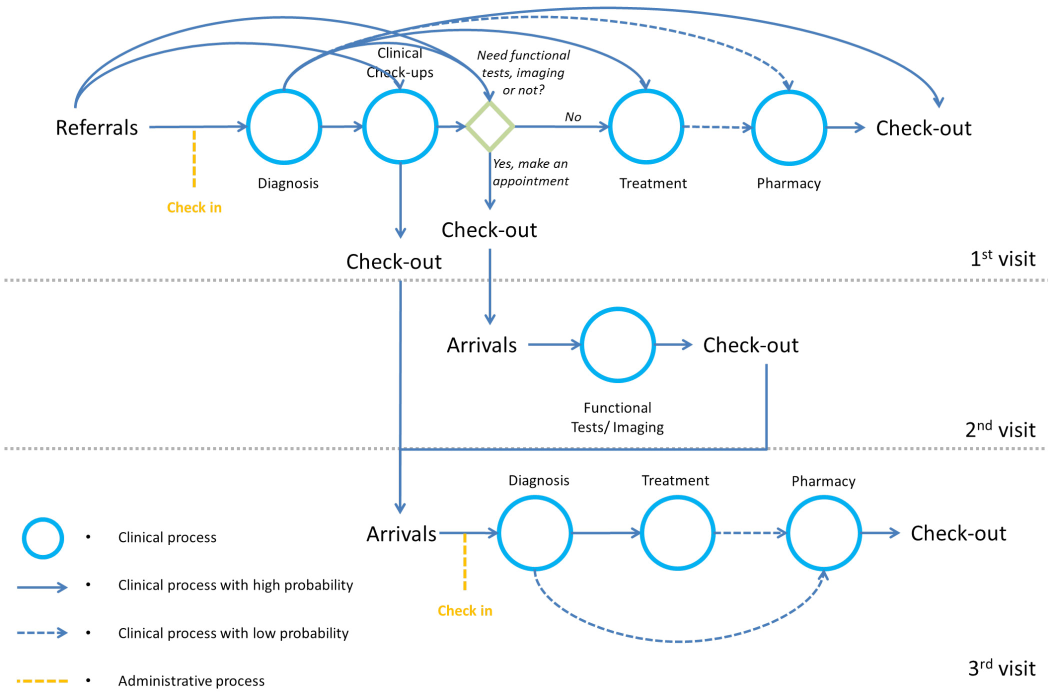

FIG. 6.12 General outpatient journey in the Netherlands

BOX 6.1

For the reason that an Electrocardiography (ECG) Test is mandatory before the first consultation, outpatients are required to take ECG tests and then discuss the ECG results with the cardiologists on their first visits to the hospital. If the cardiologists consider that additional diagnostic tests are necessary, outpatients at least have two more visits to complete the entire journey. The waiting time between visits is long. There were, for instance, 13.3 days on average of waiting at home between the first appointment and the first visit, 18.8 days between the second and third visits, and 16.6 days between the third and fourth visits. In many cases, there are two bottlenecks in this patient journey: A) New patients do not know ECG tests have to be taken before the first consultation so that they just arrive at the hospital on time for the first consultation, which leads to a longer time on their first visits; B) Patients forget to make appointments for the second consultation until they have received the test results, which leads to an extra waiting time (Schoonhoven et al., 2011:389,392,393) (Figure 6.13).

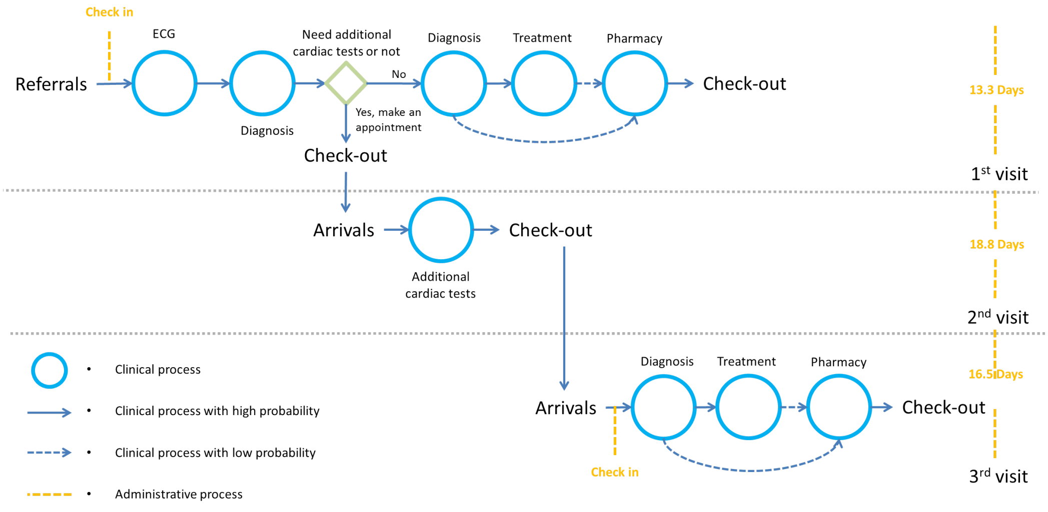

FIG. 6.13 Cardiac outpatient journey in Deventer Hospital

From the perspective of outpatient journey mapping, most of the outpatients do not have to go to the clinic's counter which is usually located in the entrance hall when they arrive at a hospital. They can directly go to the outpatient clinics. After leaving consulting rooms, there are no other places outpatients need to visit for administrative purposes in their journeys. They can go home directly because it is unnecessary to visit the pharmacy in the hospital for clinical purposes. During their visits to hospitals, outpatients can seek support from doctors, nurses, and hosts/hostesses easily. On average, at most two family members or friends accompany an outpatient.

On the whole, compared to China, outpatients in the Netherlands visit fewer places on a single visit to hospitals (Figure 6.14). However, there is a higher possibility that outpatients go back to hospitals for a second or even a third visit.

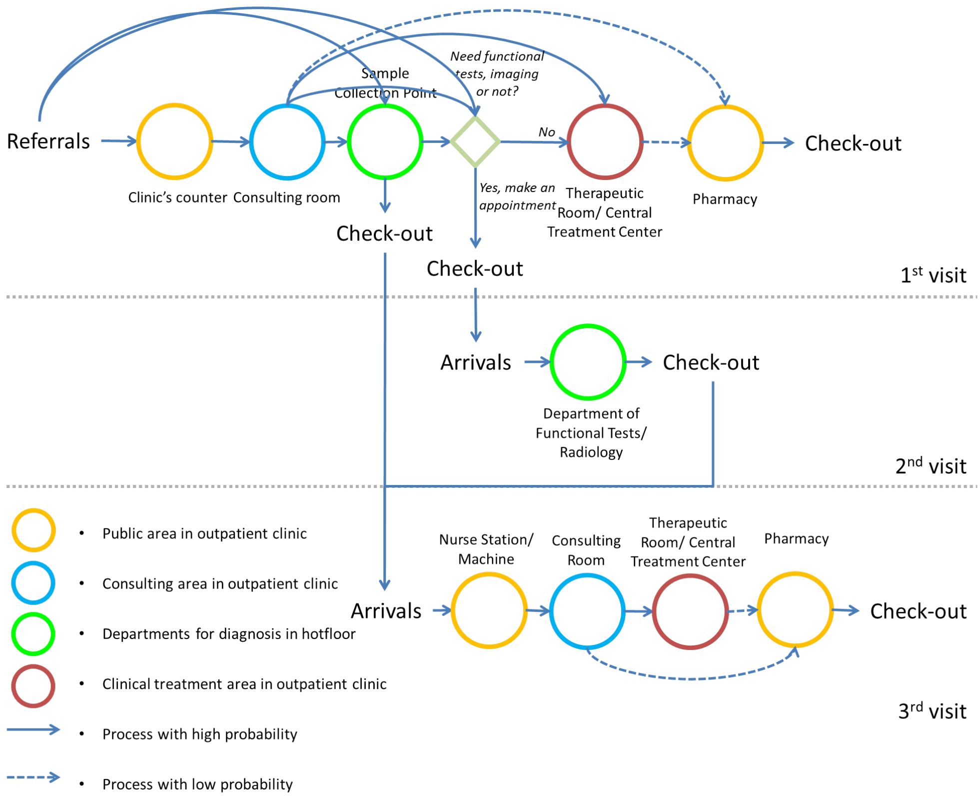

FIG. 6.14 Outpatient journey mapping in the Netherlands

6.3.2 Trends in outpatient clinics

6.3.2.1 On the aspect of procedure

Daycare becomes popular in outpatient clinics

Daycare patients stay in the daycare center for less than 24 hours to take day surgery or day treatment. From the perspective of process, daycare patient journeys are linear, the same as other patient journeys in the outpatient clinic. From the perspective of patient journey mapping, there are differences between a daycare patient journey and a normal outpatient journey. The spatial relationship in daycare pathways is simple in that there are only bidirectional connections between the daycare center and the Operation Theater. Medical samples would be delivered by nurses, as is the case in inpatient journeys (Figure 6.15 & 6.16). Take the daycare patient journey at University Medical Center Groningen (UMCG) as an example (Box 6.2).

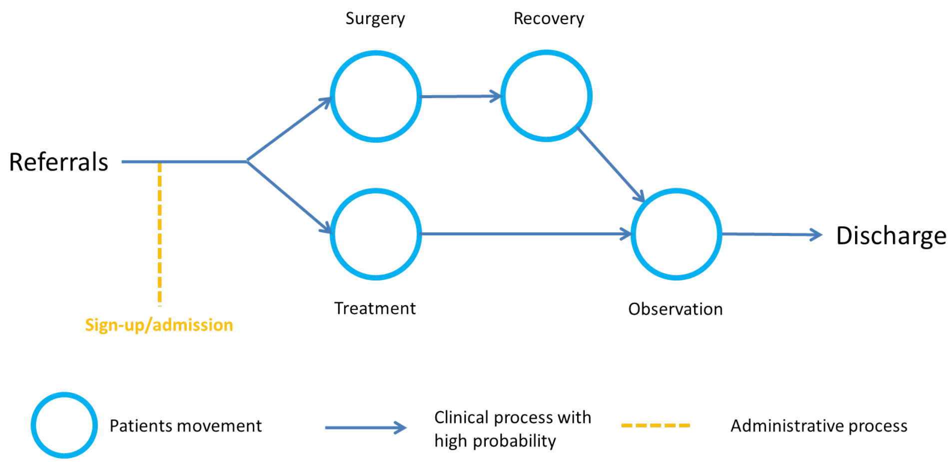

FIG. 6.15 Daycare patient journeys in the Netherlands

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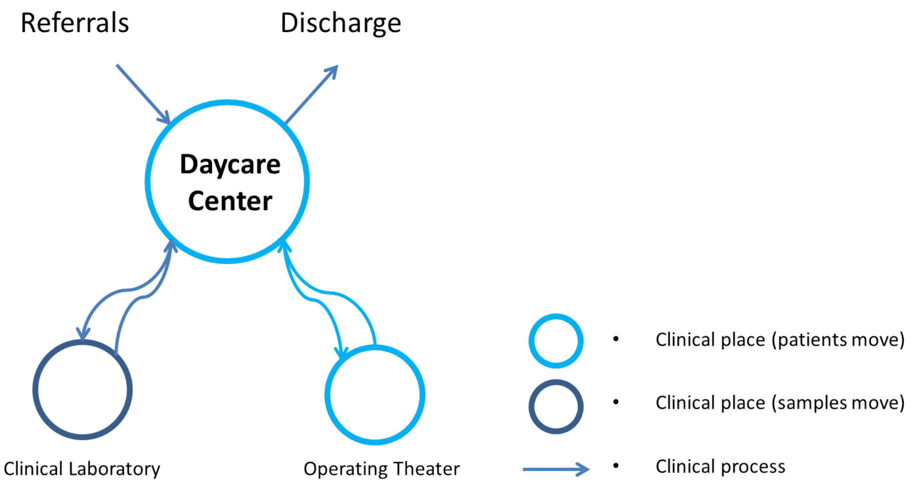

FIG. 6.16 Daycare patient journeys mapping in the Netherlands

BOX 6.2

Patients directly sign up at the Operational Day Treatment Center. After admission, patients are picked up by an employee who explains the procedures. Patients discuss the risks of anesthesia with the anesthesiologist and decide on the best method. When surgery is finished, patients are delivered to the recovery room where they stay for a short while. If patients are well awake, they are sent to the so-called living room to get some food and drink. After a period of observation, patients can be discharged (UMCG, n.d.: website).

Due to the innovations in medical technology (e.g. minimally invasive surgery) and improvement of the quality of care (e.g. the streamlining of medical processes), daycare is popular in the Netherlands. It has partly replaced inpatient care in recent years. As shown in Figure 6.17, the number of day-patient admissions saw a particularly sharp increase between 2000 and 2012. In 2009, it became larger than the number of inpatient admissions for the first time. Data from the following three years show that the number of inpatient admissions keeps declining, whereas the number of the day-patients increases; in 2012, the gap between them was more than 200 per 100,000 (Kroneman *et al.*, 2016:206).

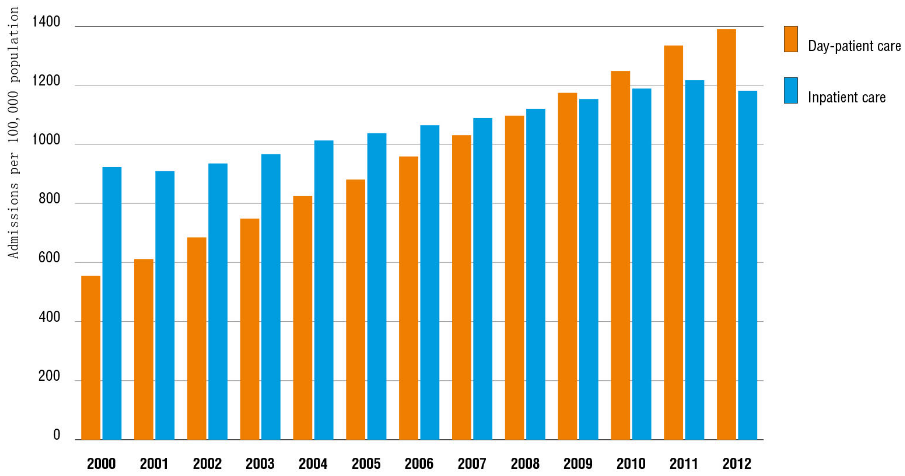

FIG. 6.17 Hospital admissions of day-patient care and inpatient care
(Data source: Statics Netherlands, 2015)

Outpatient departments evolve from a monofunctional to a multifunctional model

This evolution features the location of the doctors' office, the layout of the waiting area, the level of specificity of the consulting area, etc. In the traditional monofunctional model, outpatient departments have large-scale consulting areas where doctors not only consult with and examine patients but also study, do administrative work, and conduct meetings. This model seems convenient for doctors but inefficient and cumbersome from the perspective of patient journeys. More often than not, outpatients have to wait in the corridor near the consulting rooms, where the waiting area might be part of the routes to other medical specialties. In addition, the traffic routes of patients and medical staff in outpatient departments overlap (Model A, Figure 6.18). Then the functions of doctors' study and back-offices are gradually separated from the consulting areas, which ultimately leads to the total separation of traffic routes between outpatients and medical staff (Model B & C, Figure 6.18). In the latest multifunctional model, the waiting areas, the back-office facilities, and doctors' offices in outpatient departments have a high degree of flexibility as to their location thanks to the application of the use of Electronic Medical Record (EMR) systems and information technology (Model D, Figure 6.18) (Wagenaar *et al.*, 2018:71-73).

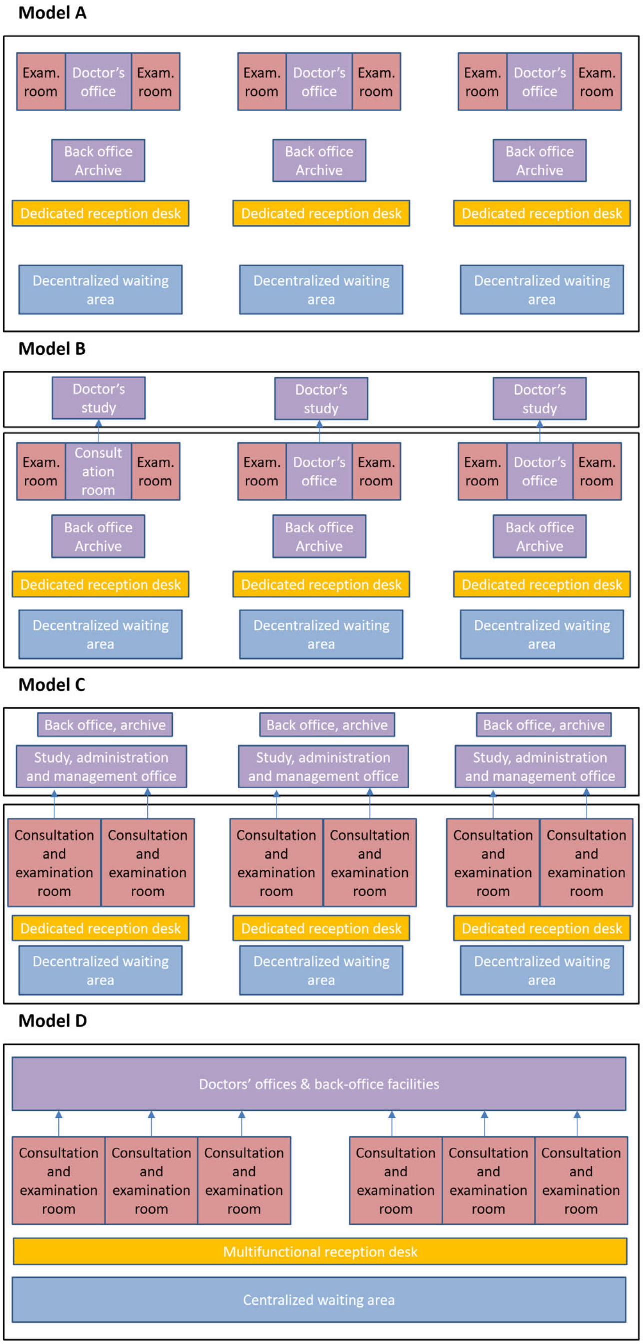

FIG. 6.18 Evolution of outpatient departments
(Wagenaar et al., 2018:71)

One of the examples of Model D is Zuyderland Medical Center in Sittard which was built in 2009. The outpatient clinic is thematically divided into three functional areas: the atrium as a public area for patients (shared with all other visitors to the hospital), consulting/treatment center as the place where patients and medical staff interact, and knowledge & expertise center for medical staff and researchers exclusively (Figure 6.19) (HHA, 2013:30). The consulting/treatment center is composed of standardized rooms located between the public area and the knowledge & expertise center where outpatients and medical staff meet each other during consultation. Even though the model may increase the risk of infection between outpatients because of the totally open waiting areas in the public space, it could enhance positive patient experiences, including privacy, faster traffic, and easier access (Wagenaar *et al.*, 2018:53).

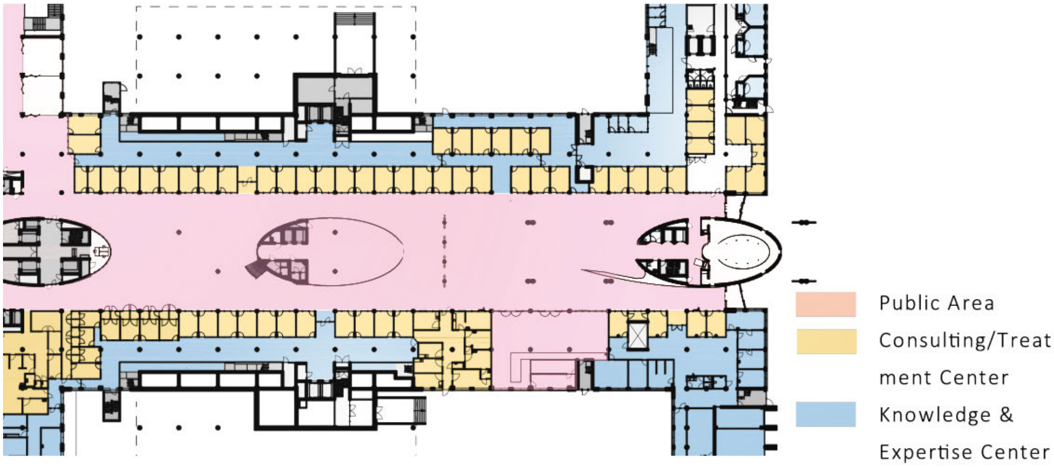

FIG. 6.19 Part of the ground floor in Zuyderland Medical Center, Sittard
(Adapted from Herweijer-van Gelder, 2016:183)

This layout breaks away from traditional models of outpatient departments: most of the consulting rooms in the consulting/treatment center are arranged flexibly according to the exact number of outpatient visits and physicians' schedules. It results in the redesign of medical processes. Outpatients are told in which consulting rooms the physicians are waiting for them after they check in at the information desk in the atrium (Figure 6.20). In this way, 140 standardized rooms are sufficient in the consulting/treatment center, instead of the 200 rooms in a traditional layout. Another advantage is that, with the support of medical assistants, all medical processes: consultation, examination, sample collection, as well as the administrative processes of follow-up appointments can take place in the same room (HHA, 2013, website). As a result, the traffic route of an outpatient is very short (Figure 6.21).

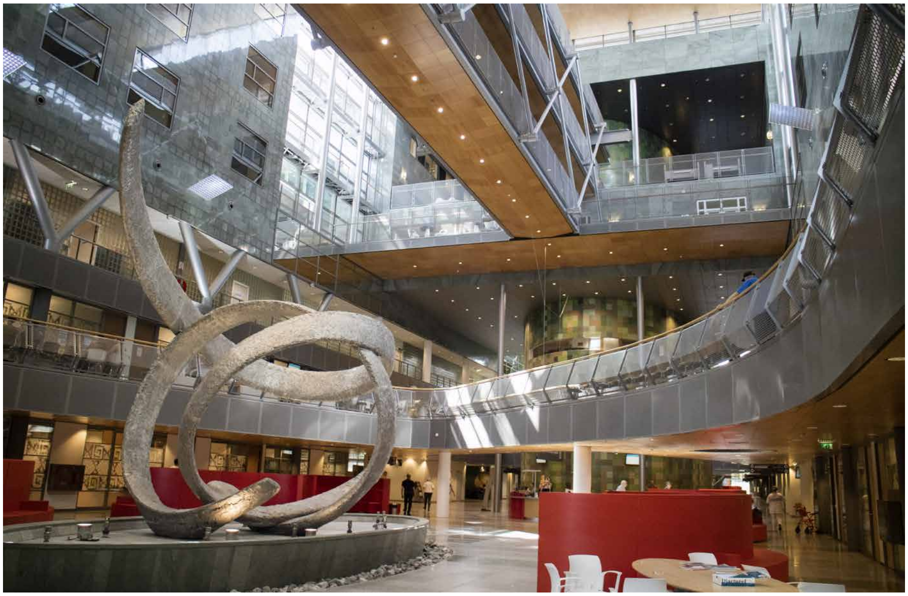

FIG. 6.20 The public area in the outpatient clinics in Zuyderland Medical Center, Sittard

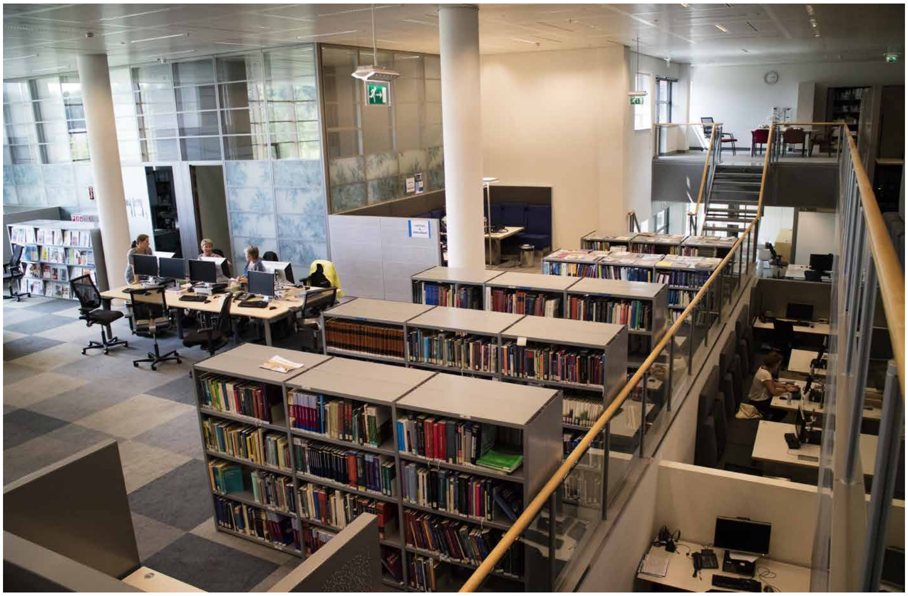

FIG. 6.21 Flexible workplaces in Knowledge & Expertise Center in Zuyderland Medical Center, Sittard

Moreover, thanks to the widespread use of the EMR system within the hospital, medical staff can conveniently check patients' medical records on any computer terminal at any time. As a result, separated offices are no longer needed in the knowledge & expertise center. Instead, various types of workstations in a large open space meet the different needs of working staff. On the one hand, this innovation has dramatically reduced the size of the center as only the number of medical staff on duty at peak hours should be considered, instead of the total number of medical staff. On the other hand, this innovation also has a great effect on improving communication between members of the medical staff, who can easily share knowledge with each other (Figure 6.22).

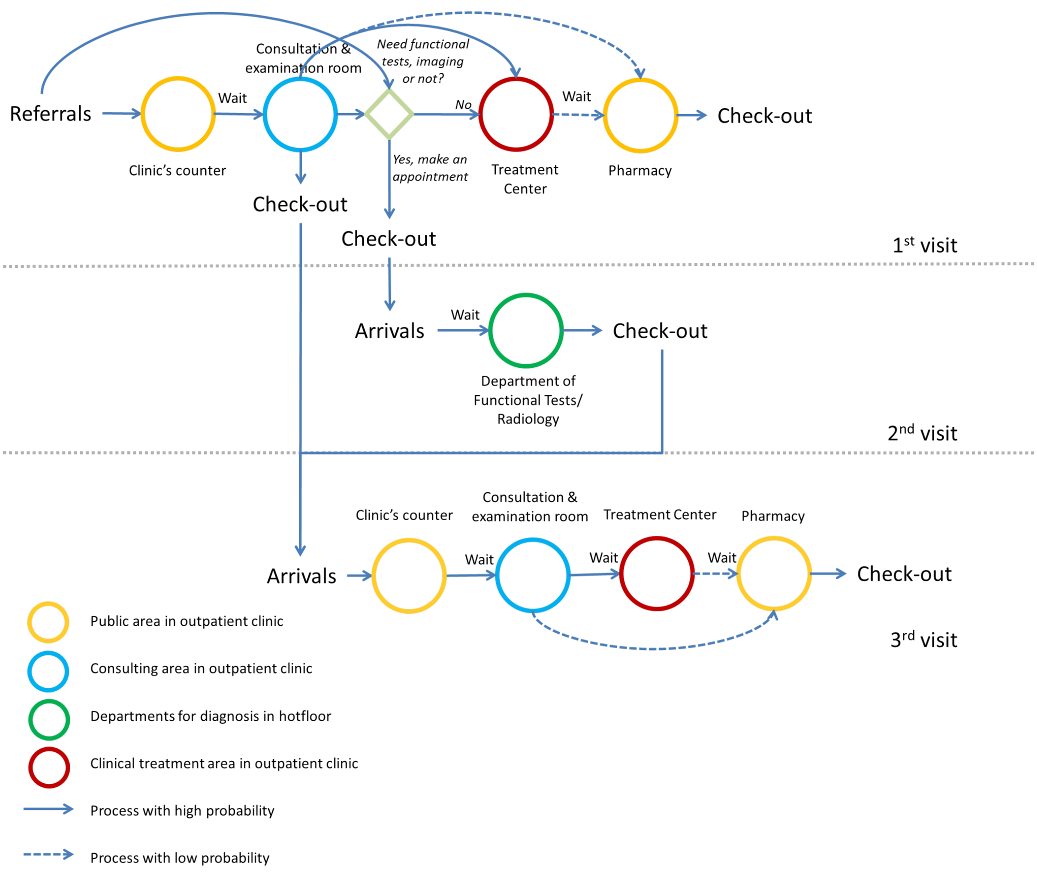

FIG. 6.22 Outpatient journey mapping in Zuyderland Medical Center Sittard

Outpatient clinics and hotfloor are prepared for flexible growth and internal relocation

More and more Dutch hospitals have realized that the rapidly changing requirements a hospital should be able to meet calls for flexible architectural solutions. Take Deventer Hospital as an example. Built in 2008, it looks like an airport with a huge hall and numerous blocks inside. Deventer Hospital has one of the first flexible outpatient clinics and hotfloor in the Netherlands as the architects and the hospital managers believe that the spatial requirements are changing rapidly (Figure 6.23) (Herweijer- van Gelder, 2016:254).

FIG. 6.23 Outpatient clinics in Deventer Hospital

In the outpatient clinic, the layout is composed of blocks that have possibilities for both extension and internal relocation. A basic block in the outpatient clinic consists of 14 standardized consulting rooms, two reception counters, two corridors for outpatients and one for medical staff on the ground floor, as well as back-offices for medical staff on the 1st floor. The two floors are connected through a narrow stair for staff only (Figure 6.24) (Herweijer- van Gelder, 2016:256&258). The back offices on the 1st floor can be relocated when the layout of consulting rooms underneath changes (Van Der Zwart, 2015:311). Under the big glass roof in the sunshine, the number of blocks can increase without any interruption to the original outpatient journeys.

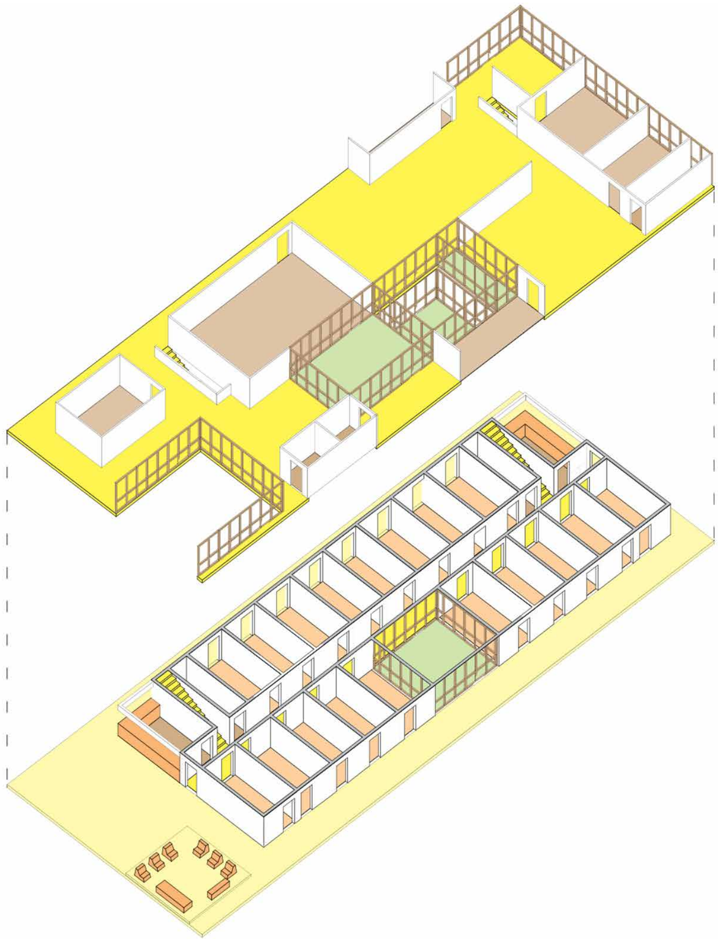

FIG. 6.24 The basic block in the outpatient clinics
(Van Der Zwart, 2015:310)

Until now, an extra block (Block A) has been built for the Ophthalmology Department, and an existing block (Block B) which was designed as the Oncology Department has been rented out to GPs (Figure 6.25).

In hotfloor, the layout is composed of fingers that can be extended at their ends. Recently, the Operating Theater in Finger B has been extended to contain a new hybrid operating room. The Radiology Department in Finger A is going to be enlarged (Figure 6.26). The extensions will not influent outpatient and inpatient journeys.

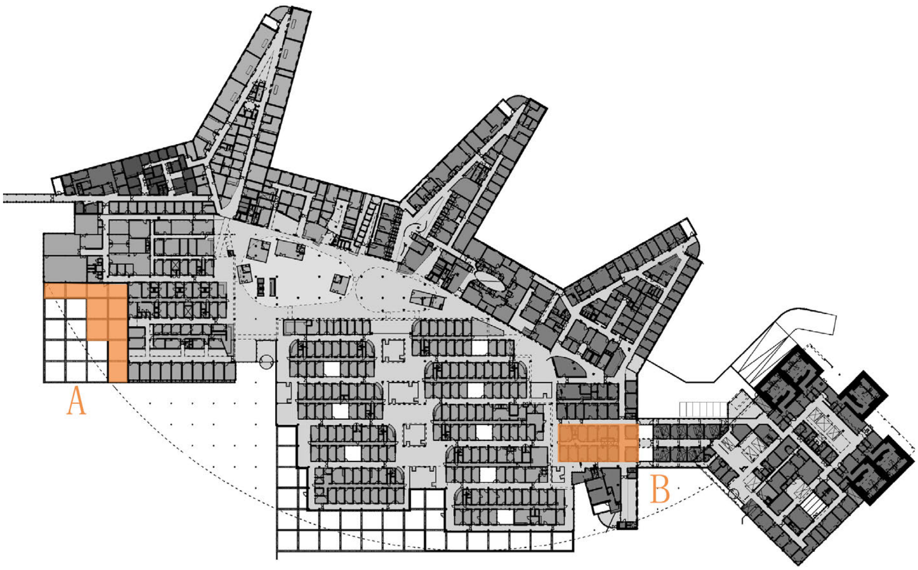

FIG. 6.25 The new block and the relocated block in the outpatient clinics
(Adapted from the floor plan provided by Deventer Hospital)

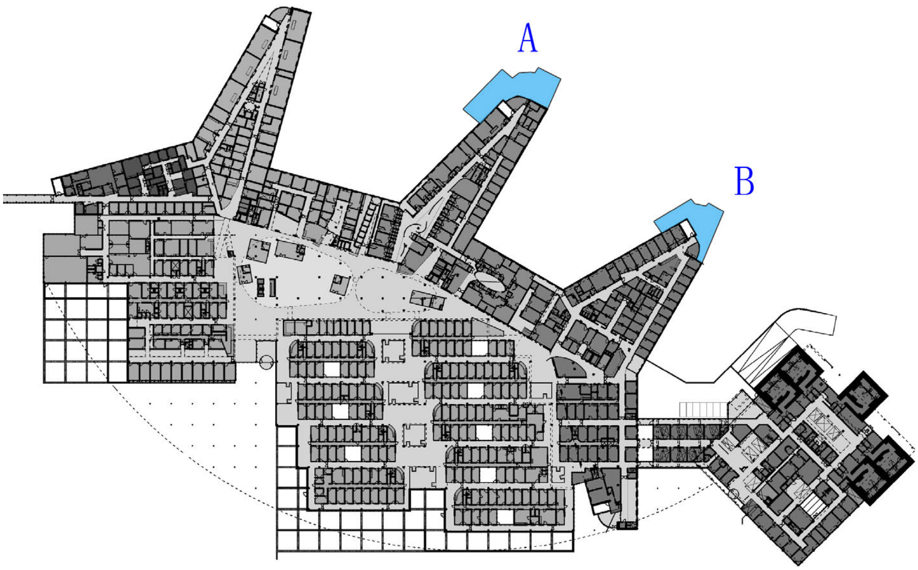

FIG. 6.26 The extension of fingers in the hotfloor
(Adapted from the floor plan provided by Deventer Hospital)

6.3.2.2 On the aspect of patient experience

Well-equipped waiting area

Although most outpatients visit hospitals with appointments, they have to stay for a while in the waiting areas after they check in. In the Netherlands, a waiting area in an outpatient clinic usually includes a seating area with benches that is suitable for chatting, and tables and chairs suitable for reading.

In the cancer center of VU University Medical Center (VUmc), the waiting area is well-equipped to fulfill the various needs of outpatients with chronic diseases who have to visit the department frequently. The waiting area, named 'patient lounge', is divided into a couch area, an area with benches with high backs, an area with reading tables, a place to watch TV, a computer area, and a roof garden (Figure 6.27). As a consequence, patients' suffering might be relieved, their anxiety reduced.

Warm colors in public spaces

The potential role and significance of colors for patients at both the psychological level and the physiological level is well known by architects (Zhang, 1999:23). Whether in newly built or renovated hospitals in the Netherlands, warm rather than cool colors are used in public areas. Even if the interior spaces have cool colors, the colors of furniture and structure are warm and bright. Comparing hospitals from the past (e.g. the AMC), with recently built ones (e.g. the Isala Hospital in Zwolle), shows how the use of color has evolved in the last few decades. In the Isala Hospital, the colors together with the plants indoors create a warm and friendly environment (Figure 6. 28).

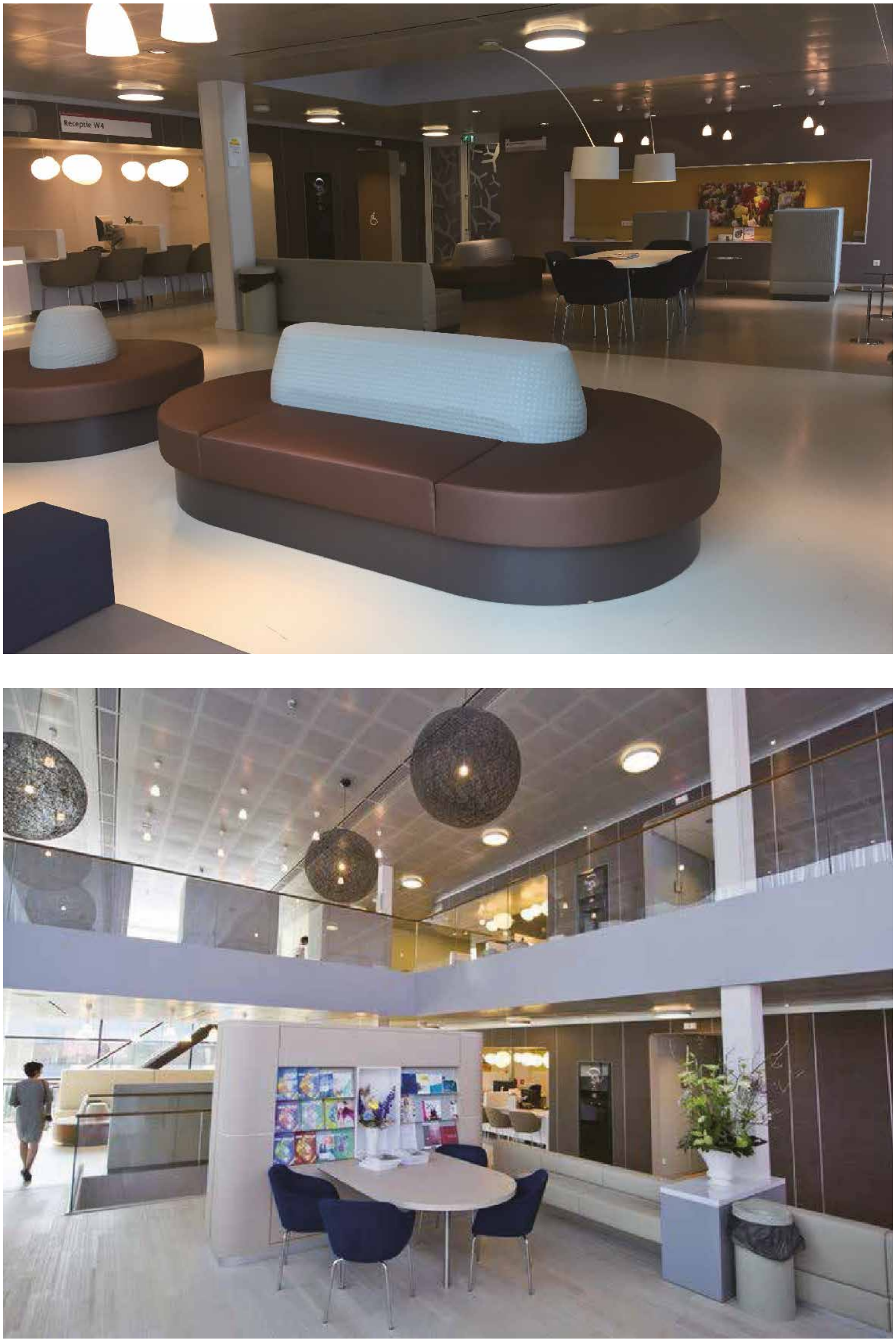

FIG. 6.27 The patient lounge in the cancer center of VUmc
(Top: photo by the Author; Bottom: Herweijer- van Gelder, 2016:267)

FIG. 6.28 Colors in the public space (Top: AMC, Bottom: Isala Hospital)

Friendly neighborhood

Dutch scholars are rethinking the interaction between hospitals and cities. It is believed that a hospital should be more than a medical factory isolated from surrounding communities. It is part of the city (Wagenaar et al., 2006:104). As a result, hospitals in the Netherlands make great efforts to integrate into the cities they are located in. Patients, medical staff, and visitors are taken care of in hospitals, but at the same time, the residents from surrounding communities are welcome to use the facilities (shops, restaurants) in their public areas.

Take University Medical Center Groningen (UMCG) as an example. The public space in the hospital is not a typical hospital interior; instead, it provides an urban ambience. The facilities providing public services for the city such as restaurants, cafes, supermarkets, and flower shops are distributed in the entrance hall, while the facilities such as hairdressing and bookstores are located at the core near the indoor plaza. Two parallel indoor boulevards are covered with transparent roofs that flood them with daylight; they connect the entrance hall and the plaza and are filled with plants, seats, sculptures, and temporary art exhibitions (Figure 6.29).

In addition, Dutch hospitals occasionally invite school children and nearby residents to visit the hospitals and participate in some activities. For example, an activity named “Teddy Bear Hospital” was held in AMC Amsterdam, which invited children to “treat” teddy bears under the guidance of doctors. During the game, children imitate the medical staff’s work, such as bandaging a wound, operating radiological tests, and putting on a cast. Besides gaining some medical knowledge, it is hoped that children would feel less frightened or anxious when they have to visit a doctor in a hospital in the future (Figure 6.30).

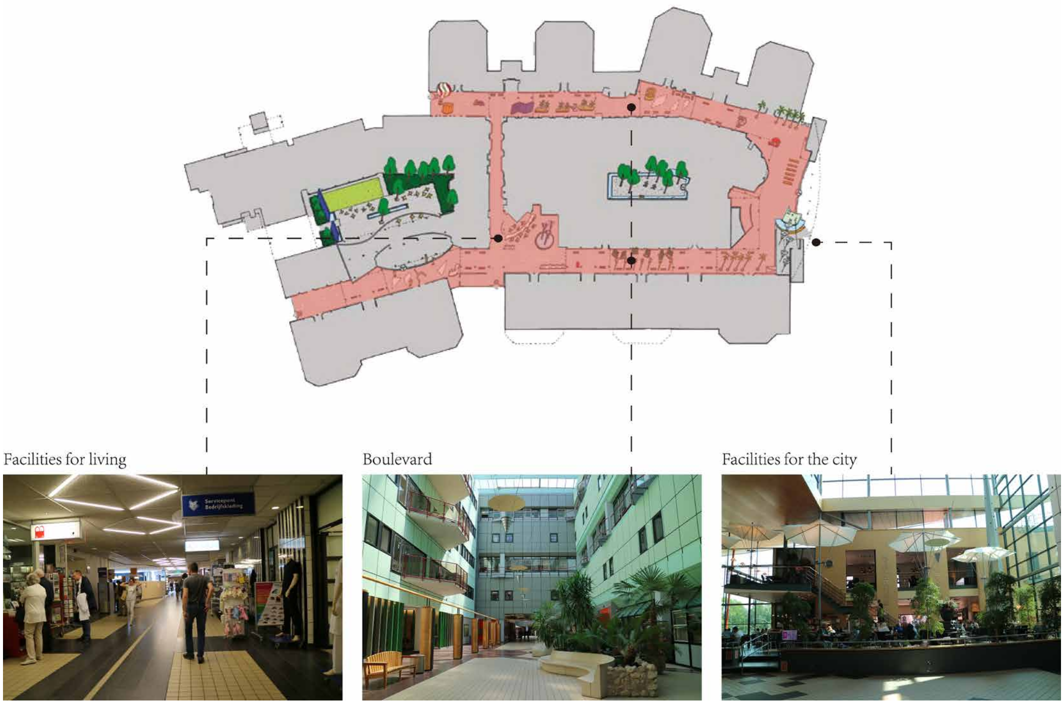

FIG. 6.29 The distribution of public service facilities in UMCG
(Adapted from Mens, 2012:86)

FIG. 6.30 The activity “Teddy Bear Hospital” in AMC Amsterdam

6.4 Inpatient journeys in hospitals

6.4.1 Inpatient journey and mapping in general – the example of patients who need surgery

Inpatients are admitted the day before surgery. Some clinical processes like clinical check-ups, functional tests or imaging may be undertaken on that day or they may have been finished in previous outpatient visits. After surgery, patients only stay in hospitals for a couple of days in order to be monitored and go through the required clinical processes. Then they go home or are referred to nursing homes (Figure 6.31). Take the inpatient journey for a brain tumor patient in the University Medical Center Utrecht (UMCU) as an example in Box 6.3.

From the perspective of inpatient journey mapping, inpatients visit almost the same places in a single journey in a Dutch hospital as those in a Chinese hospital. An obvious difference is that inpatients in a Dutch hospital do not have to go to the cashier office before discharge or referral. Sometimes inpatient admissions take place in wards instead of at registration desks in the entrance halls (Figure 6.32).

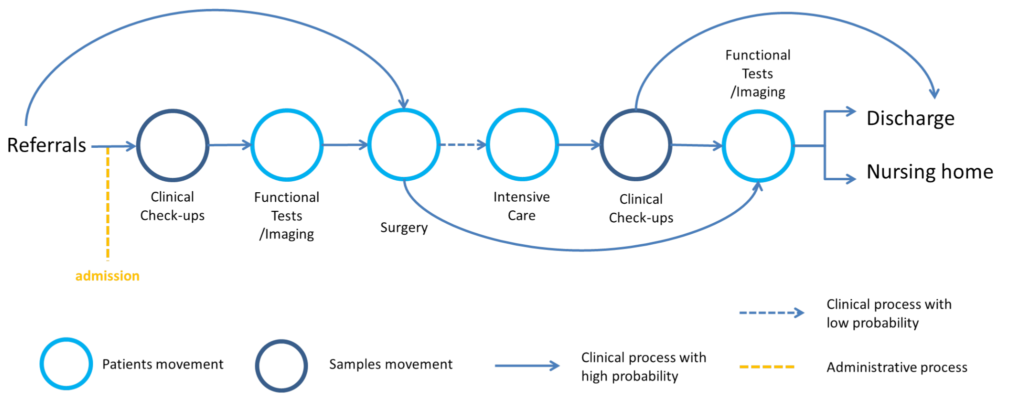

FIG. 6.31 Inpatient journey in the Netherlands

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BOX 6.3

Patients go to UMCU the day before surgery and have MRI scans. The next day, patients are delivered to the operating theater. After going through all stages on a checklist, surgery begins. Patients wake up before they are delivered to the recovery where they are closely monitored for 24 hours. Then they stay in the ward for around 4 days before they are transferred to nursing homes. A follow-up outpatient appointment is scheduled six weeks after the surgery (TU Delft, 2017: website).

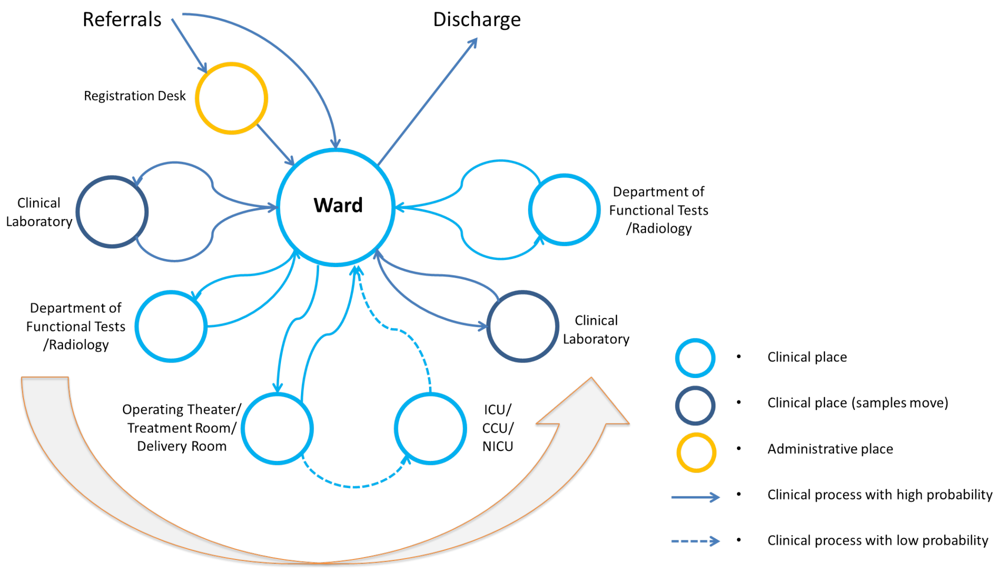


FIG. 6.32 Inpatient journey mapping in the Netherlands

6.4.2 New trends in inpatient wards

6.4.2.1 On the aspect of procedure

Single bedrooms become more popular than multi-bedroom in inpatient wards

A large number of evidence-based research has compared the pros and cons of a single bedroom compared to a multi-bedroom in inpatient wards on the aspects of cost, infection control, fall incidents, and therapeutic impacts (Table 6.2). The outcomes of the research indicate that the advantages of a single bedroom far outweigh its disadvantages. In the Netherlands, single bedrooms have been widely used in newly-built inpatient wards (Table 6.3). This leads to a significant reduction in ALOS from 7.8 days in 2002 to 5.0 in 2016, which is the shortest in the European Union (Figure 6.33).

TABLE 6.2 The advantages of single inpatient bedroom and multi-bedroom

Category	Type of room	Advantages
Cost	Single bedroom	Lower operating costs Higher occupancy rates Shorter length of stay Fewer medication errors & costs
	Multi-bedroom	Lower first costs
Infection control and falls	Single bedroom	Lower risk of hospital-acquired infection Fewer patient transfers Easier access to bathrooms
	Multi-bedroom	Fewer falls in patients requiring supervision
Hospital design & therapeutic impacts	Single bedroom	More privacy Less noise Fewer sleep disturbances More patient control More space for family More treatment and tests can be taken in bedrooms Higher patient satisfaction
	Multi-bedroom	Smaller occupied space Shorter distance between the patients and nurses

(Chaudhury et al., 2004:5-6, Wagenaar et al., 2006b:309, Wagenaar et al., 2018:75)

TABLE 6.3 Newly-built inpatient wards in the Netherlands (Incomplete Statistics)

Built-up year	Hospitals	Hospital types	Cities	Number of beds	Types of inpatient bedroom	The rates of single bedroom
2008	Deventer hospital	General hospital	Deventer	230	Single, double, treble	22.6%
2009	Zuyderland Medical Center	General hospital	Sittard	425	Single	100%
2013	Isala Hospital	General hospital	Zwolle	859	Single, double, treble, quadruple	-
2013	Jeroen Bosch Hospital	General hospital	‘s-Hertogenbosch	730	-	60%
2013	Meander Medical Center	General hospital	Amersfoort	600	Single	100%
2016	Medical Spectrum Twente	General hospital	Enschede	700	Single	100%
2017	Erasmus Medical Center	University medical center	Rotterdam	1320	Single	100%

(Data source: Official website of the hospitals)

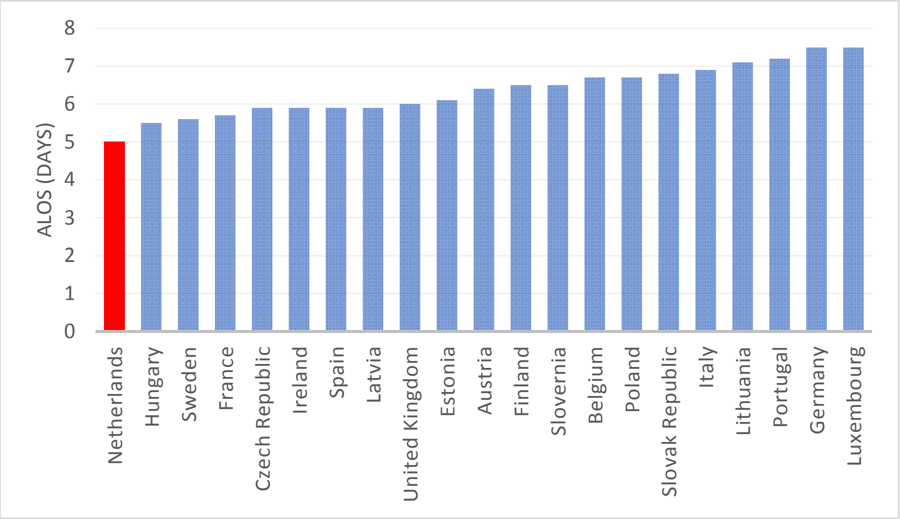


FIG. 6.33 Average lengths of hospital stay in the European Union
(OECD Health Statistics)

With the help of computers on wheels (COWS) and handheld medical devices, more treatment procedures and tests can be accommodated in single bedrooms. Fewer inpatient pathways are needed for the Departments for diagnosis (e.g. the Radiology Department) and Departments for treatment (e.g. the Dialysis Department) in the hotfloor on an inpatient journey. As a result, the wide use of single bedrooms in inpatient wards leads to a lower risk of infection (Wagenaar *et al.*, 2018:76) (Figure6.34).

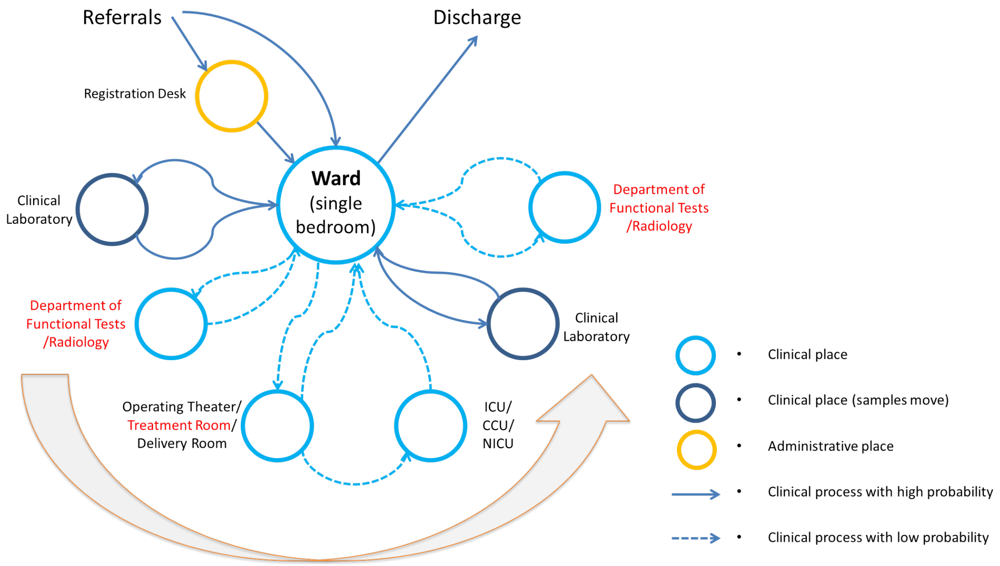


FIG. 6.34 Inpatient journey mapping when the single bedroom is widely used in wards

The type of single bedrooms used in Dutch hospitals is compact (around 20 sqm), including an en-suite bathroom and space for visitors. Inpatients can have a view from the window to the world outside from their beds. With the help of a bedside terminal, inpatients are able to order dinner, watch TV programs, make phone calls, and control the lighting, temperature, and humidity in the room, and they can open and close the door. All this greatly reduces the workload of nurses (Figure 6.35).

There are two planning options for bathroom positions. Compared with the planning options in China (stated in Paragraph 4.2.2.1). Dutch architects pay more attention to nurses' supervision, daylight access in the corridor, as well as walking distances (Figure 6.36 & Figure 6.37).

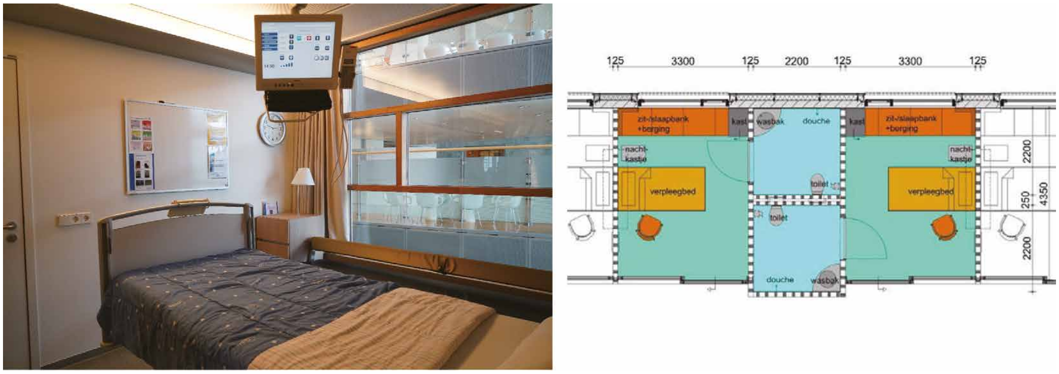


FIG. 6.35 A single bedroom in Zuyderland Medical Center
(Left: photo by the Author; Right: adapted from Herweijer van Gelder, 2016:191)

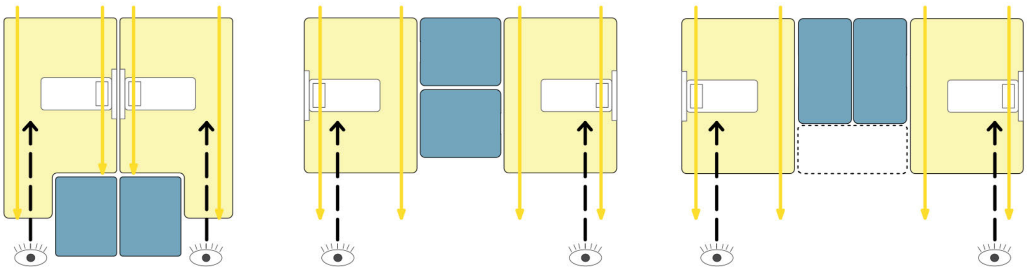


FIG. 6.36 Nurses' supervision and daylight access in an inpatient bedroom
(Wagenaar et al., 2018:80)

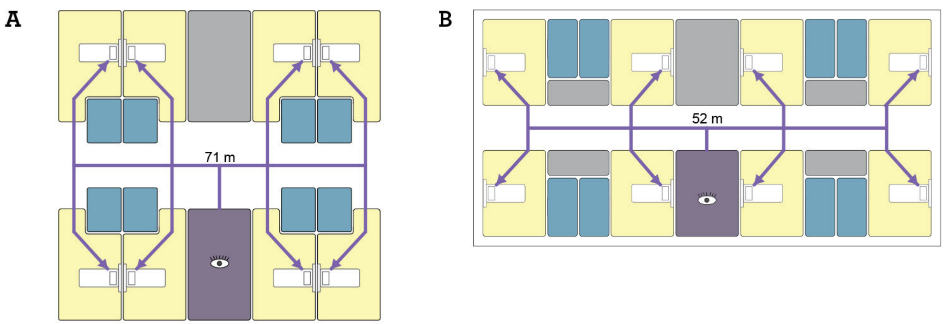


FIG. 6.37 Walking distances in part of a ward
(Wagenaar et al., 2018:81)

TABLE 6.4 The pros and cons of the different bathroom positions in an inpatient bedroom

	Pros	Cons
Bathroom near the entrance of inpatient bedroom	1. More privacy for inpatients 2. Bathroom cleaning disturbs patients less	1. Less patient visibility from the corridor for nurses 2. Less daylight in the corridor
Bathroom in-between inpatient bedrooms	1. Greater patient visibility from the corridor for nurses 2. Surplus space which can be used for support facilities	1. Less sunshine 2. Limited view from the window

6.4.2.2 On the aspect of patient experience

Family accompaniment is encouraged in inpatient wards

In the old days, it was common belief that it was not wise to allow visitors to come in and out of the inpatient wards whenever they liked, since this would increase the risk of infection. But now, some inpatient bedrooms are equipped with sofa beds, allowing visitors to stay overnight except when the patients are being prepared for surgery or other procedures (Figure 6.38). Family members and friends offer social support which is believed to be beneficial for patients and might help them to recover faster.

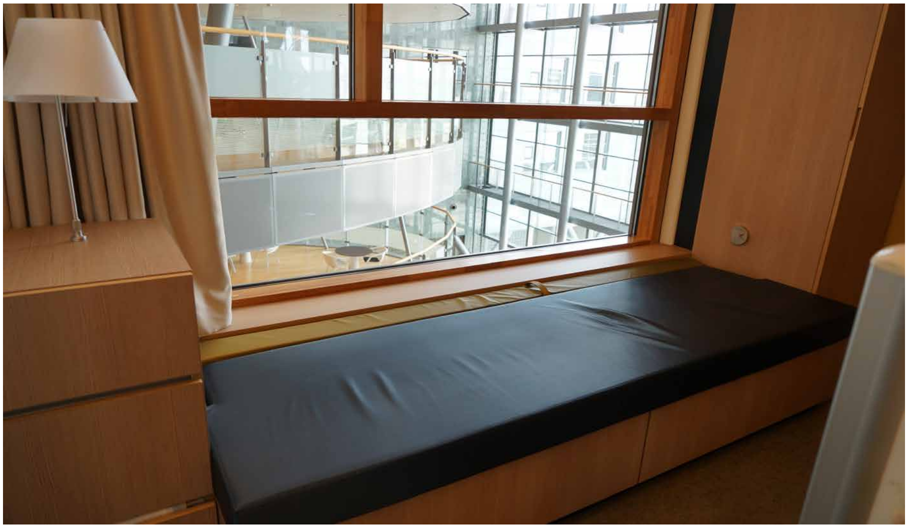


FIG. 6.38 Sofa bed in an inpatient single bedroom in Zuyderland Medical Center

Leisure area is designed especially for inpatients near their bedrooms

According to a survey conducted by the Dutch Institute of Applied Science and Technology (TNO) at Radboud University Nijmegen Medical Center (Radboud UMC) in 2015, inpatients spent 80% of their time in bed, even though only 5-10% of the inpatients had medical reasons to be bedridden all day. This physical inactivity greatly impeded patients' recovery and increased the length of their hospital stay. As a result, the researchers propose a “Ban Bed-centricity” policy, which encourages patients to get out of bed more often (Reshape center Radboudumc, n.d.: website). To implement the idea, inpatients with brain tumors in the University Medical Center Utrecht (UMCU) are encouraged to go to the toilet on their own as soon as they return to their rooms from the recovery area of the operation theater after a 24-hour monitoring (TU Delft, 2017: website).

The trend of inpatient ward design in the Netherlands coincides with the idea of “Ban Bed-centricity”, too. Traditionally, the leisure area for inpatients is a room located at the end of the corridor or near the nurse station, far away from inpatient bedrooms. In order to get inpatients out of their beds, the leisure area for inpatients in newly designed wards is now placed in the corridor, which is very close to the inpatient bedrooms. Take Zuyderland Medical Center, Sittard as an example. The central corridor is widened from 3m to 5-6m to contain both walkways and a spacious leisure area equipped with a sofa, reading tables, and coffee machines. It looks like a living room in a house, which urges inpatients to get out of their bedrooms. A similar type of ward has been applied in the Meander Medical Center, Amersfoort. The width of the central corridor gradually widens, which gives patients and their visitors a sense of direction (Figure 6.39).

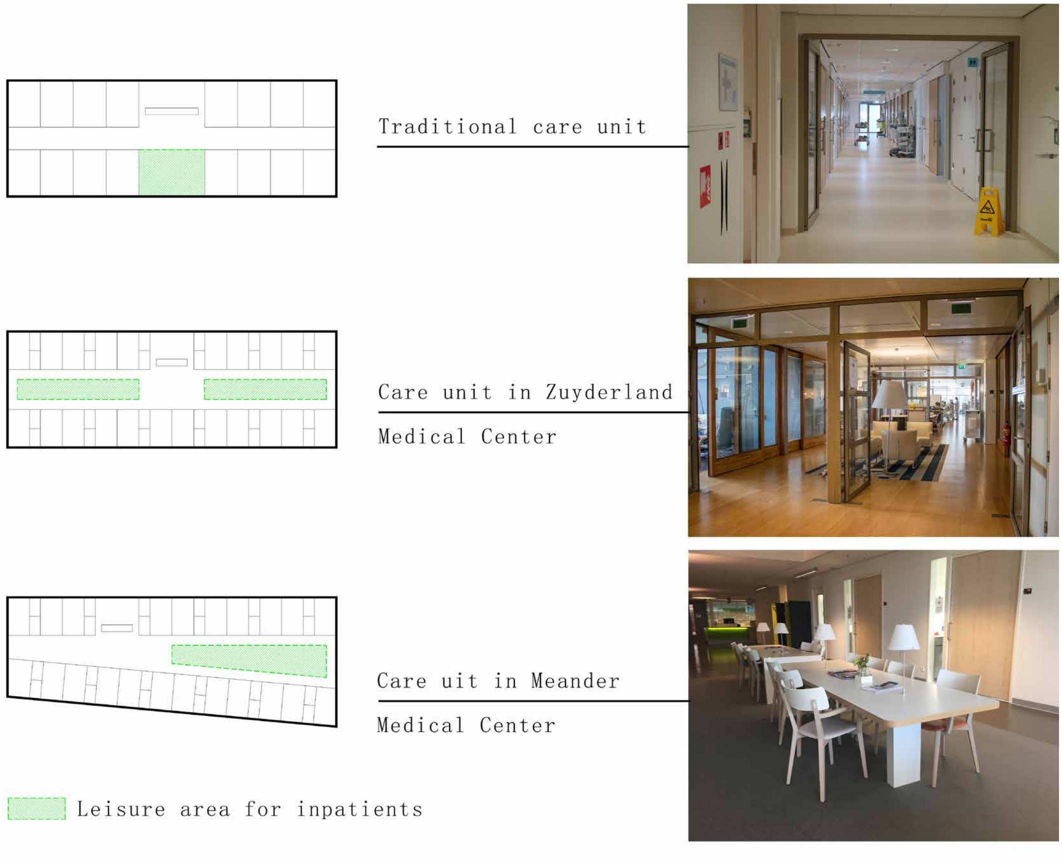


FIG. 6.39 Leisure area for inpatients in wards

Meditation rooms become essential facilities in Dutch hospitals

Every Dutch hospital has meditation rooms for both patients and visitors to seek spiritual comfort and emotional peace. They usually have a direct connection with the main public area of the hospital. In the Netherlands, there are two major types of meditation rooms: A) Separate meditation rooms for people of different faiths and beliefs. For instance, there are two rooms for Christians and Muslims respectively in VUmc; B) A neutral non-religious meditation room for all people, some of which have big windows with beautiful views while others receive light and shadow from the roof or stained-glass windows (Figure 6.40).

FIG. 6.40 Neutral non-religious meditation rooms (Top: Meander Medical Center; Bottom: Medical Spectrum Twente)

6.5 Acute patient journeys in hospitals

Acute patient services are provided by GPs, trauma centers, and emergency departments in general hospitals and university medical centers. Depending on the urgency of the situation, patients can contact their GPs or visit a GP post (for out-of-hours care) for referrals, call an ambulance, or go to an ED on their own initiative (Kroneman et al., 2016:146).

In the Netherlands, triage nurses in emergency departments and trauma centers prioritize patients on the basis of the Dutch Triage Standard (NTS) which labels acute patients with one of the six levels from resuscitation to advice (Table 6.5) (BureauNTS, 2017:6; Bureau NTS, n.d.: website).

TABLE 6.5 Dutch Triage Standard (NTS)

Acuity level	Classification criteria	In time
U0 (Resuscitation)	Loss of vital function	-
U1 (Life-threatening)	Unstable vital function	Immediately
U2 (Emergent)	Vital function threat	As soon as possible
U3 (Urgent)	Real risk of damage	Within a few hours
U4 (Not urgent)	Negligible risk of damage	Within 24 hours
U5 (Advice)	No risk of damage	Next working day

(Data source: Bureau NTS, 2017:6; Bureau NTS, n.d.: website)

Acute patients are suggested to get a referral from their GPs or the GP post, or call an ambulance in order to go to an Emergency Department. There are only three to five clinical processes the patient has to go through after triage, the reason being that all the cure and care services are provided around patients. The overall procedures do not include administrative processes (Figure 6.41). In this setting, unnecessary visits to the Emergency Departments are avoided, and the waiting times for diagnosis are short (Kroneman *et al.*, 2016:146-148).

From the perspective of acute patient journey mapping, after triage acute patients stay in the waiting area for consultation and treatment. Transportation of patients is reduced to a minimum as no time can be wasted once the consultation and treatment have started. Some acute patients have to stay in the Acute Medical Unit (AMU) for a maximum of 48 hours to be stabilized before the delivery to the usual inpatient wards (Wagenaar *et al.*, 2018:108). An acute patient journey does not contain administrative steps (Figure 6.42).

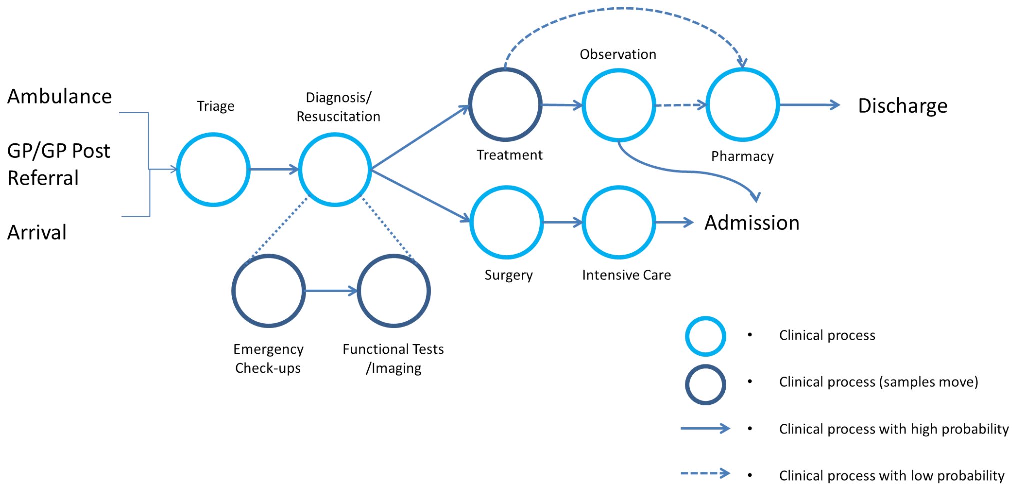


FIG. 6.41 General acute patient journey in the Netherlands

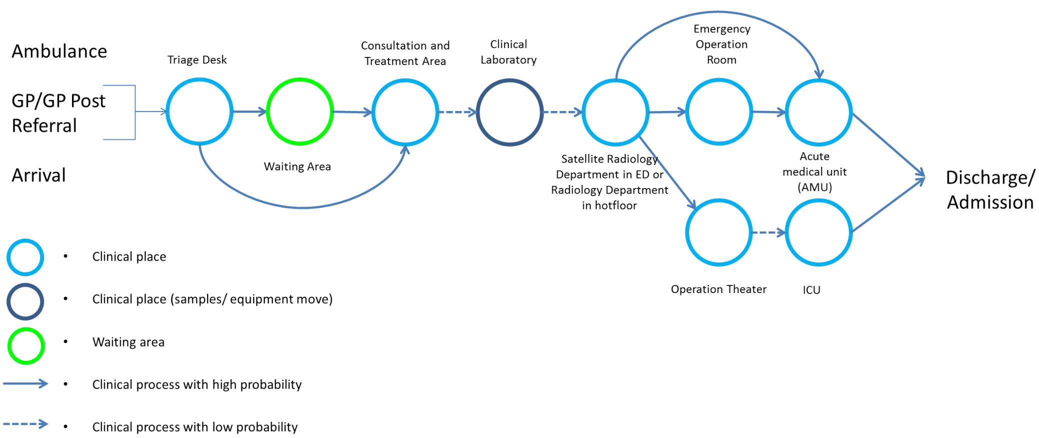


FIG. 6.42 Acute patient journey mapping in the Netherlands

For acute patients in the Netherlands, “fast” and “effective intervention” is the only thing that matters (Wagenaar *et al.*, 2018:53-54). As a result, the waiting area for acute patients in Dutch hospitals is small in scale and utilitarian in style, with little decoration (Figure 6.43).

FIG. 6.43 The waiting area of the ED in Deventer Hospital

6.6 Lessons for China

The combination of evidence-based design inspired architectural innovations, which approach hospital architecture from the perspective of the patients, and superior medical outcomes in terms of medical procedures suggest there is much China can learn from the Dutch best practices even though the two countries could hardly be more different on the aspects of both the healthcare system and patient needs.

6.6.1 At the regional level

One of the principal characteristics of the Chinese healthcare system is the lack of a proper gatekeeping system. In the Netherlands, this is one of the main responsibilities for general practitioners (GPs), a profession that does not exist in China. A lot might be gained, however, if China would introduce a system of general practitioners that would regulate access to hospitals in a patient journey at the regional level. In that case, overcrowded hospitals might disappear, and the desires for hospital development would be totally different from the ones at present.

6.6.2 At the healthcare facility level

6.6.2.1 On the aspect of procedure

Daycare, multifunctional consulting rooms, flexibility in terms of change, and internal relocation in outpatient clinics, as well as single bedrooms in inpatient wards are the prevailing ideas in Dutch hospitals. Daycare, multifunctional consulting rooms, and single inpatient bedrooms simplify the procedure of patient journeys because several processes are combined and take place in the same location. By contrast, flexibility and the strategy of internal relocation do not change the procedures and spatial sequences of the original patient journeys at all.

As a matter of fact, the ideas of daycare, flexibility in terms of change and internal relocation can be implemented in Chinese hospitals if hospital managers are ready to accept them, which comply with the rules in the current Chinese healthcare system. The brand new idea of the multifunctional consulting rooms does not break any rules either, but it requires a consensus among patients, medical staff, as well as hospital managers. The widespread use of single inpatient bedrooms seems impossible in current China due to the high initial costs. However, in the long time, when the Chinese healthcare system does focus on the lifetime costs of a hospital (including not only initial costs but also operational costs and societal costs), single inpatient bedrooms may become a good choice.

6.6.2.2 On the aspect of patient experience

On the one hand, Dutch hospitals represent best practices if it comes to well-equipped waiting areas, architectural finishing with warm colors, and integration – socially and functionally – with the neighborhood. This results in a better environment in the public areas, which helps patients and visitors to relax and feel at home in a hospital. Dutch hospitals also represent best practices in terms of allowing family members and friends to accompany patients, the provision of leisure areas near inpatient bedrooms, and meditation rooms. All of these measures have created new functions related to patients' love and belonging, as well as esteem.

All these best practices concerning patient experience can be introduced in Chinese hospitals. But the key question is what exactly motivates hospital managers to improve patient experiences. In the Netherlands, there is fierce competition between hospitals especially after the reform in 2006. As both the waiting time for an appointment and the patient satisfaction scores can be found on the front page of each hospital's official website, hospital managers are well aware that patient experiences play a dominant role when patients choose a hospital. Shorter waiting time for appointments and higher scores of patient satisfaction give the hospital a better reputation. Greater patient satisfaction would make the jobs of hospital staff members easier, too (Hall, 2013:435). This may not be the case in China.

7 Improvement of hospital architecture from the perspective of patient journey

Question

– How can the concept of patient journeys help to improve hospital architecture?

Purpose

Following the discussion on patient journeys and hospital architecture in the previous chapters, this chapter explores feasible architectural interventions to improve the performance of hospitals from the perspective of patient journeys.

To this end, the chapter looks back to significant medical events which impacted patient journeys in hospitals in the recent past. Various ways to improve patient journeys are identified, based on the characteristics of procedures and the consequences of technological innovation. Then it focuses on the five main uncertainties about hospital architecture. Finally, new ideas on hospital architecture are discussed at the regional as well as the facility level.

Approaches

In order to make predictions on hospital architecture from the perspective of patient journeys, we look into the way it developed until now and then, partly based on this historical analysis, formulate various scenarios. Thus, the uncertainties of future changes can be mitigated.

Findings

1 Aspects of possible improvement in patient journeys;
2 Uncertainties about hospital architecture;
3 New ideas of hospital architecture with the consideration of patient journeys.

7.1 A historical perspective of patient journey in hospitals around the world

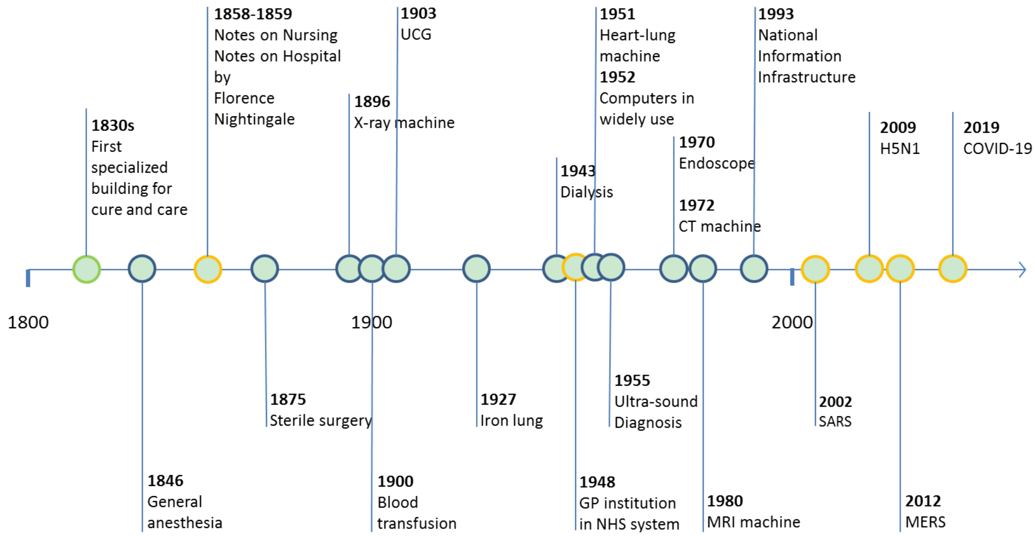


FIG. 7.1 Timeline of significant medical events related to patient journeys
(Data source: Liu, 2006:44,68-69; Hao, 2012:211-227; Goodwin et al., 2011:13)

Historically, groundbreaking innovations in medical science and technology as well as significant changes in healthcare systems have determined the evolution of patient journeys. The timeline shows significant medical events related to patient journeys since 1800 (Figure 7.1). In this period, many medical devices were invented that thoroughly changed the diagnosis and treatment of patients. As a result, the procedures that patients followed in a patient journey have changed. At present, doctors always ask patients to take clinical check-ups, functional tests, or imaging before making decisions. Furthermore, owing to the advanced medical technology in diagnosis and treatment, as well as the goal of reducing healthcare expenditure, the number of outpatients has rapidly increased while the number of inpatients went down. Patients have more choices than before. Based on their needs, they can visit daycare units, general practitioners, or rehabilitation centers.

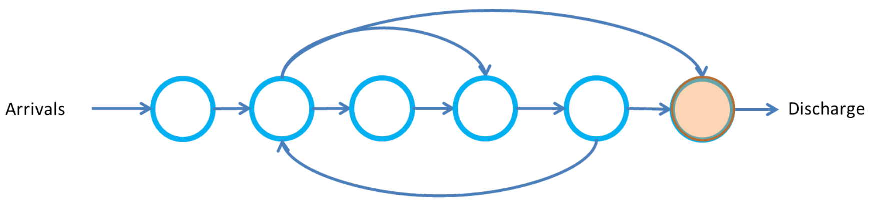
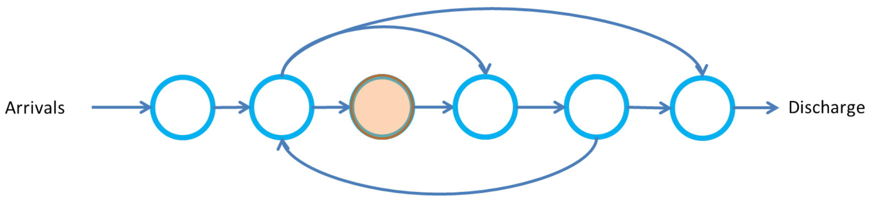
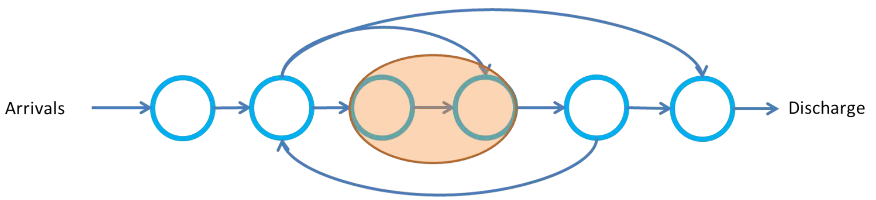
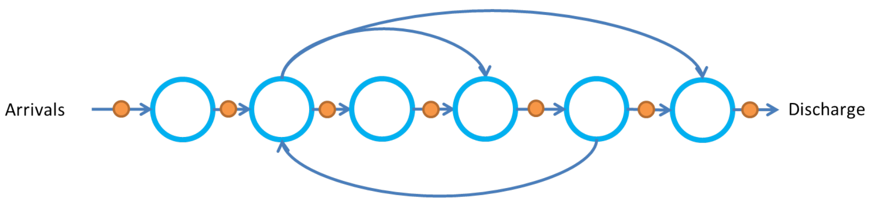
Patient journeys are also deeply influenced by public health incidents like new contagious diseases and epidemics. These incidents serve as one of the primary drivers of patient journey development. For example, fever clinics have been established in every hospital in China since 2003 in order to fight against epidemics like Severe Acute Respiratory Syndromes (SARS) and Covid-19, which led to changes in outpatient and acute patient journeys. If a patient has a fever or any symptoms of influenza, he/she would be delivered to the fever clinic immediately when he/she goes through the clinical process of triage. Only when doctors confirm that the patients have neither a contagious disease nor the symptoms of an epidemic can they continue their original journeys.

7.2 Potential aspects of patient journey enhancement

The way patient journeys are managed can lead to problems such as “wastes”, “delays”, “bottlenecks” and “waits”. From the perspective of Lean Thinking, Hall (2013:11-12) suggested to improve service processes, arrival processes, and queuing processes. Graban (2016: 151, 179, 225) proposed strategies that deal with the waste caused by transportation processes, waiting, over-processing, etc. These include A) root cause problem solving, B) prevention of errors, and C) improvement of flows. Combining the analysis of patient flows with best-practice care pathways, Wagenaar *et al.*, (2018:29) came up with some achievable improvements focusing on the aspects of sequences, duration, and the interval between steps.

The following aspects of patient journey enhancement are based on the overall procedures of patient journeys, patient experience, and professional expertise in architecture, and management (Table 7.1).

TABLE 7.1 Potential aspects that can improve patient journeys

	Standard Clinical Processes
Eliminate or simplify certain processes	
Shorten the duration of certain processes	
Integrate processes	
Shorten the duration of the interval between processes	

7.2.1 Eliminate or simplify certain processes

Patient journeys combine large numbers of clinical processes and administrative processes. Compared to the clinical processes, the administrative processes seem to be easier to be eliminated or simplified; this can be realized with the help of information technology. For instance, the administrative processes of registration and payment are considered as a kind of data exchange, which can be completed by family members, friends, or nurses instead of patients themselves. Furthermore, the process of registration can be completed at home via telephone or the Internet. The processes of payment can be completed via mobile phones or self-service terminals during the intervals between two clinical processes. In advance, the processes of payment can also be integrated into a single one at the end of the patient journey or eliminated by sending the bills to patients' insurance companies. As a consequence, it is unnecessary for patients to waste any time walking to a registration station or a cashier. In this way, hospitals can operate more efficiently because the number of processes is reduced.

Digital information, moreover, can be made available outside hospitals, which makes it possible to transfer many clinical processes to small-scale healthcare facilities or even the patient's home.

7.2.2 Shorten the duration of certain processes

In a patient journey, patients usually spend much time waiting for the outcomes of clinical processes, such as the clinical check-ups and the pharmacy. The duration mainly depends on the functional performance of various procedures, many of which can be enhanced with the help of technological development. 1) The auto-dispensing system applied in the Pharmacy, for instance, allows pharmacists to check whether the drugs comply with the doctors' prescriptions. As a consequence, patients wait only a few minutes for their medicine so that a smaller waiting area of the Pharmacy becomes possible. 2) The application of the automated assembly line network in the clinical laboratory has contributed to shortening the duration of clinical check-ups so as to give reports to patients as soon as possible. 3) Even in the process of diagnosis, the duration of various processes can be shortened, for instance by making sure that patients finish blood pressure measurement and doctors read patients' files before the consultation. In this way, hospitals operate efficiently as more patients can be treated in the same period.

7.2.3 Integrate processes

Process integration can take place between a clinical process and an administrative process, two clinical processes, or two administrative processes. For instance, the clinical process of diagnosis and the administrative process of registration for the next consultation can be easily combined if the subsequent visits follow a fixed scheme, especially for pregnant women from the Obstetrics Department.

Moreover, due to the rapid development of medical technology, new medical devices are likely to become smaller, lighter, and cheaper. Portable medical devices might be introduced in each consulting room or shared among several consulting rooms. That opens possibilities to do certain clinical check-ups, functional tests, and imaging in one single consulting room. In this way, the number of places a patient has to visit is reduced even though the number of processes included in a patient journey remains the same. By contrast, the workloads of doctors, nurses and technicians are heavier because they have to visit more consulting rooms. It may not be the most efficient way to run a hospital, but it is effective and makes patients more comfortable.

7.2.4 Shorten the duration of the interval between processes

Time spent on traffic and waiting determines the duration of the interval between processes. The need for patients to move between different places in the hospital because the steps in their patient journeys require them to go there. It can be minimized by optimizing the sequence of processes, which would be a task for hospital managers, or by placing correlated departments closer to each other, which calls for architectural solutions. The waiting time for the processes of diagnosis, functional tests, imaging can be shortened by improving working efficiency. Furthermore, it appears that a pleasant environment in the waiting areas would help patients relax and give patients the illusion of spending a shorter time there.

7.3 Uncertainties about hospital architecture

It goes without saying that the rapidly changing hospital environment causes architectural uncertainties, some of which are the result of new trends, for instance in medical science. The outcomes cannot be predicted by analyzing their historical timelines. Other uncertainties are brought about by brand-new inventions where no historical data can be used for reference, for instance, information technology.

7.3.1 Medical devices: centralization or decentralization?

As medical science has developed rapidly since the 20th century, numerous medical devices have been invented and extensively used in hospitals, which led to a change in the structure of hospitals. Traditional hospital structures, for instance, were often composed of only outpatient clinics and inpatient wards. Then the hotfloor evolved as an assembly of departments with a large number of advanced medical devices to assist diagnosis and treatment. Even though many sub-sectors such as Emergency Department, Daycare Center, and Rehabilitation Center are derived from outpatient clinics and inpatient wards, the links between the sub-sectors and the hotfloor are still close (Figure 7.2).

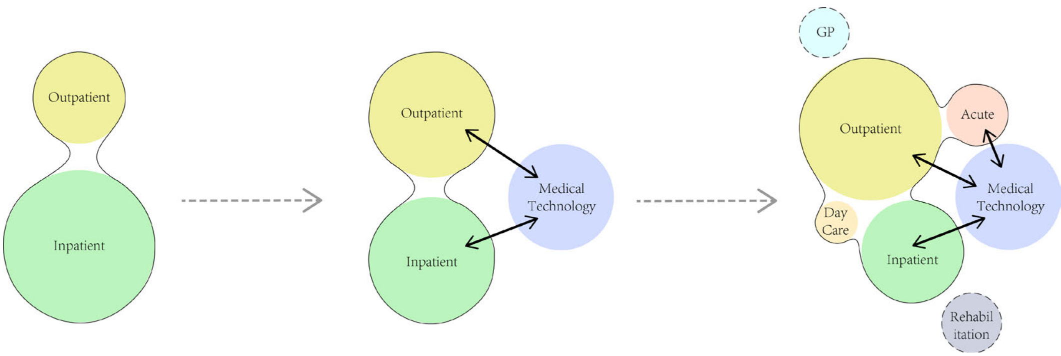


FIG. 7.2 Evolution process of patient journeys

In the foreseeable future, doctors will be even more dependent on medical devices in diagnosis and treatment. On the one hand, the departments of the hotfloor may be centralized or even operated independently as a center outside hospitals, providing professional services to healthcare facilities in the region. On the other hand, with the miniaturization and cost reduction of large-scale medical devices gradually, it is possible that medical devices will be equipped in various departments and at the bedside so as to minimize traffic. The decentralization of medical devices might have a profound influence on the hotfloor.

7.3.2 Medical concept: the extension of patient-centered care

The concept of patient-centered care was first proposed in the 1970s. One of the most famous examples is the Planetree Model. Today, the scope of the concept continues to be expanded. For instance, there was a nationwide discussion in China in the circles of academics and hospital management on who should be taken better care of in hospitals, patients or the staff. Wu *et al.* (2013:76) argued that all well-designed spaces were reserved for patients rather than for the staff. However, patients spend two weeks at most staying in a hospital while the staff stays in the hospital day and night. Their needs should be considered too. In the near future, the extension of the concept “patient-centered” will continue, the scope will include not only patients and staff but also all the other actors involved in a patient journey, such as family members, friends, nursing assistants, hosts/hostesses, as well as medical students.

7.3.3 Medical financing: transition from disease treatment to health promotion

With the implementation of care pathways as well as the analysis of big data, the single payment mechanism “fee-for-service” is going to be replaced gradually by a mixed payment system including Diagnosis-related groups (DRGs) and per-diem payment (Meng *et al.*, 2015:101). The healthcare system will be evaluated by health outcomes rather than the medical services that were used to produce these outcomes. In this context, the current institutional framework of healthcare facilities in China requires an innovation because both the service objects and the connections among healthcare facilities will change. An example is the establishment of 15-minute health service circles, where residents can find a healthcare facility and enjoy standardized medical and healthcare services within 15 minutes’ walk near home (The General Office of the CPCCC and the General Office of the State Council, 2016: website).

TOC

7.3.4 Medical demands: the emergence of regional differences

At present, the need for medical services is still growing in China (NHC, 2018: website). However, 180 cities appear to shrink in terms of the total population and population density (Long *et al.*, 2015: 15-16). Obviously, the medical needs of a growing region differ from those of a shrinking region. Different strategies have to be formulated to address varying needs. Extension is an option for growing regions rather than in the development of hospital architecture (Examples are given in Section 7.4.2).

7.3.5 Information technology: the creator of unpredictable possibilities

5G networks have been deployed rapidly worldwide since 2019, marking the start of a smart new era in all fields, including the field of healthcare. This superfast wireless technology supports highly precise and real-time transmission of massive amounts of data. That will guarantee a high degree of accuracy and reliability of the medical data that medical professionals use. As a result, many new-generation applications and tools concerning healthcare will be boosted by the 5G technology.

Information technology influences all three kinds of flows in a hospital: information, goods, and people (Ge *et al.*, 2004:18). First of all, information technology ensures information transmission between departments and even between hospitals. Secondly, the combination of information technology and automatic control technology has optimized the interconnection of people and goods, which results in a transition of the delivery of goods by staff to automatic and intelligent delivery. Information technology can also impact the flow of people. For example, the combination of online and offline approaches will shorten the duration and walking distance of patients and improve the way they experience their stay in a hospital. But at the same time, this innovation requires brand-new relationships between functional zones, and a revolution in flow systems - as well as new ideas in hospital management.

7.4 New ideas of hospital architecture from the perspective of patient journeys

7.4.1 Extension of patient journeys from a hospital to a region

In the context of the shift of medical financing from disease treatment to health promotion, hospitals are unable to fulfill the needs of inhabitants for both medical treatment and disease prevention on the one hand, and have much higher operating expenses than other healthcare facilities in the same region. As a consequence, it is better to reposition all healthcare facilities with the idea of regional medical networks, making different grades of healthcare and medical services accessible for residents.

Take medical cores in Singapore as an example. On the basis of the excellent medical resources of the six large acute hospitals with specialist outpatient clinics, six medical cores have been established, combined with a cluster of community health centers, nursing homes, hospices, and independent outpatient clinics. They share all medical resources including inpatient beds, medical devices, and medical records in the region(Li, C., 2016:53; Cui *et al.*, 2014:48). As can be seen in Figure 7.3, acute hospitals and community health centers have close medical interactions, as well as spatial connections; for instance, Jurong Community Hospital (JCH) was built together with Ng Teng Fong General Hospital (NTFGH). What's more, there are a number of nursing homes and clinics around NTFGH, which collaborate with each other efficiently and effectively (Li, C., 2016:54-55). Only patients in the acute phase of illness are allowed to stay in acute hospitals for the first few days, then they are transferred to community health centers for a few weeks in the sub-acute phase and rehabilitative phase (MOH Singapore, 2017:5). If patients have further needs for cure and care, they are transferred to nursing homes.

With the rapid development of information technology and the Electronic Medical Record (EMR), remote medical consultation has become possible and popular. As a result, referrals between healthcare facilities have become easy since they are no longer hampered by bottlenecks in the transfer of information. Patients can be transferred to the proper healthcare facility according to their needs. Moreover, the idea of the "decentralized hospital" (eg. "core hospital" and "Big Bang") predicts that other than the core part, the office-like and hotel-like parts need not be located at hospitals and can be scattered over a wide area and become a regional network providing services of cure and care (Figure 7.4) (Mens *et al.*, 2010:283, Wagenaar *et al.*, 2018:25).

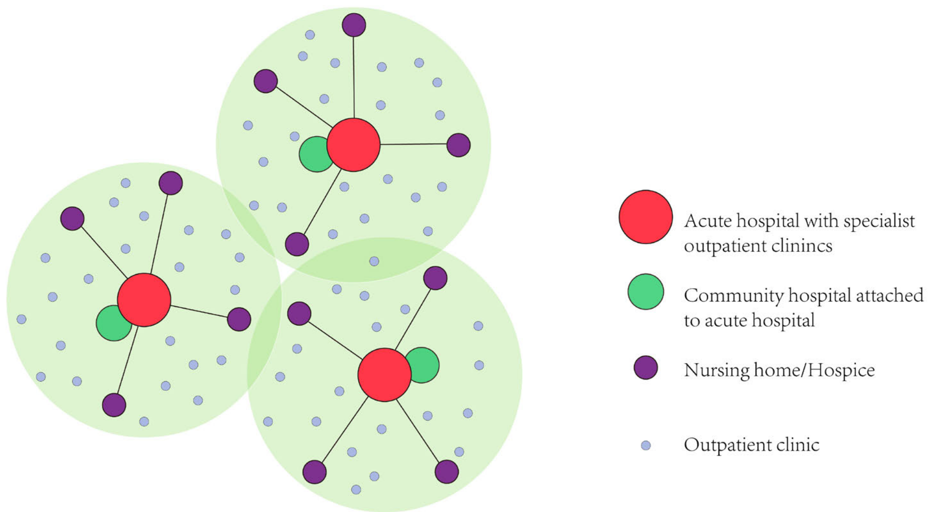


FIG. 7.3 The configuration of medical cores in Singapore
(Adapted from the figure provided by CPG Consultants)

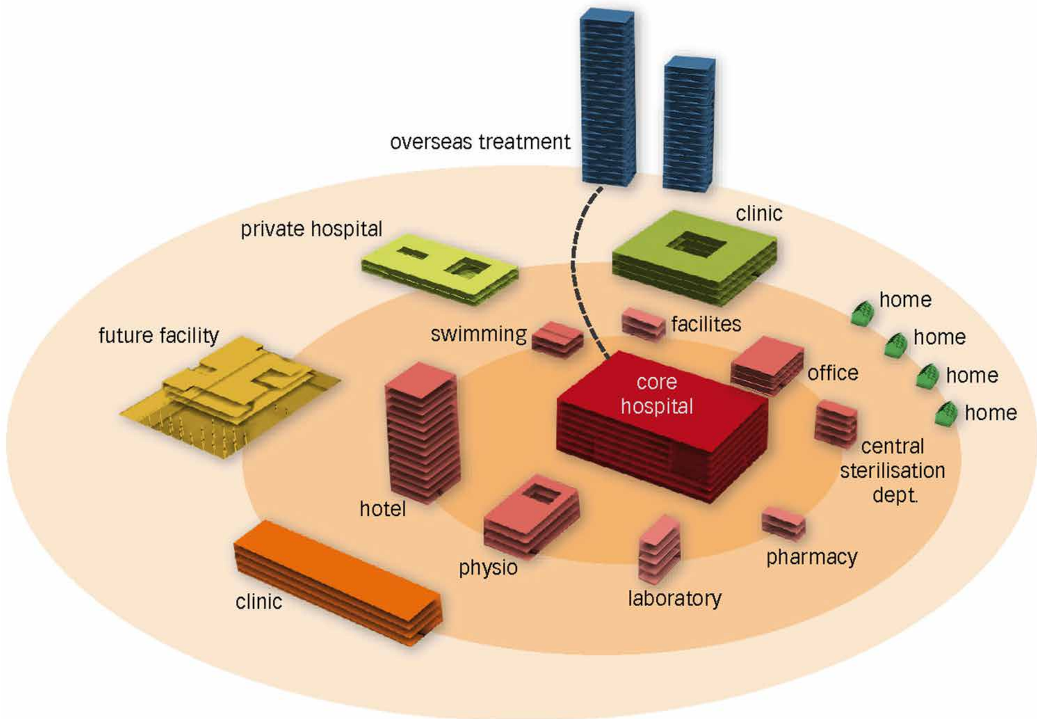


FIG. 7.4 The idea of "Core Hospital"
(Wagenaar et al., 2018:25)

7.4.2 More options in the master planning of hospitals

Master planning plays an essential role in the life cycle of a hospital. Once the master plan has been determined, it is difficult to change it. Among the uncertainties stated above, the projection of medical demands based on regional variations is critical. The planning strategies of hospitals in a region with growing medical demands are distinguished from the ones in a region with decreasing medical demands.

In a region with growing medical demands

In this kind of regions, “more options” in master planning means making room for future expansion of hospital buildings. The principle of hospital master planning is that planning is not for perfection at the moment, architects must consider both future developments and the aesthetic value of the architectural design. According to this principle, it is preferable to cluster empty land for future expansion rather than to end up with several empty areas scattered around the building. For example, in the design project of a 1200-bed general hospital in Gansu Province in China, the main building complex was placed not on the central axis of the campus, leaving two parts of spare land for future expansion (Figure 7.5). This decision proves to be absolutely right. A new building especially for sick children is being planned on the small part of the spare land; it will be built soon after the completion of the main building complex. A large part of spare land is kept, leaving the hospital with great flexibility to accommodate more future uncertainties.

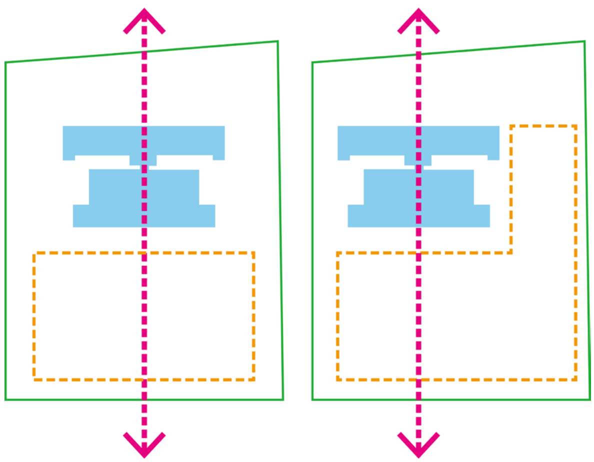


FIG. 7.5 Master plan of a general hospital in Gansu Province
(Provided by Architectural Design & Research Institute of SCUT)

In a region with decreasing medical demands

In this kind of region, there might be a surplus of hospitals. As a consequence, it is necessary to think about reusing hospitals or parts of them. However, master plans that take these possibilities into account have not yet been made in China.

In the Netherlands, the Martini Hospital in Groningen has formulated a long-term planning perspective in 2007, when the main building was built next to the 20-year old existing buildings, taking into account all the possibilities in the following 40 years. One option is that the hospital will stay on its present site. In that case, the existing building is going to be replaced in 2024, and the new building in 2048. The land use of the campus anticipates this process (Figure 7.6). Another option is to leave the site after 20 years. Then the main building will be sold for a multitude of other functions such as offices, dwellings, schools, etc. Therefore, the newly-built main building had to be futureproof with both options in mind (Burger, 2015:38).

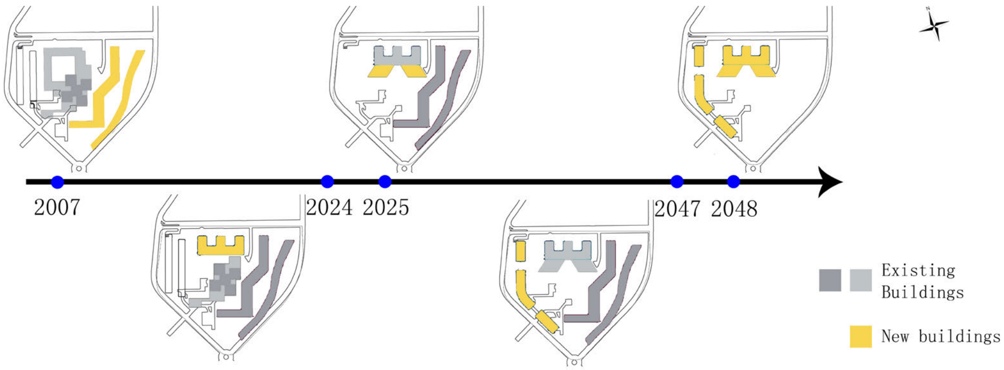


FIG. 7.6 The long-term master planning of Martini Hospital
(Adapted from the image provided by Arnold Burger)

7.4.3 Reallocation of medical resources within hospitals for better patient journeys

New logistical solutions for outpatient departments

The traditional organization mode of outpatient departments is based on the methods and objectives of treatment in China. However, as patients prefer their first diagnoses in municipal or provincial general hospitals without referrals from General Practitioners, they often have no idea which department they should visit. At present, many hospitals reorganize outpatient departments on the basis of either organs or diseases. Some of them even build Multidisciplinary Teams (MDTs) for complex diseases such as cancer (Gu, 2018:15). Parts of the functions of the hotfloor are merged with the outpatient clinic which results in brand new medical sub-centers such as Metabolic Management Center (MMC) and Respiratory Care Center (RCC), where patients are able to receive one-stop medical care services with a much shorter journey (Figure 7.7). In fact, this trend has benefited from both the emphasis on "patient-centered" care from the perspective of hospital management and the development of miniaturized and cheaper medical devices.

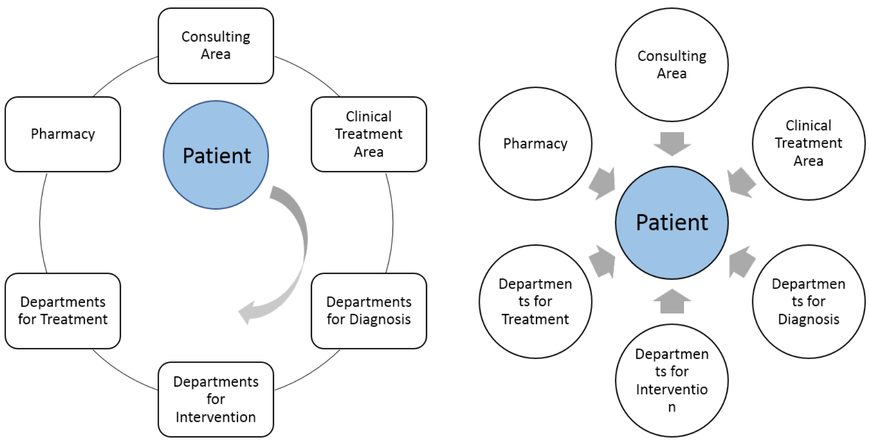


FIG. 7.7 The comparison of medical care services between traditional mode and MDT mode (Left: Traditional Mode; Right: MDT Mode)

In addition, information technology has positive impacts on both the procedure and patient experience of patient journeys in hospitals, which leads to dramatic changes in hospital architecture as well.

Part of the patient journey can be completed through apps

Numerous programs and apps have become available in recent years. They help patients navigate through better patient journeys. Administrative processes of appointment, payment, as well as the collection of the results of clinical checkups and medical tests, can easily be completed via mobile phone. Therefore, some stops in patient journeys can be skipped. In the future, apps may become more intelligent and able to remind the patients what the next processes are according to their doctors' treatment plans.

Wayfinding can be conducted in a digital way

The traditional wayfinding systems in a hospital contain a lot of signs in order to show patients the routes to different destinations. Take the University Hospital Leuven, which has an extremely complicated layout, Designers and hospital managers have marked every part of the buildings on the hospital map with a color. Patients will receive a map with a designated route if they ask the hostesses for help at the information center right next to the main entrance (Figure 7.8).

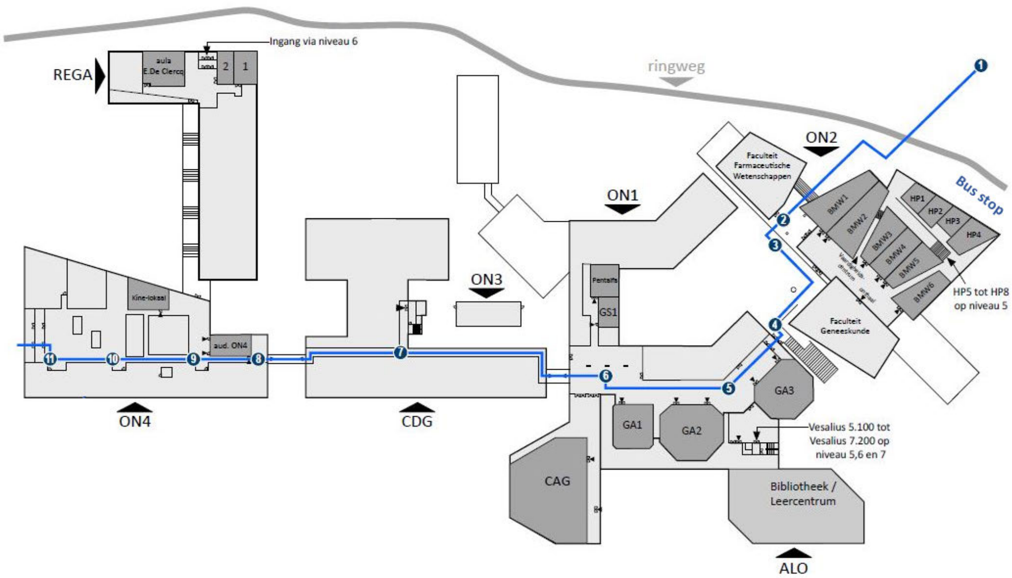


FIG. 7.8 The guide map of University Hospital Leuven
(Adapted from the website of University Hospital Leuven)

Thanks to the development of indoor positioning systems, wayfinding apps, as well as the traditional signs and colors, patients can visually navigate through their patient journeys. Their routes will be optimized in real time. The hosts/hostesses at the information center can focus on serving patients who have other needs and questions. To a certain extent, the distribution of functional zones in hospitals can be more flexible (Figure 7.9).

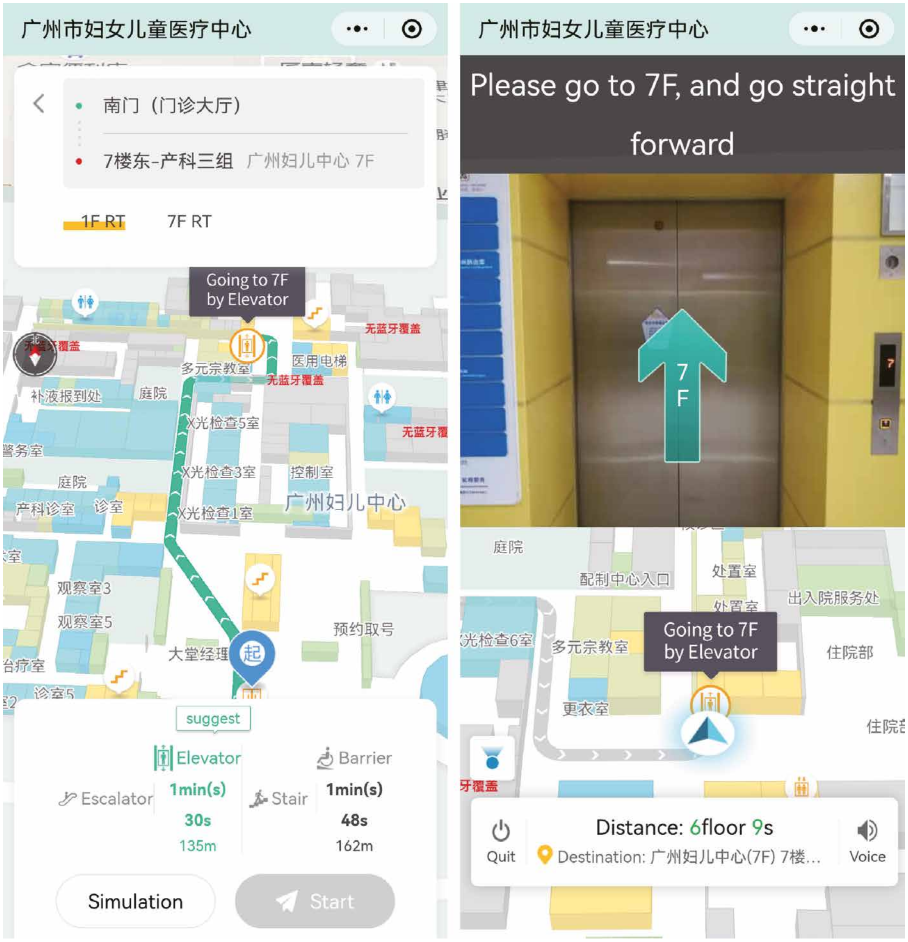


FIG. 7.9 The interface of the wayfinding apps
(Screenshot from the mini program of Guangzhou Women and Children's Medical Center, China)

8 Conclusions and recommendations

The thesis addresses both hospital architecture and hospital management. It considers “patient journey” as a new research perspective that can balance hospital performance with patient experience. A framework has been constructed on the correlation between hospital space elements, patient flow elements, and patient need elements. Furthermore, a preliminary theoretical study has been completed on the interaction mechanism between the elements mentioned above and the driving force of hospital building evolution. In the context of the Chinese healthcare system, the thesis conducts cases analysis of patient journeys in two typical patterns of modern hospitals in China. Additionally, this study analyses the patient journeys in the context of the Dutch healthcare system with the same logic. By comparison, what China can learn from the Dutch best practices is suggested.

In Chapter 1, the following main research question was formulated:

How can the performance of Chinese hospital buildings be improved by providing better patient journeys?

This study focuses exclusively on the design and management aspects of the spatial composition of hospitals. Consequently, patient journeys are studied at the healthcare facility level with a focus on patients’ one-time visits to hospitals and their one-time stays there. The three main groups of patients – inpatients, outpatients and acute patients - have been considered in the thesis.

8.1 Revisiting the research questions and conclusions

1 **What is the current situation and what are the general trends of the healthcare system and hospitals in China?**

The network of healthcare facilities in China is composed of the urban subsystem and the rural subsystem. Different levels of governments own most of the large healthcare facilities in this network, which makes the network more complicated than the Dutch one. One of the problems in the Chinese healthcare system is the lack of gatekeeping procedures. It is almost impossible to control patients' access to hospitals, which leads to an excessive number of patient visits and the colossal scale of hospitals.

The government, the healthcare providers, and private individuals are the three main actors in the Chinese healthcare market. The government plays crucial roles as both administrator and supervisor. As the social insurance system is also operated by the government, health insurers do not play an essential role in the market (Table 8.1).

In this context, China is now facing serious challenges at the system level, the regional level, and the hospital level. Some of the challenges reflect global trends, while the others are local. This study combines several empirical surveys that have been made in the realm of public health, parts of which are being popularized in China (Table 8. 2).

TABLE 8.1 Characteristics of the healthcare system in China and the Netherlands

	China	Netherlands
Network of healthcare facilities	It is composed of the urban subsystem and the rural system.	It is an entire network without any distinctions between urban areas and rural areas.
Gatekeeping mechanism	China does not have a gatekeeping mechanism. Patients can go to see doctors in any hospital without referrals.	The Netherlands has a gatekeeping mechanism. Patients cannot make appointments with specialists in hospitals without referrals from General Practitioners.
Owners of the healthcare facilities	Most of the large hospitals are owned by different levels of governments and are non-profit.	All the general hospitals including the University Medical Centers are private but non-profit.
Actors in the healthcare market	Three main actors: - Government - Healthcare providers - Private individuals	Four main actors: - Government - Healthcare providers - Private individuals - Health insurers
Medical insurance	- Urban Employee Basic Medical Insurance (mandatory for employees and retirees in urban areas) - Urban Resident Basic Medical Insurance (voluntary for unemployed city residents) - New Rural Cooperative Medical Scheme (voluntary for rural residents)	Basic insurance package (mandatory for all residents), provided by private healthcare providers within legal frameworks determined by the state
Life expectancy at birth	76.7 (in 2018)	81.8 (in 2018)
Hospital beds per thousand	4.3 (in 2017)	3.3 (in 2017)
Average length of hospital stay	9.3 (in 2017)	5.1 (in 2017)
Physicians per thousand	2.0 (in 2017)	3.6 (in 2017)
Nurses and midwives per thousand	2.66 (in 2017)	11.18 (in 2017)

TABLE 8.2 Challenges and trends at both system level and hospital level

	Challenges	Explorations and trends
Healthcare system	High cost of getting treatment	- Hospitals are united in region or in a specialized department. - Fee is packaged that covers several medical services.
	Ageing	
	Long average length of hospital stays	
	Lack of physicians and nurses	
Hospital	The excessive number of patient visits	- Automatic health monitoring is provided by 'Internet plus' community health centers. - Services from general practitioners are provided in hospitals for the first diagnoses of outpatients. - Doctors are grouped so that patients are not allowed to choose doctors. - Patients in villages can see doctors in cities and get medicines at home via online hospitals. - Private capitals are encouraged to invest in the fields of basic healthcare service, VIP service, rehabilitation, and nursing for the aged.
	The excessive scale of hospitals	

2 What is meant by the concept of the patient journey?

The concept of patient journey can be defined as all the matters around patient cure and care that comprise both the procedures and patient experiences during their stays in a healthcare facility or in a healthcare system. Compared with the terms "patient flow", "medical process", and "care pathway", the concept of patient journey focuses on how a patient physically moves from point A to point B to follow a process, and gives the highest priority to the quality of patient experience.

Studying hospitals procedures from the perspective of patients is recognized as an effective way to assess the performance of hospitals because patients are the only persons who follow the entire journey in a healthcare system. In this way, both care providers and architects can find evidence to support their daily work and design practices. It makes care providers and architects aware of a way to prevent bottlenecks in space and in processes. It contributes to improving hospital performance and patient experiences in decision-making processes and the daily operation of hospitals.

3 How do patient journeys work in Chinese hospitals?

An outpatient journey in China typically involves one to three visits to a hospital. A series of clinical and administrative processes need to be completed by outpatients themselves. Between processes, patients go to different places and wait for the next process. They spend a considerable amount of time waiting and moving between departments. In many cases, some processes like diagnosis and payment might be repeated several times in a journey. By contrast, an outpatient journey in the Netherlands involves fewer processes as some of them can be completed outside hospitals (Table 8.3).

TABLE 8.3 Components of an outpatient journey in China and in the Netherlands

	China	Netherlands
Clinical processes in hospitals	- Triage - Diagnosis - Clinical check-up - Functional Tests - Imaging - CT/MR/nuclear medicine - Treatment - Pharmacy	- Diagnosis - Clinical check-up - Functional Tests - Imaging - CT/MR/nuclear medicine - Treatment
Administration processes in hospitals	- Registration/Check in - Payment	- Check in
Processes outside hospitals		- Triage - Payment - Pharmacy

PS: Not all the processes are included in one journey.

An inpatient journey in China includes a series of clinical and administrative processes. The processes of clinical check-ups, functional tests, and imaging are mandatory at the beginning and occasionally at the end of the journey. Contrary to what is customary in outpatient journeys, the samples for clinical check-ups are delivered by nurses instead of inpatients. Between processes, inpatients do not have to wait for a long time as nurses make appointments beforehand. The inpatient journeys in the Netherlands are nearly the same as the Chinese ones, but some clinical processes may have been taken care of during previous outpatient visits. As a result, the Dutch ALOS is shorter (Table 8.4).

TABLE 8.4 Components of an inpatient journey in China and in the Netherlands

	China	Netherlands
Clinical processes in hospitals (Optional)	- Clinical check-up - Functional Tests - Imaging - CT/MR/nuclear medicine - Surgery - Intensive care - Treatment	- Clinical check-up - Functional Tests - Imaging - CT/MR/nuclear medicine - Surgery - Intensive care - Treatment
Administrative processes in hospitals	- Admission - Payment	- Admission
Processes outside hospitals		- Payment

PS: Not all the processes are included in one journey.

Acute patient journeys in China have two pathways: one for patients who meet the low acuity level criteria and the other for patients who meet the high acuity level criteria. The journeys of acute patients with mild symptoms are similar to the ones of outpatients in that all the processes need to be completed by the patients themselves. The journeys of acute patients with severe illnesses, on the other hand, are similar to the ones of inpatients. All the cure and care services center around the patients.

The acute patient journey in the Netherlands does not require any administrative processes. Ideally, owing to the gatekeeping mechanism, unnecessary visits to the Emergency Departments are avoided, and the waiting times for diagnosis become shorter.

4 What are patients' experiences like during their journeys?

Different groups of patients have complained about different aspects of patient journeys. Outpatients experience problems with all of the five categories outlined above (i.e. expense, functional process, service, environment, and procedure), while inpatients complain mainly about hospital services. Acute patients, especially the ones who meet the low acuity level criteria, have complaints primarily on the aspect of function (Table 8.5). Applying Maslow's hierarchy, we may conclude that the "safety and security" figure is the most urgent needs of patients in China.

TABLE 8.5 Patients' experience in hospitals in China

	Characteristics	Patient dissatisfaction
Outpatient journeys	- Patients do not need to stay overnight; - Patients go through the processes on their own.	- Patients cannot complete the journey in one visit; - Patients need to walk long distances between departments; - Patients experience long waiting times between processes; - Patients criticize the lack of infrastructure (i.e. parking lots, elevators, reception, cashiers); - Patients believe that the interaction between patients and doctors is not satisfactory; - Washrooms are unclean; - There are problems with the way queuing has been organized; - Patients would like to have more health education materials in waiting areas.
Inpatient journeys	- Patients stay in hospitals at least one night; - Clinical check-ups are conducted bedside; - Patients spend less time waiting because they come with appointments.	- The food in the canteens is not tasty; - The attitude of medical teams is not friendly; - Patients have no insufficient insight in their therapeutic schedules; - Patients criticize a lack of privacy.
Acute patient journeys	- Patients stay for only a short time, but arrive with an emergency; - Patients are subject to mandatory triage; - If patients meet the high acuity level criteria, they will take cure and care services immediately.	- If patients meet the low acuity level criteria, they have to wait for a long time and complete the processes on their own; - The waiting areas are crowded and noisy; - Patients suffer from a lack of infrastructure (i.e. wheelchairs, mobile beds, chairs, chargers for mobile phones).

In the Netherlands, the Top 3 reasons that lead to patient dissatisfaction are the long waiting times, staff not paying attention, and insufficient information (Lekkerkerk, 2013:8). It shows that the urgent needs of Dutch patients are related to esteem and self-actualization at the top tiers of the Maslow's pyramid.

One of the most effective approaches to improve the performance of hospitals in China could be to start with paying more attention to the most urgent needs for safety and security. Since it is clear, however, that the upper tiers of patient needs have positive impacts on the lower tiers while some of them can be met with relatively small investments, they should also be addressed. Moreover, they are important in their own right. Accordingly, it would be wise to design hospitals that take all tiers of patient needs into consideration from the outset, or design them in a flexible way to ensure the upper tiers of patient needs can be met in the future.

5 **What is the relationship between hospital architecture and patient journeys?**

The most common hospital typologies in China are the horizontal “VILLAGE” and the vertical Breitfuss Model. The core driving forces behind them are medical science, building technology, and social trends such as patient-centered care, healing environment, and Evidence-Based Design (EBD). With the help of patient journey mapping, clear spatial pathways of patients are visualized, exposing inefficient layouts, long-distances between processes, and the likelihood of long waiting times.

Contrary to the linear pattern of outpatient pathways and acute patient pathways, inpatient pathways place inpatient bedrooms at the center, with bidirectional connections between the wards and the hotfloor (Table 8.6). Comparing the spatial components of patient journeys between China and the Netherlands makes clear that public areas in Dutch hospitals lack some of the functions that are common in China. There are no cashiers, nor is there a pharmacy (perhaps), since payment and the distribution of medicine take place outside hospitals. From the perspective of architecture, measures can be taken to address the problems and bottlenecks in patient journeys (Table 8.7).

TABLE 8.6 The spatial characteristics of patient journeys

	Spatial components	Spatial relationship
Outpatient journey	- Public areas in hospitals - Consulting areas in outpatient clinics - Departments for diagnosis in the hotfloor - Clinical treatment areas in outpatient clinics	- Linear connections between processes
Inpatient journey	- Public areas in hospitals - Inpatient bedroom - Departments for diagnosis, intervention, and treatment in the hotfloor	- Inpatient bedrooms are the starting and endpoint of all steps in patient journeys - Bidirectional connections between wards and other areas
Acute patient journey	- First-aid area in the Emergency Department - Emergency area in the Emergency Department - Shared public area in the Emergency Department - Department for diagnosis, intervention, and treatment in the hotfloor (optional)	- Linear connections between processes

TABLE 8.7 The measures to improve patient journeys from the perspective of architecture

	Problems and bottlenecks in patient journeys	Measures
Outpatient journey	The complexity of procedures	- Optimize the spatial relationship between various processes; - Optimize the signage system.
	Long waiting times and queuing	- Provide well-equipped and carefully designed public spaces for people to relax.
Inpatient journey	Lack of the company of family members	- Provide space for inpatients as well as accompanied family members.
	Long stay in bedrooms	- Provide public areas in wards with more facilities for socializing and leisure.
Acute patient journey	-Slow and ineffective medical procedures - Not enough functional facilities	- Plan the routes carefully; - Redistribute functional areas.

6 What are the best practices in the Netherlands?

Recently built hospitals in the Netherlands incorporate a number of innovations, some of them inspired by Evidence-Based Design research (Table 8.8). Except for the widespread use of single inpatient bedrooms, other Dutch best practices in procedure can be introduced to Chinese hospitals because they comply with the rules in the current Chinese healthcare system. They can effectively improve hospital performance. Likewise, Dutch best practices in the field of patient experience can be introduced to Chinese hospitals. The only question is what motivates hospital managers to adopt these measures. Fierce competition between Dutch hospitals are a strong incentive for hospital managers to pay attention to patient satisfaction – this may not be the case in China.

TABLE 8.8 The best practices in the Netherlands

		Best practices in the Netherlands	Case study
At the regional level		General practitioner	–
At the healthcare facility level	Procedure	Daycare patient journeys	University Medical Center Groningen
		Multifunctional consulting rooms	Zuyderland Medical Center
		Flexible growth and internal relocation	Deventer Hospital
		Single inpatient bedrooms	Zuyderland Medical Center
	Patient experience	Well-equipped waiting area	VU University Medical Center
		Warm colors in the public space	- Academic Medical Center Amsterdam - Isala Hospital
		Friendly neighborhood	- University Medical Center Groningen - Academic Medical Center Amsterdam
		Family accompaniment	Zuyderland Medical Center
		Leisure area near bedrooms	Zuyderland Medical Center Meander Medical Center
		Meditation rooms	- VU University Medical Center - Medical Spectrum Twente

7 What are the measures to improve hospital performance from the perspective of patient journeys and architecture?

Improvement measures can be developed on the basis of the findings on both patient journey and hospital architecture in the preceding chapters. On the one hand, the research on patient journey exposes the problems of wastes, delays, bottlenecks, and waits within a patient journey, which proves the necessity to introduce concrete measures for improvement (Table 8.9). On the other hand, it is possible to formulate scenarios that give a more differentiated view on how to make hospitals more flexible and resilient to future, unpredictable changes (Table 8.10).

TABLE 8.9 Potential aspects and detailed measures that can improve patient journeys

Aspects	Detailed Measures
Eliminate or simplify certain processes	- Eliminate the administrative processes of registration and payment; - Simplify the clinical processes of treatment, diagnoses, and pharmacy, which can even be finished outside hospitals;
Shorten the duration of certain processes	- Shorten the duration of clinical check-ups and pharmacy by technology innovation; - Shorten the duration of diagnosis by patients finishing blood pressure measurement and doctors reading patients' files before consultation;
Integrate processes	- Integrate diagnosis and registration for the next consultation; - Combine the clinical processes of clinical check-ups, functional tests, and imaging with diagnostics with the help of cheap and portable medical devices;
Shorten the duration of the interval between processes	- Reduce traffic time between processes by optimizing either the sequence of processes, or the position of correlated departments; - Shorten the waiting times for the processes of diagnosis, functional tests; imaging can be shortened by improving working efficiency; - Provide a comfortable environment and complete infrastructure in waiting areas to help patients relax and give them the illusion of spending shorter time while waiting.

TABLE 8.10 New ideas of hospital architecture from the perspective of patient journey

Scenarios	Uncertainties	Details	Best practices
Extension of patient journeys from the hospital to a region	Changes in medical financing	It is preferable to integrate healthcare facilities in regional networks, taking advantage of the synergy between hospitals and other healthcare facilities.	Medical cores in Singapore
	The rapid development of information technology	Patients can be transferred to proper healthcare facilities according to their specific needs.	The idea of the "decentralized hospital" (e.g. "core hospital" and "Big Bang")
More options in the master planning of hospitals	Growing medical demands in the region	Room should be made for the future expansion of hospital buildings	The design project of a 1200-beds general hospital in Gansu Province, China
	Decreasing medical demands in the region	An entire hospital or part of it should be reused for other purposes.	The long-term master planning of Martini Hospital
Reallocation of medical resources within hospitals for better patient experiences	The concept of patient-centered, miniaturized and cheaper medical devices	Part of the functions in the hotfloor can be merged with the outpatient clinic to build up brand new medical sub-centers in hospitals, where patients are able to receive one-stop medical care services.	Multidisciplinary Teams (MDTs) for complex diseases
	The use of information technology	Patients do not have to cover large distances and can do part of the steps in their medical processes using apps.	The wayfinding app of Guangzhou Women and Children's Medical Center

The concept of patient journeys has been analyzed in two hospitals in China. Three questions were key: 1) Who are the users? 2) What do patients need and expect when they are in a hospital? 3) What can be improved in an architectural way? The concrete suggestions are listed below (Table 8.11). The two hospitals represent the horizontal and vertical patient traffic systems respectively, which allows for a comparison between them (Table 8.12).

TABLE 8.11 Concrete suggestions for the two hospital cases in China

	Panyu Central Hospital	The 6th Affiliated Hospital of Sun Yat-sen University
Potential users of hospitals' outdoor and indoor facilities	- Outpatients from the Departments of Gynecology, Surgery, and Internal Medicine - Inpatients from the Departments of Obstetrics and Pediatrics	- A small number of outpatients from the Departments of Surgery and Obstetrics - Inpatients from the Departments of Gynecology, Internal Medicine, and Surgery
Suggestions on procedure	1. Some maps shall be put at the main registration station which is used as the information center. As a result, it is easier for hosts and hostesses' to explain the routes to patients on their first visits. 2. Wards in the same inpatient departments should be placed on the same floor, where inpatient beds and medical devices can be shared more efficiently, and medical teams can cooperate and help each other in emergencies. In addition, the corridors between the two wards on the same floor can become a shared area for both the wards, which can be decorated as a leisure area for reading or fitness.	1. The hotfloor departments which have a large number of outpatient visits (e.g. Clinical Laboratory) should be placed on the middle floor of the outpatient clinics so that outpatients from different departments can easily visit them. In contrast, the hotfloor departments which have a small number of outpatient visits (e.g. Radiology Department) can be placed a little further from the outpatient departments. The hotfloor departments which have a high percentage of outpatients from certain outpatient departments (i.e. Ultrasonography Department and Endoscopy Department) should be put close to the correlated outpatient departments. 2. Wards with similar functions should be distributed on the same floor and run by the same chief manager. In this way they can share medical devices, and inpatient beds, and medical teams can be used for all of them. Moreover, the shared leisure spaces between two wards on the same floor would be used more effectively because the manager can decorate them and make them more convenient. 3. The problem of long waiting times for elevators might be partly solved in the following three ways: A) Staff elevators are shared with the visitors within a fixed time in a day; B) Optimization of care pathways; C) A holistic architectural approach. For example, some departments with a large number of patient visits can be moved to the new building.

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TABLE 8.11 Concrete suggestions for the two hospital cases in China

	Panyu Central Hospital	The 6th Affiliated Hospital of Sun Yat-sen University
Suggestions for spatial solutions	1. The hospital can provide better indoor facilities as well as improve the outdoor environment, which would especially benefit patients from the Outpatient Departments of Gynecology, Surgery and Internal Medicine, as well as from the Inpatient Department of Obstetrics and Pediatrics. 2. The environment of the waiting area in the Ultrasonography Department should be improved since the outpatients spend a long time there waiting for tests. The waiting area can be expanded and divided into several areas such as a TV watching area equipped with a comfortable sofa, a magazine reading area equipped with tables, and a chatting area equipped with pairs of comfortable chairs. The more natural light, the better.	1. Consulting rooms in the outpatient clinic can be shared by the entire clinic or even the entire department if it is located on the same floor. Waiting Area 1 which used to service the large departments can become accessible for all patients; it can be redecorated and better-equipped so as to attract more patients. In addition, a more intelligent queue management system is needed. Patients can stay in these areas or wander around until they find their names on the screen, or receive messages on their mobile phones. 2. It is advisable to create a new Admission and Discharge Center with a waiting area of its own where inpatients and their companions can sit down and fill in forms at a table. Only when their names are shown on the screen are they to complete the administrative process of admission, discharge or payment. 3. \The vacant spaces on the ground floor, as well as the leisure space on each floor of inpatient departments, could be repurposed and redecorated in order to create a more convenient environment. 4. More chairs and tables are required in the outdoor garden to the south of the main building.

TABLE 8.12 The comparison between two kinds of patient traffic system in hospitals

Patient traffic system	Horizontal	Vertical
The kind of patients who benefit from the traffic system	It benefits patients who have to be delivered with gurneys or wheelchairs. Horizontal traffic values good care in the patient journey.	It benefits patients who are able to walk without assistance. Vertical traffic values speed and convenience in the patient journey.
Advantage	- Patients spend no time waiting for elevators; - Patients would be taken good care of in moving;	Small area of each floor and limited groups of elevators for patients ensure that patients will never get lost.
Disadvantage	It is easy to get lost for new patients;	There is a heavy burden on the elevator system
Suggestions	Clear maps and signage system	- More elevators - An escalator system for the lower floors, for outpatients

This provides the answers to the main question of improving the performance of Chinese healthcare from the perspective of hospital buildings. Of course, more can do at the system level and the regional level. This research shows that the concept of “patient journeys” is a feasible and verifiable approach that can effectively combine knowledge in the fields of hospital management and architecture. It helps hospital managers and architects to evaluate the performance of hospitals, thereby preventing bottlenecks of space and processes in hospitals, as well as enhancing patient experience.

8.2 Relevance

The medical demands and health expenditures are increasing all over the world because of the ageing problem, high cost of healthcare. In this context, there is a compelling necessity to improve hospital performance.

8.2.1 Scientific relevance

1 New research into hospital architecture

The concept of patient journeys provides a new interdisciplinary perspective for studying hospital architecture. It combines research in the realm of hospital management and in the realm of architecture. As a result, a large number of evidence-based outcomes from previous studies can be used. This research provides models for the analysis of procedure and patient experiences in patient journeys, which help to understand how a hospital works for different groups of patients.

2 Innovation on hospital design evaluation

The concept of patient journey triggers new ideas for the evaluation of hospital design. Normally, it is hard to evaluate which hospital design is better, as healthcare systems vary from one country to another, which leads to a variety of hospital designs. Therefore, the evaluation of hospital design cannot simply follow architectural criteria.

More than any other building type, hospitals are intimately linked with crucial aspects of the population and its health. In this research, both qualitative and quantitative analyses were used to evaluate hospitals from the perspectives of architecture, the population they serve, and people's health, with identifiable and measurable outcomes. Moreover, these findings are reconfirmed by observation, patient journey walkthrough analysis, and semi-structured staff interviews.

8.2.2 Social relevance

1 Collaboration between hospital managers and architects

The concept of patient journey provides an effective basis for architects and hospital managers to evaluate the performance of hospitals, thereby enhancing hospital design and their daily operation. It is expected that they can share the same language in decision making, design, and management.

2 A feasible tool to improve the performance of a hospital

The two hospital cases analyzed in Chapter 5 are good empirical examples to show how to apply the concept of patient journeys in reality. With the help of medical data provided from the hospitals, bottlenecks of space and process were exposed, which leads to more precise measures to improve hospital performance.

8.3 Limitations and recommendations for further research

8.3.1 Limitations

As the thesis is pilot research on patient journeys in China, it is worth noting that the medical data available were not complete since the Electronic Medical Records does not compile all of them. Moreover, medical data are stored in different systems, some of which are disconnected. Take the 6th Affiliated Hospital of Sun Yat-sen University. Most of the medical data of patients are stored in the Hospital Information System (HIS), except those of patients in the Departments of Radiology, Endoscopy, and Ultrasonography, which are stored in Picture Archiving and Communication System (PACS), Tianzhu Endoscopy System, and Womsoft Ultrasonography System. If patients had surgeries, the name and the duration of the surgeries could only be found in the Surgical Anesthesia System. As a result, it is hard to outline the entire pathway of a patient journey. In this research, only the data of the patients' frequent-visit processes were collected.

8.3.2 Recommendations

1. Future work should include patient satisfaction follow-up surveys for specified groups of patients who stay in the hospital for a long period. This may provide a deeper understanding of what they exactly need.

2. More hospitals in different regions should be selected as case studies so that a more comprehensive representation of hospitals all over China is achieved.

3. This research exclusively focuses on patient journeys that occur in hospitals. Future work could extend the scope of research; it may, for instance, take patient journeys outside hospitals into consideration.

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APPENDIX 1

Outpatient satisfaction questionnaire A

Dear friends,

I am a PhD candidate from Delft University of Technology (TU Delft) and South China University of Technology (SCUT). This questionnaire asks for your views about the physical environment and your experience as an outpatient in **the 6th Affiliate Hospital of Sun Yat-sen University**. Thinking about your recent visit to the hospital, please **circle the number** that most closely represents your level of agreement with each statement below. I am interested in your honest views. If you have comments, please write down in spaces below the statement or on the back. The questionnaire is 2 pages long. Thank you in advance for your time.

Basic information

1 Your gender:
   a Male;
   b Female

2 Your age:
   a Less than 18;
   b 18-39;
   c 40-59;
   d Over 60

3 The outpatient Department you visit:
   a Anus & Intestine Surgery;
   b Oncology;
   c Digestive Medicine;
   d Cardiovascular Medicine;
   e Respiratory Medicine;
   f Obstetrics;
   g Stomatology;
   h Gynecology;
   i Neurology;
   j Urology;
   k Pediatrics;
   l Hematopathology;
   m ENT;
   n Rehabilitation;
   o Ophthalmology;
   p Urology;
   q Orthopedics;
   r Dermatology;
   s Traditional Chinese Medicine;
   t Hepatobiliary Medicine;
   u Others.

Evaluation factors Lv1	Evaluation factors Lv2		Evaluation					Comments
			Strongly Agree				Strongly Disagree	
A) Consulting Room	X_1	Size	5	4	3	2	1	
	X_2	Number	5	4	3	2	1	
	X_3	Decoration	5	4	3	2	1	
	X_4	Natural Light	5	4	3	2	1	
B) Waiting Area	X_5	Size	5	4	3	2	1	
	X_6	Numbers of chair	5	4	3	2	1	
	X_7	Decoration	5	4	3	2	1	
	X_8	Queuing System	5	4	3	2	1	
	X_9	Natural Light	5	4	3	2	1	
C) Traffic	X_{10}	Vertical Connection	5	4	3	2	1	
	X_{11}	Number of Elevators and Performance	5	4	3	2	1	
	X_{12}	Number of Escalator	5	4	3	2	1	
	X_{13}	Connections with hotfloor	5	4	3	2	1	
	X_{14}	Signage System	5	4	3	2	1	
D) Facilities	X_{15}	Size of Registration	5	4	3	2	1	
	X_{16}	Size of Waiting Area in Pharmacy	5	4	3	2	1	
	X_{17}	Number of Cashier	5	4	3	2	1	
	X_{18}	Size of Cashier	5	4	3	2	1	
	X_{19}	Self-service Terminals	5	4	3	2	1	
	X_{20}	Commercial Facilities	5	4	3	2	1	

Other Comments: ____

APPENDIX 2

Inpatient satisfaction questionnaire B

Dear friends,

I am a PhD candidate from Delft University of Technology (TU Delft) and South China University of Technology (SCUT). This questionnaire asks for your views about the physical environment and your experience as an inpatient in **the 6th Affiliate Hospital of Sun Yat-sen University**. Thinking about your recent visit to the hospital, please **circle the number** that most closely represents your level of agreement with each statement below. I am interested in your honest views. If you have comments, please write down in spaces below the statement or on the back. The questionnaire is 2 pages long. Thank you in advance for your time.

Basic information

1 Your gender:

- a Male;
- b Female

2 Your age:

- a Less than 18;
- b 18-39;
- c 40-59;
- d Over 60.

Evaluation factors Lv1	Evaluation factors Lv2 Strongly Agree		Evaluation					Comments
			Strongly Agree				Strongly Disagree	
A) Inpatient bedroom	X_1	Bed location	5	4	3	2	1	
	X_2	Number of bed	5	4	3	2	1	
	X_3	Space for family members	5	4	3	2	1	
	X_4	Washing room	5	4	3	2	1	
	X_5	Decoration	5	4	3	2	1	
	X_6	Natural Light	5	4	3	2	1	
B) Public Space	X_7	Corridor Size	5	4	3	2	1	
	X_8	Leisure Area	5	4	3	2	1	
	X_9	Decoration	5	4	3	2	1	
	X_{10}	Natural Light	5	4	3	2	1	
C) Traffic	X_{11}	Way finding	5	4	3	2	1	
	X_{12}	Number of Elevators and Performance	5	4	3	2	1	
	X_{13}	Connections with hotfloor	5	4	3	2	1	
	X_{14}	Signage System	5	4	3	2	1	
D) Facilities	X_{15}	Clothes Drying Area	5	4	3	2	1	
	X_{16}	Storage Space	5	4	3	2	1	
	X_{17}	Commercial Facilities	5	4	3	2	1	
	X_{18}	Size of Cashiers	5	4	3	2	1	
	X_{19}	Self-service Terminals	5	4	3	2	1	

Other Comments: ____________________

22#07

Improving the performance of hospitals

An architectural analysis of patient journeys in China

Dejian Peng

Nowadays, we are faced with serious challenges in public health worldwide. However, the challenges cannot be solved only in the domain of architecture, medical science or management. A successful hospital building is more than a nice building or an efficient healing machine. Patient journey is such a concept that tries to explore the possibility to solve the problems in hospitals in the domain of hospital architecture and hospital management. In this context, the research proposes a study of patient journey in hospitals from the perspective of architecture on basis of the outcomes achieved in management. Patient journeys are transferred from both clinical and administrative processes to special patterns. Moreover, in such a visual way, both the efficiency and effectiveness of hospitals and patients' satisfaction during the journeys in hospitals are analyzed with case studies of China and the Netherlands. The system of spatialized patient journeys helps architects and hospital managers broaden their understanding of hospital. And the comparison results from case studies are useful for hospitals in China to improve performance and patients' satisfaction.

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