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Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2022-070130
Article Type:	Original research
Date Submitted by the Author:	16-Nov-2022
Complete List of Authors:	Zhang, Zhiying; Capital Medical University, School of Medical Humanities Zhang, Ruyi; Capital Medical University Affiliated Beijing Ditan Hospital, Ethics Committee Office Peng, Yingchun; Capital Medical University, School of Medical Humanities Zhai, Shaoqi; Capital Medical University, School of Medical Humanities Zhang, Jiaying; Capital Medical University, School of Medical Humanities Jin, Qilin; People's Hospital of Beijing Daxing District Zhou, Jiaojiao; Fengtai District Xiluoyuan Community Health Service Center Li, Hanlin; Capital Medical University, School of Basic Medical Science Chen, Jingjing; Huairou District Liulimiao Community Health Service Center
Keywords:	Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PUBLIC HEALTH, HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Organisation of health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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The Barriers and Facilitators of Family Doctor Contract Services in Caring for the Disabled Elderly in Beijing, China: A Mixed Methods Study

Zhiying Zhang^{1#}, Ruyi Zhang^{2#}, Yingchun Peng^{1*}, Shaoqi Zhai¹, Jiaying Zhang¹, Qilin Jin³, Jiaojiao Zhou⁴, Hanlin Li⁵, Jingjing Chen⁶

*Correspondence: pycjq@ccmu.edu.cn ORCID ID : 0000-0002-2168-5155

Zhiying Zhang and Ruyi Zhang contributed equally to this work

¹ School of Medical Humanities, Capital Medical University, No.10, Xitoutiao, You An Men Wai, Beijing 100069, China

² Ethics Committee Office, Beijing Ditan Hospital, Capital Medical University, No. 8 Jingshun East Street, Chaoyang District, Beijing 100015, China

³ Cardiac Surgery Department, People's Hospital of Beijing Daxing District, No.26, Huangcun West Street, Daxing District, Beijing

⁴ Fengtai District Xiluoyuan Community Health Service Center, Beijing, China

⁵ School of Basic Medical Science, Capital Medical University, No.10, Xitoutiao, You An Men Wai, Beijing 100069, China

⁶ Huairou District Liulimiao Community Health Service Center, Beijing, China

Abstract

Objective To evaluate the current state of Family doctor contract services (FDCS) in Beijing, identify the responsibilities of (Family doctors) FDs who have worked with the disabled elderly, and investigate the challenges and opportunities faced by FDCS in providing care for them.

Design A cross-sectional mixed methods study was carried out from October 2020 to January 2021. Quantitative data were collected by using the self-designed questionnaire. Qualitative data were gleaned by adopting a semi-structured interview.

Setting 15 Community health services centers (CHCs) were selected in four districts of Beijing by using multistage sampling strategy. Among 4 districts, 2 from urban areas, 2 from rural areas.

Participants From the 15 sampled CHCs in four districts of Beijing, China, a random sample of 283 family doctors participated in the questionnaire survey. During the same period, 30 FDs at the site from 15 CHCs in Beijing were randomly selected.

Results On the one hand, FDs are essential to the FDCS for the disabled elderly. In addition to

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4 acting as “gatekeepers” in CHCs, FDs also played another five unique roles, including
5 “psychological consultant”, “rehabilitation physiotherapist”, “health educator”, “health manager”,
6 and “family health guardian”. On the other hand, FDs are confronted with a myriad of barriers
7 (including high risks in the process of home visits, a lack of supervisory and incentive mechanisms,
8 insufficiency of time and energy, etc) and facilitators (including establishing a doctor-patient trust
9 relationship, developing humanistic care services, etc) in the FDCS of the disabled elderly.
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15 **Conclusions** This study has demonstrated the relationships between barriers and roles of FDs in
16 FDCS and put forward corresponding suggestions to improve the quality of FDCS. It is suggested
17 that further research needs to focus on solving existing barriers of FDCS to optimize the health of
18 the disabled elderly and improve the quality of their lives.
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23 **Keywords:** family doctors, the disabled elderly, roles, barriers, facilitators
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25 **What is already known on this topic**

- 26 ■ Family doctor contract services has been implemented widely in many countries.
- 27 ■ Family doctors has been shown to be an ideal medical service provider to meet the diverse
28 needs of the disabled elderly, but little is understood about the specific roles of family doctors,
29 barriers and facilitators of family doctor contract services in caring for the disabled elderly.
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35 **What this study adds**

- 36 ■ Mixed methods were conducted in this study to explore the current status of family doctor
37 contract services for the disabled elderly, the workload of family doctors, family doctors’
38 evaluation of contracted services, and barriers and facilitators of family doctor contract services
39 in caring for the disabled elderly.
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45 **How this study might affect research, practice or policy**

- 46 ■ This study identifies six unique roles of family doctors in caring for the disabled elderly and
47 describes the relationships between barriers and the roles of family doctors, which can enrich
48 the international discussion of similar topics, and inform national policies and agenda setting
49 for achieving national and global targets for removing the current FDCS restrictions to improve
50 the health of the disabled elderly and their well-being.
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56 **1. Introduction**

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58 With the global escalation of the aging process and the extension of average life expectancy, more
59 and more old people tend to face a high risk of disability. *The World Report on Disability* manifested
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4 that there are more than 1000 million people with disabilities in the world, and disability
5 disproportionately exerts a profound influence on vulnerable populations, in particular, the elderly
6 [1]. At the end of 2020, there are more than 85 million people living with some type of disability in
7 China [2]. Among them, the population of disabled elderly has reached 26.28 million, accounting
8 for 9.95% of the overall elderly [3]. Beijing, as a typical example, is characterized by advanced age
9 and a high disability rate. In 2021, there are about 205,000 disabled elderly people in Beijing, the
10 disability rate of the elderly is 4.78% and the disabled elderly with moderate or severe disability
11 account for 70% of the whole disabled elderly [4]. Not only does the large number of disabled
12 elderly imposes a heavy burden on society, but the disabled elderly's needs for health and medical
13 services also bring a great challenge to the primary care system.
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23 The disabled elderly, as a priority group of society, have extremely complex conditions and
24 diversified needs. Nieboer A. et al. found that different elderly groups have different values for long-
25 term care services [5]. Important factors including the physical, mental, and family financial
26 conditions of the disabled elderly have a significant influence on the choice of the disabled elderly's
27 needs [6,7]. A related study indicates that the disabled elderly's care not only need daily care, but
28 also medical care and rehabilitation training care services [8]. Due to poor physical conditions, many
29 disabled elderly people have difficulty moving, they hardly can go to the hospital by themselves.
30 CHC may become the only way for them to obtain medical treatment. Moreover, most elderly with
31 severe disabilities have lost normal physiological functions, they have to rely on external devices,
32 such as a gastric tube, and a urinary catheter to support their daily physical needs. However,
33 changing the gastric tube or urinary catheter is a knotty problem for those bedridden elderly and
34 their families. Therefore, it is crucial to consider how the primary care system can satisfy the care
35 needs of the disabled elderly.
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48 It has been proven worldwide that a strong primary healthcare system is a foundation and guarantee
49 of an efficient healthcare system [9,10]. As a core component of the primary healthcare system,
50 FDCS is a matter of cardinal significance in realizing hierarchical diagnosis treatment, and
51 optimizing health outcomes and healthcare containment in practice [11]. Family doctors (FDs) as
52 medical specialists are trained to allocate health resources reasonably and provide comprehensive,
53 continuous, effective, opportune, and personalized medical care for service objects. FDs are also the
54 gatekeepers of residents' health, it is therefore that the policy of FDCS has been implemented widely
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4 in many countries [12-14].

5 Primary care was given a prominent position in China's new healthcare reform plan in 2009, and
6 boosting FDCS was an expansion and growth of the primary care system [15]. FDCS is an objective
7 requirement and an important way to achieve hierarchical diagnosis treatment and improve the level
8 of primary care in China [16]. By utilizing FDCS, FDs in CHC establish a long-lasting, ongoing,
9 and stable contractual relationship with the locals. And it is natural to provide medical care, and
10 essential public health management services for them, including establishing health records,
11 physical examinations, chronic disease follow-ups, etc. With a growing proportion of aging, FDs'
12 relevant work is increasingly skewed toward the elderly group, especially the disabled elderly. The
13 National Health Commission also released a series of policies about FDCS, which requires FDs to
14 "provide door-to-door medical and health services for disabled and semi-disabled elderly,
15 terminally ill patients and other people who are in urgent need, and extend the contracted services
16 from institutions to communities and families[17]."

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FDs, as ideal medical service providers, are expected to take a pivotal role in the provision of
medical care services for the disabled elderly and meet the disabled elderly's diversified needs.
Previous studies mainly shine the spotlight on the roles of FDs in the primary care system [18,19],
the effect of FDCS [20,21], and the barriers and challenges of disabled people accessing primary
care services [22-24]. However, there is less research to figure out whether FDs are qualified to deal
with complex cases of the disabled elderly, what roles FDs play in the FDCS model with the disabled
elderly and what barriers and facilitators of FDCS will have in the process of caring for the disabled
elderly. In order to identify the roles and services of FDs contracted with the disabled elderly and
explore the barriers and facilitators of FDCS in Beijing, mixed methods research has been conducted.

2. Materials and Methods

2.1 Study Design

Mixed methods were used in data collection and the analytical process. In the quantitative phase, a
cross-sectional survey using a self-designed questionnaire was conducted on FDs. The self-designed
questionnaire made emphasis on three aspects, including the current status of FDCS for the disabled
elderly, the workload for home visits by FDs, and FDs' evaluation of contracted services for the
disabled elderly. In the qualitative phase, a one-to-one and semi-structured in-depth personal
interview for FDs was utilized to supplement and support the study. As thematic framework

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4 methods adopted, the content of the interview mainly is to focalize two perspectives, one is the
5 differences in health management between contracted healthy elderly and the disabled elderly, and
6 the other is the barriers and facilitators of FDCS in caring for the disabled elderly. The process of
7 mixed methods is shown in Figure 1 and described in detail below.
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11 12 13 **2.2 Quantitative Phase**

14 15 **2.2.1 Data Collection and Subjects**

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17 A cross-sectional quantitative survey was carried out on FDs in the CHCs of Beijing, the capital
18 city of China, from October 2020 to January 2021. A multistage sampling strategy was adopted. In
19 the first stage, 4 districts of Beijing (2 from urban areas, namely Xicheng District, Fengtai District;
20 2 from rural areas, namely Daxing District, and Huairou District) were selected based on the level
21 of economic development and the linear distance from Tiananmen Square. In the second stage, 3 to
22 5 CHCs were randomly picked out in each district, amounting to 15 CHCs were in the list. Lastly,
23 trained investigators were dispatched to each sampling CHCs to randomly invite FDs to participate
24 in our investigation [25,26].
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33 This survey excluded the respondents who had not signed a contract with the disabled elderly or
34 worked for the disabled elderly for less than 6 months. Face-to-face interviews with FDs.
35 Participants are required to read the informed consent form and obtain oral consent, then fill out the
36 questionnaires and took part in this survey [27]. The ethics approval was given by the Medical
37 Ethics Committee of Capital Medical University.
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42 A random sample of 283 family doctors participated in the questionnaire survey in the 15 selected
43 CHCs, among which 90% are the center's registered doctors. The returned questionnaires with
44 missing values on the outcome and explanatory variables were to the exclusion of data analysis,
45 and hence final samples of 276 were gathered.
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50 51 **2.2.2 Measurements**

52 Under the national and Beijing's relevant policies of FDCS for the disabled elderly, it is therefore
53 that the research team has considered the humanistic environment, regional characteristics and the
54 actual situation of the contracted services in Beijing and compiled a self-designed questionnaire
55 after an extensive review of relevant literature and repeated discussion by panel experts.
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60 **2.2.2.1 Current status of FDCS for the disabled elderly**

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4 To investigate the current status of FDCS for the disabled elderly, four aspects were tracked: 1) the
5 type of contract services that FDs provided for the disabled elderly; 2) the top three services that the
6 disabled elderly needed most from the perspective of FDs; 3) the most concerning factors of the
7 disabled elderly while FDs providing medical services; 4) the main reasons that affect FDs to
8 provide services for the disabled elderly.
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10 11 12 13 **2.2.2.2 The workload for home visits by FDs**

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15 To describe the workload of home visits by FDs, three variables were taken into consideration: 1)
16 the frequency per year of home visits provided by each FD for the disabled elderly; 2) the treatment
17 time in hours quantified the time of treatment for each home visit. 3) the workload for home visits
18 by FDs was calculated by multiplication of the treatment time with the frequency per year.
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20 21 22 23 **2.2.2.3 FDs' evaluation of contracted services for the disabled elderly**

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25 FDs' evaluation of contracted services for the disabled elderly mainly focused on three aspects: 1)
26 cooperation frequency of the disabled elderly and their families when FDs operate home visits
27 service; 2) importance of FDs' role in the FDCS for the disabled elderly; 3) The extent to which
28 FDCS meet the medical needs of the disabled elderly.
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30 31 32 33 **2.2.3 Statistical Methods**

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35 Statistical description: Data were recorded into EpiData 3.1 system and processed by SPSS 21.0
36 statistical software. The mean and standard deviation were used to statistically describe the
37 measurement data, and the counting data were presented by composition ratio, frequency, and parity
38 arrangement.
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41 Data analysis: Frequency and rank were applied to display the quantitative data of FDs including
42 demographic characteristics, gender, age, regions, education and positional title, rank sum test was
43 used to analyze the content of the FDs' evaluation of contracted services for the disabled elderly, in
44 which Wilcoxon rank sum test pointed to for two groups and Kruskal-Wallis H test (K-W test) for
45 multiple groups.
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47 48 49 50 51 **2.3 Qualitative phase**

52 53 54 **2.3.1 Sampling and Interviews**

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56 As for the qualitative survey, 30 FDs at the site from 15 CHCs in Beijing were randomly selected.
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58 It is worthwhile to mention that FDs who were not contracted with the disabled elderly or engaged
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4 in the related work of the disabled elderly for less than 6 months were precluded.

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6 The content of the interview contained the demographic characteristics of FDs, the differences of
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8 health management between contracted healthy elderly and the disabled elderly, the barriers and
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10 facilitators of FDCS of the disabled elderly. One-to-one, semi-structured in-depth personal
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12 interviews were conducted in this study. All the interviewers have received a unified standard
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14 training in advance, so as to avoid the induced problems and reduce research bias. Before the
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16 interview, the interviewee introduced the research purpose, methods, content and confidentiality
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18 principles to the interviewees in detail, and obtained informed consent [28]. During the interview,
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20 one investigator was responsible for recording the interviewee's comments, whilst the other was
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22 assigned to ask questions. The comments of respondents were written down and verbatim by the
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24 interviewer. To ensure the accuracy and completeness of the information, and the entire processes
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26 recorded with the consent of the interviewees. The data saturation of our research is defined as the
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28 point when the interviewees did not show any new content or views in the latest round of interviews
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30 [29]. 30 FDs reached the maximum of data saturation. After the interview, the recorded content will
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32 be transcribed in detail within 24 hours by members of the research group to ensure the authenticity
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34 of the interview content. The interviewees were anonymized, and FDs were coded with N1 ~ N30.

35 36 **2.3.2 Content Analysis**

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38 A thematic framework method was employed in the qualitative study. The data are classified and
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40 analyzed by identifying themes, labeling data, and extracting core information [30]. With the help
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42 of the grounded theory [31,32], the data was divided into discrete parts that represented of raw data
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44 and open-coded in order to dig out as many themes as possible [33]. The dominant themes were
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46 extracted from the comment that appeared repeatedly. Data reduction was performed manually. We
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48 classified the related comments into various categories. In this regard, cooperation and division of
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50 labor coexist. Specifically, two coders initially read the transcripts and edited the data into codes,
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52 and then reread and identified transcripts and coded them into emerging categories [34]. In the next
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54 stage, the codes were later organized into themes and further expanded into broader domains after
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56 adequate discussion. Finally, the theme-based variables were determined by reaching a consensus.

57 58 **2.4 Patient and public involvement**

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60 No patients or public were involved in the design, or conduct, or reporting, or dissemination plans

of this research.

3. Results

3.1 Quantitative findings

The demographic characteristics of 276 FDs are displayed in Table 1. Males occupied less than half (30.1%) of the participants. The proportion of females is about twice that of males. Approximately 47.1% of FDs are between 30 and 40 years, and the average age of 276 FDs is 38.93 ± 8.63 years old. There are 93 (33.7%) FDs from Fengtai District, 69 (25.0%) FDs from Daxing District, 59 (21.4%) FDs from Huairou District, and 55 (19.9%) FDs from Xicheng District. Almost 83.7% of the participants obtained bachelor's or above degree. Only 4 FDs haven't got any positional title, FDs with the positional title of "resident" or "attending physician" comprised 30.8% and 48.9%, respectively.

Table 1 Demographic characteristics of FDs

Items	Number of surveys (%)
Gender	
Male	83 (30.1)
Female	193 (69.9)
Age	
20~	47 (17.0)
30~	130 (47.1)
40~	78 (28.3)
50~	15 (5.4)
60~	6 (2.2)
Regions	
Xicheng District	55 (19.9)
Fengtai District	93 (33.7)
Daxing District	69 (25.0)
Huairou District	59 (21.4)
Education	
High school or technical secondary school	4 (1.4)

Junior college	41 (14.9)
University	177 (64.1)
Postgraduate degree or above	54 (19.6)
Positional title	
Chief physician	4 (1.4)
Associate chief physician	48 (17.4)
Attending physician	135 (48.9)
Resident	85 (30.8)
None	4 (1.4)
Total	276 (100.0)

Table 2 revealed current status of FDCS for the disabled elderly in Beijing. The contracted services provided for the disabled elderly comprise primary care, home visits, medical examination, health consultation and education, medication guidance, telephone follow-up, psychological counseling and family care. Among these services, primary care is the most common services for the disabled elderly, following by health consultation and education, and medication examination. According to the situation of service needs for the disabled elderly, FDs hold the idea that the medication guidance, medical examination and home visits are the top three services which the disabled elderly desired most. Attitude in the service is the most concerned factors of the disabled elderly. There are many reasons that exert an influence on FDs to offer services for the disabled elderly, for instance, short of hands and intensive work is one of the biggest obstacles for FDs to serve the disabled elderly.

Table 2 Current status of FDCS for the disabled elderly

Items	Results	
Types of contracted services which FDs provided	Total person-time	Rank
Primary care	254	1
Home visits	176	6
Medical examination	222	5
Health consultation and education	239	2

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Medication guidance	234	3
Telephone follow-up	233	4
Psychological counseling	162	7
Family care bed	30	8
The most desired services for the disabled elderly	Total points ^a	Rank
Primary care	255	5
Home visits	284	3
Medical examination	295	2
Health consultation and education	270	4
Medication guidance	316	1
Telephone follow-up	84	6
Psychological counseling	76	7
Family care bed	74	8
The most concerned factors of the disabled elderly while	Total person-time	Rank
FDs providing medical services		
Diagnostic level	224	2
Service attitude	233	1
Charge standard	196	3
Drug effectiveness	159	4
Others	9	5
The main reasons that affect FDs to provide services for	Total points ^b	Rank
the disabled elderly		
Poor compliance of the disabled elderly and their families	200	3
Lack of government policy support	469	2
Short of hands and intensive work	533	1
Unreasonable content of contracted services	137	5
More complicated and difficult conditions to look after the	178	4
disabled elderly		
Additional demands from the disabled elderly and their	75	6

families beyond contracted services

Others	1	7
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Note: total points ^a=number of people selected for the first desired service×3+ number of people selected for the second desired service×2+ number of people selected for the third desired services×1

Total points ^b=number of people selected for the first main reason×3+ number of people selected for the second main reason×2+ number of people selected for the third main reason×1

Home visits is one of the most desired services for the disabled elderly, which is a bridge of effective communication between FDs and the disabled elderly. Due to the poor physical condition and immobility of the disabled elderly, home visits also are the main service content of FDs' work for the disabled elderly. Therefore, it is necessary to measure and reflect the workload for home visits by FDs when performing contracted services for the disabled elderly. As shown in Table 3, approximately 27.2% of FDs provided home visits services for the disabled elderly once a year. 68 (24.6%) FDs serve the disabled elderly at their home once a month. The frequency of home visits provided by FDs from Fengtai District is the highest, nearly 5.4 times/year. The frequency of home visits in the Huairou district is the lowest, around 2.5 times a year. The treatment time of 139 (50.4%) FDs is from 0.5h to 1h. The average treatment time for each home visits of 276 FDs is nearly 1.03 hours. The average treatment time of home visits, during which FDs from Huairou District spend the most, is around 1.11h. The total yearly workload for home visits provided by FDs is around 4.33 h. The yearly workload of home visits from Fengtai District is the highest and Huairou District is the lowest, almost 5.72h and 2.78h, respectively.

Table 3 The workload for home visits by FDs

Items	Regions				Total
	Xicheng District	Fengtai District	Daxing District	Huairou District	
Frequency per year N (%)					
Once a month	11 (20.0)	34 (36.6)	17 (24.6)	6 (10.2)	68 (24.6)
Once per quarter	10 (18.2)	19 (20.4)	15 (21.7)	9 (15.3)	53 (19.3)
Once half a year	6 (10.9)	4 (4.3)	10 (14.5)	6 (10.2)	26 (9.4)
Once a year	16 (29.1)	9 (9.7)	21 (30.4)	29 (49.2)	75 (27.2)

None	7 (12.7)	10 (10.8)	2 (2.9)	3 (5.1)	22 (8.0)
Others ^c	5 (9.1)	17 (18.3)	4 (5.8)	6 (10.2)	32 (11.6)
Total	55 (100)	93 (100)	69 (100)	59 (100)	276 (100)
Mean	3.6	5.4	4.4	2.5	4.2

(time/year)

Treatment time in Hours N (%)

0~	11 (20.0)	16 (17.2)	7 (10.1)	10 (16.9)	44 (15.9)
0.5~	32 (58.2)	42 (45.2)	37 (53.6)	28 (47.5)	139 (50.4)
1.0~	1 (1.8)	27 (29.0)	21 (30.4)	13 (22.0)	71 (25.7)
2.0~	10 (18.2)	5 (5.4)	3 (4.3)	5 (8.5)	14 (5.1)
3.0~	1 (1.8)	3 (3.2)	1 (1.4)	3 (5.1)	8 (2.9)
Total	55 (100)	93 (100)	69 (100)	59 (100)	276 (100)
Mean (h)	1.03	1.06	1.04	1.11	1.03

Yearly workload Hours (h)

Total	3.71	5.72	4.58	2.78	4.33
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Note: In accordance with the disabled elderly's personalized service needs, sometimes the frequency of home visits by FDs is uncertain, we generalize such case into the "others" category. When calculating the FD's workload, such section of the data was not included.

Generally speaking, FDs, the disabled elderly and their families have a good cooperation, 133 (48.2%) FDs indicate that the disabled elderly and their families often cooperate with them while enjoying FDCS, as displayed in Table 4. Approximately 89.8% of FDs think that the contracted services for the disabled elderly take into effect, they believe that they have played an important role in the FDCS for the disabled elderly. Compared with the other 3 districts, FDs from Fengtai district have the highest level of evaluation about contracted services, 83 (89.3%) FDs regard themselves as a vital promoter in providing contracted services for the disabled elderly. 172 (62.2%) FDs acknowledge that the contracted service they provided can meet the medical needs of the disabled elderly, but it is not very high the extent to FDCS required to meet the medical needs of the disabled elderly. Only 40 (14.4%) FDs think that service satisfaction of the disabled elderly has achieved the degree of "more satisfactory" or "most satisfactory".

There is a significant difference among the four districts in the aspects of the importance of FDs'

role and the extent to which FDCS meets the medical needs of the disabled elderly. Cooperation frequency of the disabled elderly and their families among four districts show no significant difference.

Through difference analysis between urban and rural areas, there is no significant difference in the cooperation frequency of the disabled elderly and their families. The importance of FDs' role between urban and rural areas indicates a significant difference. To be more specific, FDs from urban areas believe they play a more important role in FDCS for the disabled elderly than FDs from rural areas. By analyzing the extent to which FDCS meets the medical needs of the disabled elderly, there is a significant difference between urban and rural areas. Rural FDs hold the belief that their services are better than urban FDs to meet the medical needs of the disabled elderly.

Table 4 FDs' evaluation of contracted services for the disabled elderly

Items	Regions				Total
	Xicheng District	Fengtai District	Daxing District	Huirou District	
Cooperation frequency of the disabled elderly and their families N (%)					
Always	15 (27.2)	23 (24.7)	25 (36.2)	8 (13.6)	71 (25.7)
Usually	8 (14.5)	15 (16.1)	5 (7.2)	10 (16.9)	38 (13.8)
Often	24 (43.6)	43 (46.2)	33 (47.8)	33 (55.9)	133 (48.2)
Seldom	4 (7.2)	10 (10.8)	6 (8.7)	7 (11.9)	27 (9.8)
Never	4 (7.2)	2 (2.2)	0 (0)	1 (1.7)	7 (2.5)
Total	55 (100)	93 (100)	69 (100)	59 (100)	276 (100)

Difference analysis

between urban and

$\chi^2=0.003$, $P=0.955$

rural areas

Difference analysis

among four $\chi^2=4.394$, $P=0.222$

districts

Importance of FDs' role N (%)

Least important	5 (9.1)	4 (4.3)	1 (1.4)	3 (5.1)	10 (3.5)
Less important	4 (7.3)	6 (6.5)	2 (2.9)	22 (37.3)	18 (6.5)
Important	12 (21.8)	31 (33.3)	24 (34.8)	28 (47.5)	95 (34.4)
More important	25 (45.5)	42 (45.2)	28 (40.6)	6 (10.2)	117 (42.4)
Most important	9 (16.4)	10 (10.8)	1 (1.4)	0 (0)	36 (13.0)
Total	55 (100)	93 (100)	69 (100)	59 (100)	276 (100)

Difference analysis

between urban and $\chi^2=21.220$, $P<0.001$

rural areas

Difference analysis

among four $\chi^2=45.938$, $P<0.001$

districts

The extent to which FDCS meet the medical needs of the disabled elderly N (%)

Least satisfactory	12 (21.8)	7 (7.5)	5 (7.2)	6 (10.2)	30 (10.9)
Less satisfactory	12 (21.8)	32 (34.4)	11 (15.9)	19 (32.2)	74 (26.8)
Satisfactory	23 (41.8)	46 (49.5)	34 (49.3)	29 (49.2)	132 (47.8)
More satisfactory	8 (14.6)	7 (7.5)	16 (3.2)	5 (8.5)	36 (13.0)
Most satisfactory	0 (0)	1 (1.1)	3 (4.3)	0 (0)	4 (1.4)
Total	55 (100)	93 (100)	69 (100)	59 (100)	276 (100)

Difference analysis

between urban and $\chi^2=4.996$, $P=0.025$

rural areas

Difference analysis

among four $\chi^2=13.495$, $P=0.004$

districts

3.2 Qualitative findings

8 (26.3%) male and 22 (73.3%) female FDs participate in the interview and provide demographic characteristics information displayed in Table 5. 17 (56.7%) FDs are aged between 30 and 40 years, with an average age of 30 FDs is 38.33 ± 6.00 years old for the first 30 FDs. There are 9 (30.0%) FDs from Xicheng District, which accounts for the largest number of FDs. Most of the interviewees (93.3%) had a bachelor's degree or higher.

Table 5 Demographic characteristics of FDs

Items	Number of interviewees (%)
Gender	
Male	8 (26.3)
Female	22 (73.7)
Age	
20~	1 (3.3)
30~	17 (56.7)
40~	11 (36.7)
50~	1 (3.3)
Regions	
Xicheng District	9 (30.0)
Fengtai District	8 (26.7)
Daxing District	8 (26.7)
Huairou District	5 (16.6)
Education	
Junior college	2 (6.7)

University	22 (73.3)
Postgraduate degree or above	6 (20.0)
Total	30 (100.0)

The information from this interview can be distilled into three themes utilizing the thematic framework methodologies as follows:

- (i) The differences in health management between contracted healthy old and the disabled elderly;
- (ii) The facilitators of FDCS in caring for the disabled elderly.
- (iii) The barriers of FDCS in caring for the disabled elderly.

After identifying the meaning units from themes, this study has coded associated sub-themes related to three themes, the analysis process of FDs from the interviews as displayed in Supplementary Table 1.

As shown in Supplementary Table 1, there are many differences of health management between contracted healthy elderly and the disabled elderly. The service content of FDCS should be tailored to the specific needs of the impaired elderly because they have greater health demands than contracted with healthy old. In addition, because of the complicated physical conditions of the elderly with disabilities, providing FDCS is significantly riskier and requires more medical and human resources on the part of FDs. Additionally, FDs should pay closer attention to their physical and mental health and give them more humanistic care, because the majority of elderly people with disabilities have little interaction with other people.

In the process of providing contracted services for the disabled elderly, FDs are confronted with many facilitators and barriers. On the one hand, through FDCS, FDs regularly interact with the disabled elderly and their families, improve their health knowledge, directly provide them with some counsel on nutrition and medication use, which can build trust between the doctor and patient. Meanwhile, FDCS has significantly reduced the strain on neighborhood hospitals and eased the financial burden on older people with disabilities and their families. On the other hand, there are many barriers hindering the development of FDCS. The majority of FDs have acknowledged that labor scarcity is a problem. They often work intensively and sometimes even sacrifice their rest time to provide services for the disabled elderly. However, because there are no supervision or incentive

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4 programs in place for FDs, their losses and gains are not directly proportional. Besides, some
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6 problems always haunt FDs, such as high risks in the process of home visits, lack of continuity in
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8 FDCS, poor compliance of the disabled elderly and their families, and insufficient publicity of
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10 FDCS, etc.

11 **4. Discussion**

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13 The development of primary care is inseparable from the escort of FDs. At present, over 50 countries
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15 and regions have implemented FDCS and FDs play a more and more vital role in the primary care
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17 system [35]. Due to different medical and health systems of different countries, FDCS has obvious
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19 differences with many countries in service mode [36,37], service content [38-40] and motivation
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21 mechanism [41,42]. By comparing with existing literature, our research finds that the successful
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23 implementation of FDCS in various countries has the following commonalities: 1) The development
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25 of FDCS is based on community health institutions or platforms, such as Patient-centered Medical
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27 Home (PCMH) in US[43,44], the family doctor-and-nurse offices in Cuba[45,46], and FD's
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29 community private clinic in UK, Germany, Netherlands, French and Canada[47-51]. Although the
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31 service model and service content of FDCS are different from the above countries, their health
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33 institutions are all over the country, forming the backbone of primary health care. 2) As the
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35 gatekeeper of residents' health, FDs play six functions in the primary care system, including triage
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37 and treatment, resource allocation, surveillance and monitoring, preventive care, integrated care,
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39 and continuity of care [52-54]. 3) A reasonable and effective incentive mechanism of FDs is a
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41 necessary guarantee for FDs to insist on FDCS, which is closely related to the government's policy
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43 support and the allocation of medical resources[55].

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45 Our survey results show that community health centers are the main health institutions that FDCS
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47 rely on, while outreach services play an important role in caring for the disabled elderly. In addition
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49 to offering basic medical services, FDs often provide physical examination, health promotion,
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51 medication guidance, telephone follow-up, home visits and family care bed for the disabled elderly.
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53 From the view of FDs, medication guidance, physical examination and home visits are the top three
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55 services that the disabled elderly desire most. Relevant research evidence shows that with the
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57 increasing demand of medical care and the tightening of government public expenditure, the unmet
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59 needs among the disabled elderly are also increasing[56,57]. Similar to our results,
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FDCS 'satisfaction with the medical needs of the disabled elderly is not high.,Only 40 (14.4%) FDs

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4 think that service satisfaction of the disabled elderly has achieved the degree of “more satisfactory”
5 or “most satisfactory”. It is worth mentioning that there is a significant difference in satisfaction
6 among the four regions of FDCS. The service provided by rural medical staff for the disabled elderly
7 is better than that provided by urban medical staff, thus satisfying the medical needs of the disabled
8 elderly. It means the living standard of the disabled elderly in urban areas is high, compared with
9 the disabled elderly in rural areas, they may have more diverse medical service needs, so FDCS is
10 difficult to meet their medical needs. Through measuring the workload for home visits by FDs, this
11 study effectively assesses the workload of FDs when performing contracted services for the disabled
12 elderly. Our findings have indicated that the closer the disabled elderly live to the urban area, the
13 more frequently FDs provide home visits, and the closer to the remote areas, the more time and
14 effort it takes FDs to make visits. It shows that the current medical resources in Beijing are obviously
15 unbalanced at present, especially between urban and rural areas..

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Meanwhile, this study also discusses differences of in health management between contracted with healthy elderly and the disabled elderly. The results show that the disabled elderly have higher health demands and FDs should invest more time and energy to look after them. Besides fulfilling the six functions of gatekeeper in the primary care system, FDs have five unique roles to look after the disabled elderly. 1) “Psychological consultant”, which refers to contacting with the disabled elderly and their families to better understand their physical and psychological conditions and to provide more empathetic treatment. 2) “Rehabilitation physiotherapist”, which means providing rehabilitation treatment to meet the rehabilitative needs of the disabled elderly. 3) “Health Educator”, which entails educating the elderly with disabilities and their families about health issues as well as offering medical advice and health counseling to the elderly with disabilities. 4) “Health Manager”, requires to educate the elderly with disabilities and their families about health issues as well as offer medical advice and health counseling to the elderly with disabilities. 5) “Family health guardian”, which means offering home visits and family care bed services, supporting the family care of the disabled elderly, and protecting the health of the disabled elderly in all aspects. According to the results, 248 (89.8%) FDs regard themselves as an important role in providing contracted services for the disabled elderly, and FDs from urban areas consider they play a more important role in FDCS for the disabled elderly than FDs from those rural areas.

Our research has demonstrated that FDs are confronted with a myriad of barriers and facilitators in

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4 the FDCS of the disabled elderly. Following the implementation of FDCS, the facilitators include
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6 developing a trusting connection between the doctor and the patient, enhancing the health literacy
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8 of the elderly with disabilities, reducing the financial burden on the elderly with disabilities and
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10 their families, etc. However, many barriers have occurred on FDs when they provide contract
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12 services for the disabled elderly. In their interviews, the majority of FDs described how difficult it
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14 was to deal with issues such a lack of personnel, the dangers associated with house visits, the
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16 discontinuity of the FDCS, and inadequate promotion of the FDCS, among others. Our study has
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18 classified these barriers into two categories, the exterior barriers and interior ones. The outer barriers
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20 mainly focus on three aspects: 1) High risks involved in home visits. Home visits entail FD leaving
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22 their usual practice space and going to the homes of the disabled elderly. Many FDs expressed
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24 concern that accidents might happen while going to their home or while giving them with medical
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26 care. In China, there is currently no insurance covering medical mishaps involving house visits;
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28 should this occur, FDs would suffer significant financial losses and legal issues. 2) Absence of
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30 supervisory and incentive mechanism. In some developed countries, such as the U.S., Canada,
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32 French[58-60], FDs' personal income is directly related to their own performance due to fair market
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34 competition and free FDs signing model. However, most FDCS in Beijing follow the Pay-for-
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36 Service model, which means the government sets the content and fees of FDCS, and FDs only can
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38 provide these fixed services for the disabled elderly. It is inevitable that the disabled elderly will
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40 generate additional service needs, and FDs will complain about the incentive mechanism. FDs in
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42 the interviews expressed that their efforts were not directly proportional to their income, and most
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44 of the services were driven by their responsibilities. 3) Lack of government policy support and
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46 medical resources input. Shortage of personnel is a major problem which faced by FDs. It reflects
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48 that the current supply of medical human resources are disconnected from the actual medical needs
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50 of the disabled elderly. Moreover, there are obvious differences between urban and rural areas in
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52 terms of medical resource input. FDs in rural areas said that their CHC lacks basic inspection
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54 facilities, which brings a lot of inconveniences to conducting FD contract services

54 The interior barriers are mainly about three aspects: 1) Lack of time and effort. FDs must expend
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56 more effort and time serving the disabled elderly towing to their complex conditions and varied
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58 medical service needs. Many FDs mentioned that they needed to sacrifice their personal time to help
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60 the disabled elderly, which brought a serious pressure on their bodies and minds. 2) Lack of capacity.

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4 According to our results, only 40 (14.4%) FDs think that the disabled elderly have been very
5 satisfied with their services. Additionally, 8 FDs stated in the interviews that they were unable to
6 handle the issue when the disabled elderly and their families demanded extra services that were
7 outside the purview of FDCS, which resulted in low compliance from the elderly with disabilities
8 and their families. 3) Undertaking extra non-professional responsibilities. Most family members of
9 the disabled elderly think that since signing up with FDs, FDs should take more responsibility for
10 the disabled elderly. Sometimes FDs feel like they are being filial to the disabled elderly. The
11 phenomenon of shifting care responsibilities will exacerbate the bad relationship between doctors
12 and patients.

13
14 At present, there are few studies on the relationship between the barriers and the roles of functional
15 medical services in the FDCS disabled elderly people. Based on our findings, the researchers drew
16 a schematic diagram to describe the relationships between barriers and the roles of FD, as shown in
17 Figure 2.

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31 How to improve the quality of FDCS for the disabled elderly? First, the government should
32 improve policy formulation, support of FDCS, and establish an effective supervision and incentive
33 mechanism to ensure that the efforts of FDs is directly proportional to their income. Meanwhile, the
34 government should strengthen the training and education of FSs to solve the lack of hands, and
35 improve the laws and regulations on the risk of FDs to ensure their security during home visits.
36 Besides, the government should promote the policy publicity of FDCS to raise the social status of
37 FDs, and to reduce misunderstanding about FDs. Second, as far as FDs are concerned, some
38 standards they must be observed in the process of FDCS. FDs should consciously fulfill the spirit
39 of the contract, improve the frequency of communication between doctors and patients, pay more
40 attention to their physical and psychological conditions, and establish a mutual trust relationship
41 with the disabled elderly and their families. Meanwhile, FDs should refuse the exorbitant demands
42 of the disabled elderly and resist financial or other temptations to agree to their requests which go
43 beyond the scope of contracted services. Third, the disabled elderly and their families should
44 understand and cooperate with FDs [61]. Families of the disabled elderly should assume
45 responsibility for them, devote more time and effort to caring for them, and take the initiative to
46 inform FDs of the disabled elderly's most recent physical and mental conditions. By doing this, FDs
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4 will be better able to identify the disabled elderly's health risks and lessen the chance of secondary
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6 injury.

7 8 5. Strengths and Limitations

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10 Our study has investigated the current status of FDCS of the disabled elderly, identified five distinct
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12 roles of FDs who have contracted with the disabled elderly, and explored the relationships between
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14 the barriers and roles of FDs in the process of FDCS. Firstly, from the new perspective of family
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16 doctors, this study has examined many aspects of the current family doctor contract service of the
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18 disabled elderly in Beijing, such as service content, the workload of family doctors, and service
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20 satisfaction, and enriched the international discussion of similar topics. Secondly, this study has
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22 discovered the interests and demands of family doctors as well as potential obstacles and enablers
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24 in the implementation of family doctor contract services for the disabled elderly. Finally, it is the
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26 first time to identify the roles of family doctors in family doctor contract service of the disabled
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28 elderly in Beijing, and manifest the relationships between the roles of family doctors and the barriers.
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30 However, our research inevitably has some shortcomings, which can be roughly divided into two
31
32 aspects. First, our qualitative and quantitative findings are dependent on a single subject——FDs,
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34 while FDCS of the disabled elderly involves not only FDs, but also other subjects, such as the
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36 disabled elderly and their families. Second, the representativeness of our study was limited since
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38 only a sample of FDs in 4 districts chosen from 16 in Beijing were interviewed and studied. But we
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40 believe it is worth considering conducting similar studies in smaller cities across the China in the
41
42 future and putting more related subjects into our research.

43 44 6. Conclusion

45
46 There is no doubt that FDs play an important role in the FDCS of the disabled elderly. Compared
47
48 with contracted healthy elderly, the disabled elderly need more accessible, comprehensive and
49
50 humanistic care. Therefore, FDs should devote more time and effort to caring for them. This study
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52 has demonstrated the relationships between barriers, roles played by FDs, and the process of FDCS
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54 and put forward corresponding suggestions to improve the quality of FDCS. Future research must
55
56 concentrate on removing the current FDCS restrictions to improve the health of the disabled elderly
57
58 and their well-being.
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Acknowledgements

The author would like to thank all the participants, experts and researchers who participated in this study.

Authors' Contributions

ZZ, ZR, and PY contributed to the conception and design of the research. ZZ, ZR, ZS, ZJ and PY conducted on-site research and data gathering. JQ, ZJ, LH and CJ analyzed the data. ZZ, ZR, ZS and PY drafted the manuscript; and other authors revised it. All authors read and approved the final manuscript. All authors agreed to be accountable for all aspects of the work.

Funding

This study was funded by Beijing Social Science Foundation Project (Funding Number 19JDSRB008). The funding organization had no further role in the study design, data collection and analysis, interpretation of the data, writing the paper and the decision to submit the paper for publication.

Ethics Declarations

All included participants gave their oral and written informed consent and all experiments were performed in accordance with relevant guidelines and regulations. The study was approved by Medical Ethics Committee of Capital Medical University, Beijing, China. (Reference number Z2021SY027).

Competing Interests

The authors declare that they have no competing interest.

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4 Consent for Publication

5 Not applicable.
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11 Availability of Data and Materials

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13 Transcripts will not be shared for online access to protect the anonymity of the participants. Readers
14 who wish to gain access to the data can write to the corresponding author.
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19 Abbreviations

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21 FD Family doctor
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23 FDCS Family Doctor Contract Services
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25 CHC Community Health Service Center
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29 Figure legends

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31 Figure 1 Process of the mixed methods research. It intuitively reflects the purpose of our research,
32 the main content and methods of each stage.
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34
35 Figure 2 Schematic diagram of the relationships between the roles of FDs and the barriers. It
36 shows the relationship of six unique roles of FDs in the contracted services for the disabled elderly,
37 three interior barriers and three outer barriers. Interior barriers mainly arise from the FDs themselves,
38 which directly affects the roles of FDs. Outer barriers mainly arise from the environment around the
39 family doctors, includes policy environment of FDCS, working environment, which indirectly
40 affects the roles of FDs.
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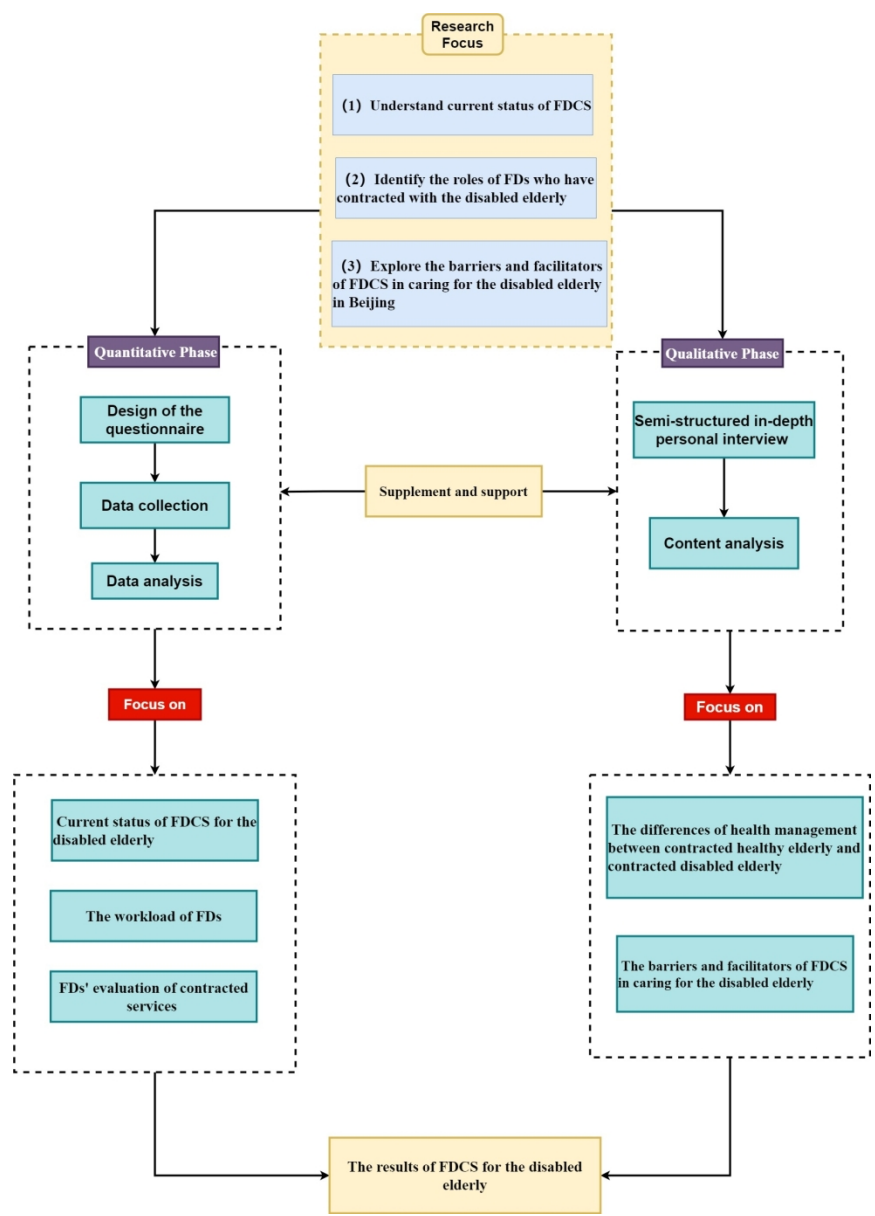
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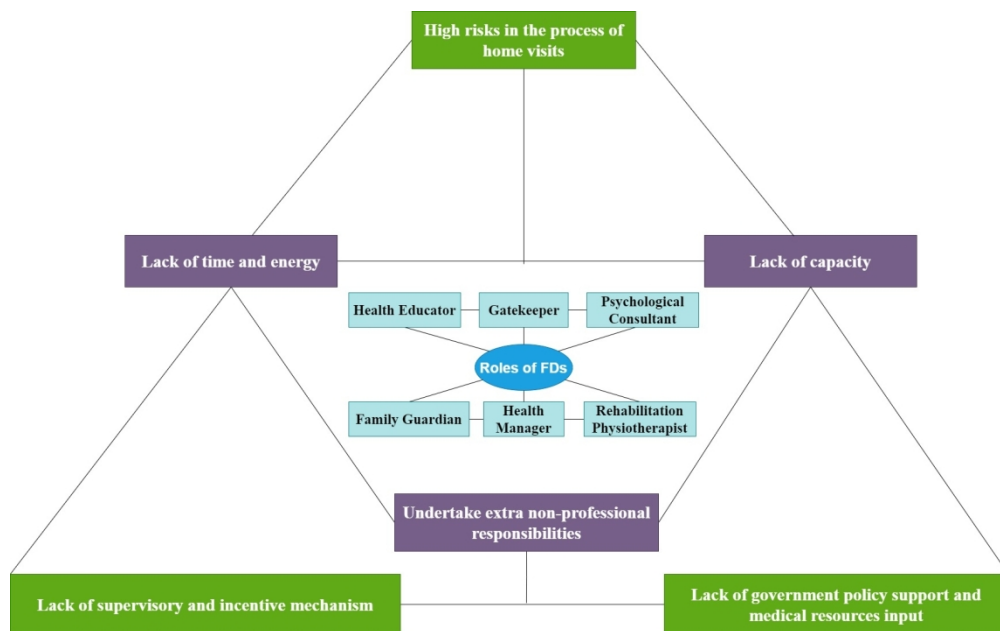
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Process of the mixed methods research

602x841mm (72 x 72 DPI)



Schematic diagram of the relationships between the roles of FDs and the barriers.

614x383mm (72 x 72 DPI)

Table 6 The analysis process of FDs from the interviews

Themes	Associated Sub-themes	Example of Verbatim Transcript
Differences	Health demands (25/30)	“.....the disabled elderly have greater health demands, particularly in the areas of Medicare and Medicaid.....” (FD, N7)
	Service content (20/30)	“.....Disabled elderly people usually have trouble moving, so we have to provide home-visiting service for them.....” (FD, N5)
	Level of humanistic care (17/30)	“.....Most of disabled elderly people are rely on their families, they have little opportunity to communicate with others and receive less social support.....FDs should have more communication with the disabled elderly via WeChat or telephone, understand their physical and psychological conditions, and give them more empathetic care.....” (FD, N30)
	Personal energy input (15/30)	“.....Compared with the contracted healthy elderly, we need invest more energy and time to provide care for the disabled elderly. For senior patients who are well, the diagnosis takes around 10 minutes, while the home visits we offer to those who are incapacitated take at least an hour.....” (FD, N13)
	Medical resources input (8/30)	“.....The disabled elderly occupy more human and medical resources than contracted healthy elderly, especially the facilities and tools of diagnosis and treatment for home visits service.....” (FD, N21)
	Level of service difficulty and risks (7/30)	“.....Care services for the disabled elderly are more difficult due to their complex physical condition. Besides, as risk of home visits service is high, some professional services cannot be offered at the disabled elderly’s home.....” (FD, N23)
	Facilitators	Establishing doctor-patient trust relationship (24/30)
Improving the health knowledge of the disabled elderly and their families (20/30)		“..... FDs will regularly hold regular lectures on health knowledge for the disabled elderly and their families, and we will teach some nursing skills for them to deal with emergencies.....” (FD, N9)
Improve the frequency of communication between doctors and the disabled elderly (18/30)		“.....Except for telephone follow-up, I have added patients’ WeChat through which I could ask their physical and mental conditions every day.....” (FD, N25)
Lightening the financial burden of the disabled elderly and their families (16/30)		“.....The disabled elderly and their families bear a huge economic and emotional burden, FDs can greatly solve the problems of the disabled elderly and their families, facilitate their lives and relieve their economic pressure.....” (FD, N16)
Developing humanistic care services (13/30)		“.....The disabled elderly have no the ability to look after themselves and lack the initiative to manage

1		their own health, so as FDs, we should pay more attention on them and provide more humanistic care
2		services, such as psychological counseling.....” (FD, N6)
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8	Improve the efficiency of medical resources (9/30)	“.....FDCS has greatly eased the pressure of local hospitals. Through home visits services, most of the
9		medical needs of the disabled elderly people can be met, and the waste of medical resources can be
10		avoided.....” (FD, N24)
11		
12		
13	Barriers	
14	Short of hands (23/30)	“.....The staff shortage of FD team is a thorny problem. If the salary is not properly distributed, human
15		resources will be insufficient.....” (FD, N5)
16		
17	High risks of home visits service (17/30)	“.....There are many risks on home visits service. Whether we go to the homes of the disabled elderly or
18		conduct home visiting service in their home, we are faced with many threats.....” (FD, N2)
19		
20		
21	Lack of continuity in FDCS (15/30)	“.....The FDCS just sustain one year, the contractual relationship between FDs and the disabled elderly is
22		not very close, some disabled elderly people who I am responsible for them this year, but I may not
23		manage their health next year. The continuity of FDCS cannot be effectively guaranteed.....” (FD, N17)
24		
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27	Lack of government policy support (11/30)	“.....FDCS lack the support of government policy, and the medical resources in Beijing are unevenly
28		distributed.....our CHC lack basic inspection facilities, which brings a lot of inconvenience to conduct FD
29		contract services.....” (FD, N8)
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33	Poor compliance of the disabled elderly and their families	“..... Most of the disabled elderly and their family are very cooperative with our work, but some patients
34	(8/30)	will put forward additional requirements beyond the scope of FDCS, which are hard to meet. So there are
35		some complaints from the disabled elderly and their families.....” (FD, N11)
36		
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39	Lack of supervisory and incentive policies for FDs (5/30)	“..... Our FD team does not have a supervision and incentive policy.....My contribution is not directly
40		proportional to my income, and most of the services for the disabled elderly are promoted by my
41		responsibility.....” (FD, N3)
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45	Insufficient publicity of FDCS (4/30)	“.....The propagation intensity of FDCS is a long way to go, many the disabled elderly and their families
46		misunderstand our work, which has brought a lot of troubles to FDs.....” (FD, N)
47		
48		
49	Shift more care responsibility on FDs (3/30)	“.....The family members of the disabled elderly believe that FDs should take responsible to the health of
50		the elderly. With my help, they pay less attention to the elderly, trying to evade their care responsibilities.
51		Sometimes I feel like I’m being filial to the disabled elderly.....” (FD, N10)
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STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1,2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	5,7
		(b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case	6,7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6,7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6,7
Bias	9	Describe any efforts to address potential sources of bias	6,7
Study size	10	Explain how the study size was arrived at	6,8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	N/A
		(b) Describe any methods used to examine subgroups and interactions	N/A
		(c) Explain how missing data were addressed	N/A
		(d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	7,8
		(e) Describe any sensitivity analyses	7,8

Continued on next page

Results			
Participants	13 *	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6,7
		(b) Give reasons for non-participation at each stage	6,7
		(c) Consider use of a flow diagram	4
Descriptive data	14 *	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9,15
		(b) Indicate number of participants with missing data for each variable of interest	6,7
		(c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15 *	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	N/A
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure	N/A
		<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	6,7
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	14
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	16
Discussion			
Key results	18	Summarise key results with reference to study objectives	21,2 2
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	25
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	25
Generalisability	21	Discuss the generalisability (external validity) of the study results	23,2 4
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	26

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

The Barriers and Facilitators of Family Doctor Contract Services in Caring for Disabled Older Adults in Beijing, China: A Mixed Methods Study

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2022-070130.R1
Article Type:	Original research
Date Submitted by the Author:	04-Apr-2023
Complete List of Authors:	Zhang, Zhiying; Capital Medical University, School of Medical Humanities Zhang, Ruyi; Capital Medical University Affiliated Beijing Ditan Hospital, Ethics Committee Office Peng, Yingchun; Capital Medical University, School of Medical Humanities Zhai, Shaoqi; Capital Medical University, School of Medical Humanities Zhang, Jiaying; Capital Medical University, School of Medical Humanities Jin, Qilin; People's Hospital of Beijing Daxing District Zhou, Jiaojiao; Fengtai District Xiluoyuan Community Health Service Center Li, Hanlin; Capital Medical University, School of Basic Medical Science Chen, Jingjing; Huairou District Liulimiao Community Health Service Center
Primary Subject Heading:	Health services research
Secondary Subject Heading:	General practice / Family practice
Keywords:	Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Organisation of health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Health Services for the Aged

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4 **1 The Barriers and Facilitators of Family Doctor Contract Services in Caring for**
5 **2 Disabled Older Adults in Beijing, China: A Mixed Methods Study**

6
7 Zhiying Zhang^{1#}, Ruyi Zhang^{2#}, Yingchun Peng^{1*}, Shaoqi Zhai¹, Jiaying Zhang¹, Qilin Jin³, Jiaojiao
8
9 Zhou⁴, Hanlin Li⁵, Jingjing Chen⁶

10
11
12 *Correspondence: pycjq@ccmu.edu.cn ORCID ID : 0000-0002-2168-5155

13
14 # Zhiying Zhang and Ruyi Zhang contributed equally to this work

15
16 ¹ School of Medical Humanities, Capital Medical University, No.10, Xitoutiao, You An Men Wai,
17
18 Beijing 100069, China

19
20 ² Ethics Committee Office, Beijing Ditan Hospital, Capital Medical University, No. 8 Jingshun
21
22 East Street, Chaoyang District, Beijing 100015, China

23
24 ³ Cardiac Surgery Department, People's Hospital of Beijing Daxing District, No.26, Huangcun
25
26 West Street, Daxing District, Beijing

27
28 ⁴ Fengtai District Xiluoyuan Community Health Service Center, Beijing, China

29
30 ⁵ School of Basic Medical Science, Capital Medical University, No.10, Xitoutiao, You An Men
31
32 Wai, Beijing 100069, China

33
34 ⁶ Huairou District Liulimiao Community Health Service Center, Beijing, China

35
36 **Abstract**

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38 **Objective** To evaluate the current state of family doctor contract services(FDCS) in Beijing,
39
40 identify the roles of family doctors who have worked with disabled older adults and investigate the
41
42 barriers and facilitators faced by family doctors in providing care for them.

43
44 **Design** A convergent mixed methods study was carried out from October 2020 to January 2021 to
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46 collect and analyze both quantitative and qualitative data. The integration strategies in this study
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48 was connecting the results of the quantitative phase to data collection of the qualitative phase.

49
50 **Setting** A multi-stage sampling strategy was used to select 15 community health centers (CHCs) in
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52 four districts of Beijing. Of the four districts, two were from urban areas and two were from rural
53
54 areas.

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56 **Participants** The inclusion criteria for participants were(1) family doctors, (2) contracted with
57
58 disabled older adults,(3) engaged in the related work for disabled older adults more the 6 months.

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60 **Methods** A cluster sampling of 283 family doctors was used in the questionnaire. A purposive

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4 30 sample of 30 family doctors from the same CHCs was selected during the same period. Frequency
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6 31 and rank, rank sum test, K-W test were used in qualitative data analysis, the views of the
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8 32 interviewees were analyzed through the thematic framework method.

9
10 33 **Results** Currently, family doctors provided various services to satisfy the health needs of disabled
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12 34 older adults, while the utilization of FDCS for disabled older adults is affected by many factors. The
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14 35 differences of the importance of family doctors' role ($P < 0.001$) and service satisfaction ($P = 0.004$)
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16 36 were significant among four districts. Compared with contracted health senior citizens, this study
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18 37 has identified five unique roles of family doctors, including "psychological consultant",
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20 38 "rehabilitation physiotherapist", "health educator", "health manager", and "family health guardian".
21
22 39 Moreover, family doctors are confronted with a myriad of barriers (including high risks in the
23
24 40 process of home visits, a lack of supervisory and incentive mechanisms, insufficiency of time and
25
26 41 energy, etc) and facilitators (including establishing a doctor-patient trust relationship, developing
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28 42 humanistic care services, etc) in the FDCS for disabled older adults.

29 43 **Conclusions** Family doctors play a pivotal role in the FDCS for disabled older adults, while the
30
31 44 effect and quality of FDCS in China needs to be improved. It is suggested that further research needs
32
33 45 to focus on solving existing barriers of FDCS to optimize the health of disabled older adults and
34
35 46 improve the quality of their lives.

36
37 47 **Keywords:** barriers, contract services, disabled older adults, facilitators, family doctors, roles

38 39 48 **Strengths and Limitations**

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41 49 ■ This study is the first time to identify the roles of family doctors in FDCS for disabled older
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43 50 adults in Beijing.
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45 51 ■ This study has discovered the interests and demands of family doctors as well as potential
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47 52 obstacles and enablers in the implementation of FDCS for disabled older adults.
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49 53 ■ This study has examined many aspects of the current FDCS for disabled older adults in Beijing,
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51 54 and enriched the international discussion of similar topics.
- 52
53 55 ■ This study were collected data from one sector of healthcare provider does not cover the
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55 56 perspective of all stakeholders in FDCS.
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57 57 ■ The representativeness of this study was limited since only a sample of family doctors in 4
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59 58 districts chosen from 16 in Beijing.

60 59 **1. Introduction**

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4 60 With the global escalation of the aging process and the extension of average life expectancy, more
5
6 61 and more older adults tend to face a high risk of disability. *The World Report on Disability*
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8 62 manifested that there are more than 1000 million people with disabilities in the world, and disability
9
10 63 disproportionately exerts a profound influence on vulnerable populations, in particular, the older
11
12 64 adults [1]. At the end of 2020, there are more than 85 million people living with some type of
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14 65 disability in China [2]. Among them, the population of disabled older adults has reached 26.28
15
16 66 million, accounting for 9.95% of the overall aging population [3]. Beijing, as a typical example, is
17
18 67 characterized by advanced age and a high disability rate. In 2021, there are about 205,000 disabled
19
20 68 older adults in Beijing, the disability rate of the senior citizens is 4.78% and the older adults with
21
22 69 moderate or severe disability account for 70% of the whole disabled older adults [4].

23
24 70 The disabled older adults, as a priority group of society, have extremely complex conditions and
25
26 71 diversified needs. Nieboer A. et al. found that different aging groups have different values for long-
27
28 72 term care services [5]. Important factors including the physical, mental, and family financial
29
30 73 conditions of disabled older adults have a significant influence on their choice of health and care
31
32 74 services [6,7]. A related study indicates that the disabled older adults' care not only need daily care,
33
34 75 but also medical care and rehabilitation training care services [8]. Due to poor physical conditions,
35
36 76 many disabled old individuals have difficulty moving, they hardly can go to the hospital by
37
38 77 themselves. Community health centers(CHCs) may become the only way for them to obtain medical
39
40 78 treatment. Moreover, most older adults with severe disabilities have lost normal physiological
41
42 79 functions, they have to rely on external devices, such as a gastric tube, and a urinary catheter to
43
44 80 support their daily physical needs. However, changing the gastric tube or urinary catheter is a knotty
45
46 81 problem for those bedridden people and their families. Therefore, satisfying the health and care
47
48 82 needs and improving the basic living conditions of disabled older adults is not only an urgent needs
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50 83 of the senior and their families, but also a serious social issue to be considered.

51
52 84 To address the challenges of rapid growth and massive demand of the older adults with disability,
53
54 85 China has released a series of policies. *The Law of the People's Republic of China on the Protection*
55
56 86 *of the Rights and Interests of Elderly(2012)*, which clearly stated that local government at all levels
57
58 87 should give care subsidies to older adults who are unable to take care of themselves for a long time
59
60 88 or have difficulties in finance based on their disability level. In 2016, the State Council Medical
89 Reform Office and other seven ministries launched the Guiding Opinions on Promoting Family

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4 90 Doctor Contract Services(FDCS), it marked the formal implementation of FDCS in China and had
5
6 91 a positive significance for enhancing the health level of community residents and achieving the goal
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8 92 of hierarchical diagnosis treatment. The National Health Commission in 2019 gave further guidance
9
10 93 on FDCS, which required family doctors to provide door-to-door medical and health services for
11
12 94 disabled older adults, terminally ill patients and other people who are in urgent need, and extend the
13
14 95 contracted services from institutions to communities and families [9]. In 2022, the State Council
15
16 96 issued *a guideline to promote the development of national undertakings for the aged and improve*
17
18 97 *the elderly care service system during the 14th Five-Year Plan period (2021-2025)*, which
19
20 98 encouraged medical and health institutions providing FDCS such as family care beds or home visits
21
22 99 to solve the basic care needs of disabled older adults. With relevant policies on disabled older adults
23
24 100 released in recent years, the living conditions and lives quality of disabled older adults have
25
26 101 improved. However, currently, China has not yet established a long-term care system for disabled
27
28 102 older adults due to lots of factors, such as lack of qualified professionals, limited service types, and
29
30 103 unrealized integrated care, etc [10].

31 104 As a core component of the primary healthcare system, FDCS is the most available health care
32
33 105 services to cater to older adults' long-term care needs in China[11]. Like other developed countries,
34
35 106 such as US, UK and Germany, family doctors play a more and more vital role in the primary care
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37 107 system [12]. As the gatekeeper of residents' health, family doctors play six roles in the primary care
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39 108 system, including triage and treatment, resource allocation, surveillance and monitoring, preventive
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41 109 care, integrated care, and continuity of care [13~15]. By utilizing FDCS, family doctors in CHCs
42
43 110 establish a long-lasting, ongoing, and stable contractual relationship with disabled older adults. And
44
45 111 it is natural to provide medical care, and essential public health management services for them,
46
47 112 including establishing health records, physical examinations, chronic disease follow-ups, etc. At
48
49 113 end of 2021, there are 1435 million family doctors across the whole country and they have formed
50
51 114 431 thousand teams to provide FDCS for residents. As one of the first pilot areas of FDCS, Beijing's
52
53 115 contracted residents have reached 8.016 million in 2021, and the signing rate of key groups has
54
55 116 remained above 90% [16].

56 117 Although the number of contracted residents is increasing every year, the overall performance of
57
58 118 utilizing FDCS at CHCs is in a bad condition. Previous studies have shown that FDCS is plagued
59
60 119 with severe problems, such as lack of community health resources, the shortage of family doctors

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4 120 [17], the low awareness of contracted residents to FDCS [18], and the absence of supporting policies
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6 121 [12], which results in the actual utilization of FDCS has not increased. Meanwhile, the current effect
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8 122 of utilizing FDCS for disabled older adults is not obvious in Beijing due to limited medical resources,
9
10 123 less service types of FDCS, and low contract spirit between doctors and patients [19].

11 124 Family doctors, as ideal medical service providers, are expected to take a pivotal role in the
12
13 125 provision of medical care services for the disabled older adults and meet the disabled older adults'
14
15 126 diversified needs. However, no previous study has explored the roles of family doctors in the process
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17 127 of providing FDCS for disabled older adults, and there is less research to figure out what barriers
18
19 128 and facilitators of FDCS will have in the process of caring for disabled older adults based on the
20
21 129 viewpoints of healthcare providers. To solve the dilemma of FDCS and let family doctors provide
22
23 130 more high quality services for disabled older adults, this study is the first to identify the roles of
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25 131 family doctors contracted with disabled older adults in Beijing and investigated the barriers and
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27 132 facilitators of utilizing FDCS from the perspectives of family doctors.

29 133 **2. Materials and Methods**

30 134 **2.1 Study design and sample selection**

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33 135 A questionnaire survey and semi-structured interviews were carried out on family doctors in the
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35 136 CHCs of Beijing, the capital city of China, from October 2020 to January 2021. A multistage
36
37 137 sampling strategy was adopted [20]. In the first stage, 4 districts of Beijing (2 from urban areas,
38
39 138 namely Xicheng District, Fengtai District; 2 from rural areas, namely Daxing District, and Huairou
40
41 139 District) were selected based on the level of economic development and the linear distance from
42
43 140 Tiananmen Square. The prominent feature of Xicheng District is the functional core area of Beijing.
44
45 141 As one of six urban districts of Beijing, Xicheng District is the core bearing area of political center
46
47 142 and cultural center, the protection of famous historical and cultural city, and also is "an important
48
49 143 window" to reflect the national image and international communication. Fengtai District is the
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51 144 central city area of Beijing. It is positioned as "an important guaranteed area for supply high quality
52
53 145 life services in the capital" from the Beijing City Master Plan. Daxing District is located in the
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55 146 southeast of Beijing, which is an important base of agricultural and sideline food production.
56
57 147 Huairou District is one of rural areas of Beijing, located in the northeast of cities. It has many
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59 148 mountains, which formed the natural barrier of Beijing. Huairou District also is called the Green
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149 Great Wall of Beijing. In the second stage, 3~4 CHCs were selected in each district based on the

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4 150 status of utilizing family doctor contract services, a total of 15 CHCs participated in our research.
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6 151 In the third stage, due to 3~5 family doctor teams in each CHC, and the family doctor team was
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8 152 composed of three medical-nursing-prevention personnel, so all the family doctor teams were
9
10 153 selected by using cluster sampling method. There were a total of 283 family doctors participating
11
12 154 in this study. At the same period, 2~3 family doctors were selected from 15 CHCs by purposive
13
14 155 sampling method and joined in-depth interview. Lastly, the research team(one graduate tutor and
15
16 156 three graduate students) went to each sampling CHC to conduct this study [21,22].

17 157 Convergent mixed methods [23,24]were used in data collection and the analytical process, which
18
19 158 collected and analyzed qualitative and quantitative data independently and simultaneously, and
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21 159 evaluated and combined with qualitative and quantitative results. The process of mixed methods is
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23 160 shown in Figure 1 and described in detail below.

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29 163 In the quantitative phase, a cross-sectional survey using a self-designed questionnaire was
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31 164 conducted on family doctors. The self-designed questionnaire mainly investigated the current status
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33 165 of FDCS for disabled older adults, including the utilization of FDCS, the workload for home visits
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35 166 by family doctors, and the performance evaluation of FDCS based on the family doctors.

36
37 167 In the qualitative phase, a one-to-one and semi-structured in-depth personal interview for family
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39 168 doctors was utilized to supplement and support the study. As thematic framework methods
40
41 169 adopted[25], the content of the interview mainly is to focalize two perspectives, one is the
42
43 170 differences in health management between contracted healthy senior citizens and disabled older
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45 171 adults, and the other is the barriers and facilitators of FDCS in caring for disabled older adults.

46
47 172 In this study, the quantitative phase and qualitative phase were conducted in parallel and then
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49 173 integrated. The integration strategies in this study was connecting the results of the quantitative
50
51 174 phase to data collection of the qualitative phase. By using quantitative method to understand the
52
53 175 current status of FDCS in caring for disabled older adults and the main factors which affect family
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55 176 doctors to provide contracted services for disabled older adults. Then based on the results of the
56
57 177 quantitative phase, this study further explored the roles of family doctors and barriers and
58
59 178 facilitators of FDCS in caring for disabled older adults. In this study, using both quantitative and
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179 qualitative results made a better understanding of the roles and challenges faced by family doctors

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4 180 in the process of providing contracted services for disabled older adults and the factors associated
5
6 181 with better quality of FDCS for disabled older adults.

7 182 **2.2 Quantitative Phase**

9 183 Under the national and Beijing's relevant policies of FDCS for disabled older adults, the research
10
11 184 team has considered the humanistic environment, regional characteristics and the actual situation of
12
13 185 the contracted services in Beijing and compiled a self-designed questionnaire after an extensive
14
15 186 review of relevant literature and repeated discussion by panel experts. The questionnaire was revised
16
17 187 based on feedback from a pretest performed in one CHC. Moreover, the questionnaire design and
18
19 188 the whole process of questionnaire exploring were applied the Guideline Implementation Planning
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21 189 Checklist developed by Gagliardi et al [26,27].

22 190 2.2.1 Instruments

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24
25 191 To explore the status of FDCS for disabled older adults in Beijing, the questionnaire consisted of
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27 192 four sections. The first part was a total of four questions regarding demographic characteristics of
28
29 193 family doctors, including gender, age, regions, education level and position title. The second part
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31 194 was the utilization of family doctor contract services for disabled older adults. It consisted of four
32
33 195 multiple choice questions : 1) the type of contract services that family doctors provided for disabled
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35 196 older adults; 2) the top three services that disabled older adults needed most from the perspective of
36
37 197 family doctors; 3) the most concerning factors of disabled older adults while family doctors
38
39 198 providing medical services; 4) the main factors that affect family doctors to provide contracted
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41 199 services for disabled older adults. Respondents needed to list the top three answers in question 2
42
43 200 and question 4. The third part was the workload for home visits by family doctors, to describe the
44
45 201 workload of home visits by family doctors, three aspects were taken into consideration: 1) the
46
47 202 frequency per year of home visits provided by each family doctor for disabled older adults; 2) the
48
49 203 treatment time in hours quantified the time of treatment for each home visit. 3) the workload for
50
51 204 home visits by family doctors was calculated by multiplication of the treatment time with the
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53 205 frequency per year. The final part was the performance evaluation of family doctor contract services
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55 206 based on family doctors, which included three multiple choice questions: 1) the cooperation
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57 207 frequency of disabled older adults and their families when family doctors operate home visits
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59 208 service; 2) the importance of family doctors' role in the FDCS for disabled older adults; 3) the extent
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209 to which FDCS meet the medical needs of disabled older adults. To measure the performance

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4 210 evaluation of family doctor contract services based on family doctors, we identified the independent
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6 211 was different regions and the dependent variable was cooperation frequency of disabled older adults
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8 212 and their families, importance of family doctors' role and the extent to which FDCS meet the
9
10 213 medical needs of disabled older adults.

11
12 214 The research team has discussed the rationality and appropriateness of each question, and the
13
14 215 content validity of the questionnaire was tested by an expert with extensive experience in FDCS and
15
16 216 an clinical expert who work in a CHC. After experts' feedback, a pilot study was conducted in a
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18 217 CHC with 40 samples twice within a 2-week interval to check reliability of the questionnaire. The
19
20 218 40 samples were same population and they have same characteristics as those used in the present
21
22 219 study. The test-retest reliability coefficient after 2 weeks was 0.73.

23 24 220 2.2.2 Data collection

25
26 221 The inclusion criteria of the questionnaires were as follows: 1) family doctors, 2) contracted with
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28 222 disabled older adults, 3) engaged in the related work for disabled older adults more the 6 months.
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30 223 283 family doctors participated in the questionnaire survey in the 15 selected CHCs. The returned
31
32 224 questionnaires with invalid data were to the exclusion of data analysis, and hence final samples of
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34 225 276 were gathered.

35 36 226 2.2.3 Statistical Methods

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38 227 Statistical description: Data were recorded into EpiData 3.1 system and processed by SPSS 21.0
39
40 228 statistical software. The mean and standard deviation were used to statistically describe the
41
42 229 measurement data, and the counting data were presented by composition ratio, frequency, and parity
43
44 230 arrangement.

45
46 231 Data analysis: Frequency and rank were applied to display the quantitative data of family doctors
47
48 232 including demographic characteristics, gender, age, regions, education and positional title, rank sum
49
50 233 test was used to analyze the content of the performance evaluation of FDCS based on family doctors,
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52 234 in which Wilcoxon rank sum test pointed to for two groups and Kruskal-Wallis test (K-W test) for
53
54 235 multiple groups. After K-W test, we used Least Significant Difference method (LSD) to compare
55
56 236 pairwise group.

57 58 237 2.3 Qualitative phase

59 60 238 2.3.1 Sampling and Interviews

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4 239 The sampling strategies applied in this stage were purposive sampling. At the start of this research,
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6 240 purposive sampling was used to selected family doctors who met the following inclusion criteria: 1)
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8 241 family doctors, 2) contracted with disabled older adults, 3) engaged in the related work for disabled
9
10 242 older adults at least 5 years. The exclusion criteria was that family doctors were unwilling to
11
12 243 participate or not able to cooperate with the research. The research team initially connected with 15
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14 244 managers of CHCs by telephone, email, WeChat to confirm the time, place and the number of family
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16 245 doctors who may accepted interview. Then, the manager of CHC provides a list containing contact
17
18 246 information of family doctors who meet the eligibility criteria and their contact information. The
19
20 247 research team members contact the intended interviewees and provide a detailed introduction to the
21
22 248 research purpose. Finally, 30 family doctors have informed consent and voluntarily participate in
23
24 249 the interview [27]. The ethics approval was given by the Medical Ethics Committee of Capital
25
26 250 Medical University.

27 251 2.3.2 Data collection

28
29 252 The interview outline formulated based on an extensive review of relevant literature and repeated
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31 253 discussion by panel experts. And two participants were also invited to conduct pre interviews before
32
33 254 the formal interview to ensure the integrity of the outline content. The content of the interview
34
35 255 outline contained the demographic characteristics of family doctors, the differences of health
36
37 256 management between contracted healthy senior citizens and disabled older adults, and the barriers
38
39 257 and facilitators of FDACS for disabled older adults. One-to-one, semi-structured in-depth personal
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41 258 interviews were conducted in this study. All the interviewers have received a unified standard
42
43 259 training in advance, so as to avoid the induced problems and reduce research subjective biases.
44
45 260 Before the interview, the interviewee introduced the research purpose, methods, content and
46
47 261 confidentiality principles to the interviewees in detail, and obtained informed consent [28]. During
48
49 262 the interview, the interviewee or the research assistant note (Field note) for the main issue and after
50
51 263 completing the interview verify the content by them. The notes were used to compare with the
52
53 264 verbatim transcription. Due to a verbatim transcript captures every single spoken word in the
54
55 265 recording and puts it into text. The data saturation of our research is defined as the point when the
56
57 266 interviewees did not show any new content or views in the latest round of interviews [29]. 30 family
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59 267 doctors reached the maximum of data saturation. After the interview, the recorded content will be
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268 transcribed in detail within 24 hours by members of the research group to ensure the authenticity of

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4 269 the interview content. The interviewees were anonymized, and family doctors were coded with
5
6 270 N1 ~ N30.

8 271 **2.3.2 Content Analysis**

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10 272 A thematic framework method was employed in the qualitative study. The data are classified and
11
12 273 analyzed by identifying themes, labeling data, and extracting core information [30]. With the help
13
14 274 of the grounded theory [31,32], the data was divided into discrete parts that represented of raw data
15
16 275 and open-coded in order to dig out as many themes as possible [33]. The dominant themes were
17
18 276 extracted from the comment that appeared repeatedly. Data reduction was performed manually. We
19
20 277 classified the related comments into various categories. In this regard, cooperation and division of
21
22 278 labor coexist. Specifically, two coders initially read the transcripts and edited the data into codes,
23
24 279 and then reread and identified transcripts and coded them into emerging categories [34]. In the next
25
26 280 stage, the codes were later organized into themes and further expanded into broader domains after
27
28 281 adequate discussion. Finally, the theme-based variables were determined by reaching a consensus.

29 282 **2.4 Patient and public involvement**

30
31 283 No patients or public were involved in the design, or conduct, or reporting, or dissemination plans
32
33 284 of this research.

35 285 **3. Results**

37 286 **3.1 Quantitative findings**

38
39 287 The demographic characteristics of 276 family doctors are displayed in Table 1. Males occupied
40
41 288 less than half (30.1%) of the participants. The proportion of females is about twice that of males.
42
43 289 Approximately 47.1% of family doctors are between 30 and 40 years, and the average age of 276
44
45 290 family doctors is 38.93 ± 8.63 years old. There are 93 (33.7%) family doctors from Fengtai
46
47 291 District, 69 (25.0%) family doctors from Daxing District, 59 (21.4%) family doctors from Huairou
48
49 292 District, and 55 (19.9%) family doctors from Xicheng District. Almost 83.7% of the participants
50
51 293 obtained bachelor's or above degree. Only 4 family doctors haven't got any positional title, family
52
53 294 doctors with the positional title of "resident" or "attending physician" comprised 30.8% and 48.9%,
54
55 295 respectively.

56
57
58 **Table 1 Demographic characteristics of family doctors**

Items	Number of surveys (%)
Gender	
Male	83 (30.1)
Female	193 (69.9)
Age	
20~	47 (17.0)
30~	130 (47.1)
40~	78 (28.3)
50~	15 (5.4)
60~	6 (2.2)
Regions	
Xicheng District	55 (19.9)
Fengtai District	93 (33.7)
Daxing District	69 (25.0)
Huairou District	59 (21.4)
Education	
High school or technical secondary school	4 (1.4)
Junior college	41 (14.9)
University	177 (64.1)
Postgraduate degree or above	54 (19.6)
Positional title	
Chief physician	4 (1.4)
Associate chief physician	48 (17.4)
Attending physician	135 (48.9)
Resident	85 (30.8)
None	4 (1.4)
Total	276 (100.0)

296

297 Table 2 revealed the utilization of FDCS for disabled older adults in Beijing. The contracted services

298 provided for disabled older adults comprise primary care, home visits, medical examination, health
 299 consultation and education, medication guidance, telephone follow-up, psychological counseling
 300 and family care. After ranking above services by proportion of person time by month hour, this
 301 study has shown that primary care is the most common services for disabled older adults, following
 302 by health consultation and education, and medication examination. According to the situation of
 303 service needs for disabled older adults, family doctors hold the idea that the medication guidance,
 304 medical examination and home visits are the top three services which disabled older adults desired
 305 most. Attitude in the service is the most concerned factors of disabled older adults. There are many
 306 reasons that exert an influence on family doctors to offer services for disabled older adults, for
 307 instance, short of hands and intensive work is one of the biggest obstacles for family doctors to
 308 serve disabled older adults.

309

Table 2 The utilization of family doctor contract services for disabled older adults

Items	Results	
Types of contracted services which family doctors provided	Total person-time	Rank
Primary care	254	1
Home visits	176	6
Medical examination	222	5
Health consultation and education	239	2
Medication guidance	234	3
Telephone follow-up	233	4
Psychological counseling	162	7
Family care bed	30	8
The most desired services for disabled older adults	Total points ^a	Rank
Primary care	255	5
Home visits	284	3
Medical examination	295	2
Health consultation and education	270	4

Medication guidance	316	1
Telephone follow-up	84	6
Psychological counseling	76	7
Family care bed	74	8
The most concerned factors of disabled older adults while family doctors providing medical services	Total person-time	Rank
Diagnostic level	224	2
Service attitude	233	1
Charge standard	196	3
Drug effectiveness	159	4
Others	9	5
The main reasons that affect family doctors to provide services for disabled older adults	Total points ^b	Rank
Poor compliance of disabled older adults and their families	200	3
Lack of government policy support	469	2
Short of hands and intensive work	533	1
Unreasonable content of contracted services	137	5
More complicated and difficult conditions to look after the disabled older adults	178	4
Additional demands from disabled older adults and their families beyond contracted services	75	6
Others	1	7

310 Note: total points^a=number of people selected for the first desired service×3+ number of people selected
 311 for the second desired service×2+ number of people selected for the third desired services×1

312 Total points^b=number of people selected for the first main reason×3+ number of people selected for the
 313 second main reason×2+ number of people selected for the third main reason×1

314 Home visits is one of the most desired services for disabled older adults, which is a bridge of
 315 effective communication between family doctors and disabled older adults. Due to the poor physical
 316 condition and immobility of disabled older adults, home visits also are the main service content of
 317 family doctors' work for disabled older adults. Therefore, it is necessary to measure and reflect the

workload for home visits by family doctors when performing contracted services for disabled older adults. As shown in Table 3, approximately 27.2% of family doctors provided home visits services for disabled older adults once a year. 68 (24.6%) family doctors serve disabled older adults at their home once a month. The frequency of home visits provided by family doctors from Fengtai District is the highest, nearly 5.4 times/year. The frequency of home visits in the Huairou district is the lowest, around 2.5 times a year. The treatment time of 139 (50.4%) family doctors is from 0.5h to 1h. The average treatment time for each home visits of 276 family doctors is nearly 1.03 hours. The average treatment time of home visits, during which family doctors from Huairou District spend the most, is around 1.11h. The total yearly workload for home visits provided by family doctors is around 4.33 h. The yearly workload of home visits from Fengtai District is the highest and Huairou District is the lowest, almost 5.72h and 2.78h, respectively.

Table 3 The workload for home visits by family doctors

Items	Regions				Total
	Xicheng District	Fengtai District	Daxing District	Huairou District	
Frequency per year N (%)					
Once a month	11 (20.0)	34 (36.6)	17 (24.6)	6 (10.2)	68 (24.6)
Once per quarter	10 (18.2)	19 (20.4)	15 (21.7)	9 (15.3)	53 (19.3)
Once half a year	6 (10.9)	4 (4.3)	10 (14.5)	6 (10.2)	26 (9.4)
Once a year	16 (29.1)	9 (9.7)	21 (30.4)	29 (49.2)	75 (27.2)
None	7 (12.7)	10 (10.8)	2 (2.9)	3 (5.1)	22 (8.0)
Others ^c	5 (9.1)	17 (18.3)	4 (5.8)	6 (10.2)	32 (11.6)
Total	55 (100)	93 (100)	69 (100)	59 (100)	276 (100)
Mean	3.6	5.4	4.4	2.5	4.2
(time/year)					
Treatment time in Hours N (%)					
0~	11 (20.0)	16 (17.2)	7 (10.1)	10 (16.9)	44 (15.9)
0.5~	32 (58.2)	42 (45.2)	37 (53.6)	28 (47.5)	139 (50.4)
1.0~	1 (1.8)	27 (29.0)	21 (30.4)	13 (22.0)	71 (25.7)

2.0~	10 (18.2)	5 (5.4)	3 (4.3)	5 (8.5)	14 (5.1)
3.0~	1 (1.8)	3 (3.2)	1 (1.4)	3 (5.1)	8 (2.9)
Total	55 (100)	93 (100)	69 (100)	59 (100)	276 (100)
Mean (h)	1.03	1.06	1.04	1.11	1.03
Yearly workload Hours (h)					
Total	3.71	5.72	4.58	2.78	4.33

329 Note: In accordance with disabled older adults' personalized service needs, sometimes the frequency of
 330 home visits by family doctors is uncertain, we generalize such case into the "others" category. When
 331 calculating the family doctors' workload, such section of the data was not included.

332 Generally speaking, family doctors, disabled older adults and their families have a good cooperation,
 333 133 (48.2%) family doctors indicate that disabled older adults and their families often cooperate
 334 with them while enjoying FDCS, as displayed in Table 4. Approximately 89.8% of family doctors
 335 think that the contracted services for disabled older adults take into effect, they believe that they
 336 have played an important role in the FDCS for disabled older adults. Compared with the other 3
 337 districts, family doctors from Fengtai district have the highest level of evaluation about contracted
 338 services, 83 (89.3%) family doctors regard themselves as a vital promoter in providing contracted
 339 services for disabled older adults. 172 (62.2%) family doctors acknowledge that the contracted
 340 service they provided can meet the medical needs of disabled older adults, but it is not very high the
 341 extent to FDCS required to meet the medical needs of disabled older adults. Only 40 (14.4%) family
 342 doctors think that service satisfaction of disabled older adults has achieved the degree of "more
 343 satisfactory" or "most satisfactory".

344 There are significant differences among the four districts in the aspects of the importance of family
 345 doctors' role ($P < 0.001$) and the extent to which FDCS meets the medical needs of disabled older
 346 adults ($P = 0.04$). Cooperation frequency of disabled older adults and their families among four
 347 districts show no significant difference ($P = 0.222$).

348 Through difference analysis between urban and rural areas, there is no significant
 349 difference ($P = 0.955$) in the cooperation frequency of disabled older adults and their families. The
 350 importance of family doctors' role between urban and rural areas indicates a significant difference ($P < 0.001$).
 351 To be more specific, family doctors from urban areas believe they play a more important
 352 role in FDCS for disabled older adults than family doctors from rural areas. By analyzing the extent

353 to which FDCS meets the medical needs of disabled older adults, there is a significant difference
 354 ($P=0.025$) between urban and rural areas. Rural family doctors hold the belief that their services
 355 are better than urban family doctors to meet the medical needs of disabled older adults.

Table 4 The performance evaluation of family doctor contract services based on family doctors

Items	Regions				Total (n=276)
	Urban Areas(n=148)		Rural Areas(n=128)		
	Xicheng District (n=55)	Fengtai District (n=93)	Daxing District (n=69)	Huairou District (n=59)	
Cooperation frequency of disabled older adults and their families N (%)					
Always	15 (27.2)	23 (24.7)	25 (36.2)	8 (13.6)	71 (25.7)
Usually	8 (14.5)	15 (16.1)	5 (7.2)	10 (16.9)	38 (13.8)
Often	24 (43.6)	43 (46.2)	33 (47.8)	33 (55.9)	133 (48.2)
Seldom	4 (7.2)	10 (10.8)	6 (8.7)	7 (11.9)	27 (9.8)
Never	4 (7.2)	2 (2.2)	0 (0)	1 (1.7)	7 (2.5)
Mean Rank ^a	126.43	130.83	166.85	128.69	
		$\chi^2=4.394, P=0.222$			
Mean Rank ^b	138.27		138.77		
		$\chi^2=0.003, P=0.955$			
Importance of family doctors' role N (%)					
Least important	5 (9.1)	4 (4.3)	1 (1.4)	3 (5.1)	10 (3.5)
Less important	4 (7.3)	6 (6.5)	2 (2.9)	22 (37.3)	18 (6.5)
Important	12 (21.8)	31	24 (34.8)	28 (47.5)	95 (34.4)

		(33.3)				
More important	25 (45.5)	42	28 (40.6)	6 (10.2)	117 (42.4)	
		(45.2)				
Most important	9 (16.4)	10 (10.8)	1 (1.4)	0 (0)	36 (13.0)	
Mean Rank ^a	152.79	148.35	142.96	76.44		
		$\chi^2=45.938, P<0.001$				
Mean Rank ^b	150.00		108.83			
		$\chi^2=21.220, P<0.001$				
The extent to which FDCS meet the medical needs of disabled older adults N (%)						
Least satisfactory	12 (21.8)	7 (7.5)	5 (7.2)	6 (10.2)	30 (10.9)	
Less satisfactory	12 (21.8)	32 (34.4)	11 (15.9)	19 (32.2)	74 (26.8)	
Satisfactory	23 (41.8)	46 (49.5)	34 (49.3)	29 (49.2)	132 (47.8)	
More satisfactory	8 (14.6)	7 (7.5)	16 (3.2)	5 (8.5)	36 (13.0)	
Most satisfactory	0 (0)	1 (1.1)	3 (4.3)	0 (0)	4 (1.4)	
Mean Rank ^a	126.43	130.83	166.85	128.69		
		$\chi^2=13.495, P=0.004$				
Mean Rank ^b	129.20		149.26			
		$\chi^2=4.996, P=0.025$				

Note: a= difference analysis among four districts (K-W test),*significant value<0.05

b=difference analysis between urban and rural areas (K-W test),*significant value<0.05

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3.2 Qualitative findings

8 (26.3%) male and 22 (73.3%) female family doctor participates in the interview and provide demographic characteristics information displayed in Table 5. 17 (56.7%) family doctors are aged between 30 and 40 years,with an average age of 30 family doctors is 38.33 ± 6.00 years old for the first 30 family doctors. There are 9 (30.0%) family doctors from Xicheng District, which accounts for the largest number of family doctors. Most of the interviewees (93.3%) had a bachelor's degree or higher.

366

Table 5 Demographic characteristics of family doctors

Items	Number of interviewees (%)
Gender	
Male	8 (26.3)
Female	22 (73.7)
Age	
20~	1 (3.3)
30~	17 (56.7)
40~	11 (36.7)
50~	1 (3.3)
Regions	
Xicheng District	9 (30.0)
Fengtai District	8 (26.7)
Daxing District	8 (26.7)
Huairou District	5 (16.6)
Education	
Junior college	2 (6.7)
University	22 (73.3)
Postgraduate degree or above	6 (20.0)
Total	30 (100.0)

367

368 The information from this interview can be distilled into three themes utilizing the thematic
 369 framework methodologies as follows:

370 (i) The differences in health management between contracted healthy senior citizens and disabled
 371 older adults;

372 (ii) The facilitators of FDCS in caring for disabled older adults.

373 (iii) The barriers of FDCS in caring for disabled older adults.

374 After identifying the meaning units form themes, this study has coded associated sub-themes related
 375 to three themes, the analysis process of family doctors from the interviews as displayed in
 376 Supplemental Table 1.

377

378 As shown in Supplemental Table 1, there are many differences of health management between
379 contracted healthy senior citizens and disabled older adults. The service content of FDCS should be
380 tailored to the specific needs of disabled older adults because they have greater health demands than
381 contracted with healthy old people. In addition, because of the complicated physical conditions of
382 older adults with disabilities, providing FDCS is significantly riskier and requires more medical and
383 human resources on the part of family doctors. Additionally, family doctors should pay closer
384 attention to their physical and mental health and give them more humanistic care, because the
385 majority of old people with disabilities have little interaction with other people.

386 In the process of providing contracted services for disabled older adults, family doctors are
387 confronted with many facilitators and barriers. On the one hand, through FDCS, family doctors
388 regularly interact with disabled older adults and their families, improve their health knowledge,
389 directly provide them with some counsel on nutrition and medication use, which can build trust
390 between the doctor and patient. Meanwhile, FDCS has significantly reduced the strain on
391 neighborhood hospitals and eased the financial burden on older people with disabilities and their
392 families. On the other hand, there are many barriers hindering the development of FDCS. The
393 majority of family doctors have acknowledged that labor scarcity is a problem. They often work
394 intensively and sometimes even sacrifice their rest time to provide services for disabled older adults.
395 However, because there are no supervision or incentive programs in place for family doctors, their
396 losses and gains are not directly proportional. Besides, some problems always haunt family doctors,
397 such as high risks in the process of home visits, lack of continuity in FDCS, poor compliance of
398 disabled older adults and their families, and insufficient publicity of FDCS, etc.

399 **4. Discussion**

400 **The performance of FDCS for disabled older adults in Beijing**

401 The development of primary care is inseparable from the escort of family doctors. At present, over
402 50 countries and regions have implemented FDCS, which are vital for dealing with the burden of
403 those countries' health care system [12]. According to the results, 248 (89.8%) family doctors
404 regard themselves as an important role in providing contracted services for disabled older adults.
405 Consistent with our results, Family doctors play a more pivotal role in the health security of
406 contracted resident[35]. In addition to offering basic medical services, family doctors often provide

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4 407 a various services to meet the health needs of disabled older adults in Beijing, such as health
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6 408 promotion, telephone follow-up, home visits and family care etc. From the view of family doctors,
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8 409 medication guidance, physical examination and home visits were the top three services that disabled
9
10 410 older adults desired most. However, relevant research evidence shows that with the increasing
11
12 411 demand of medical care and the tightening of government public expenditure, the unmet needs
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14 412 among disabled older adults are also increasing [36,37]. This study has found FDCS 'satisfaction
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16 413 with the medical needs of disabled older adults is not high. Only 40 (14.4%) family doctors think
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18 414 that service satisfaction of disabled older adults has achieved the degree of "more satisfactory" or
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20 415 "most satisfactory".

21 416 **The roles of FDCS for disabled older adults in Beijing**

22
23 417 The disabled older adults have higher health demands and family doctors should invest more time
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25 418 and energy to look after them. Besides fulfilling the six functions of gatekeeper in the primary care
26
27 419 system, our study has identified five unique roles of family doctors in the process of looking after
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29 420 disabled older adults. 1) "Psychological consultant", which refers to contacting with disabled older
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31 421 adults and their families to better understand their physical and psychological conditions and to
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33 422 provide more empathetic treatment. 2) "Rehabilitation physiotherapist", which means providing
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35 423 rehabilitation treatment to meet the rehabilitative needs of disabled older adults. 3) "Health
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37 424 Educator", which entails educating disabled older adults and their families about health issues as
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39 425 well as offering medical advice and health counseling to disabled older adults. 4) "Health Manager",
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41 426 requires to educate disabled older adults and their families about health issues as well as offer
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43 427 medical advice and health counseling to disabled olde adults. 5) "Family health guardian", which
44
45 428 means offering home visits and family care bed services, supporting the family care of disabled
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47 429 older adults, and protecting the health of disabled older adults in all aspects.

48 430 **The differences of FDCS for disabled older adults between urban and rural Beijing**

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50 431 There are many factors that exert a negative influence on the utilization of FDCS for disabled older
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52 432 adults. Due to lack of manpower, family doctors have heave work tasks and high work intensity in
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54 433 the process of caring for disabled older adults, which is one of the biggest difficulties impeded the
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56 434 utilization of FDCS. In this study, there is a significant difference($P=0.025$) in satisfaction of FDCS
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58 435 between urban and rural areas, the rural medical staff are more satisfied with the provision of FDCS
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60 436 for the disabled older adults than urban. Although there is more demand for medical services in

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4 437 urban areas, family doctors in these areas often have more medical resources. One possible
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6 438 explanation to describe this phenomenon is that disabled older adults living in rural areas may have
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8 439 relatively simple health needs compared to urban areas [38]. So, the contracted services provided
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10 440 by family doctors may be more likely to meet the needs of rural disabled older adults. However, the
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12 441 role of FDCS for disabled older adults from urban is more important than those from rural areas. A
13
14 442 higher frequency of home visits was more likely accomplished in urban Beijing, which is opposite
15
16 443 to Maik Pochert's findings of Germany[39]. Above different results may be caused by the different
17
18 444 patient population and level of medical resources between two countries.

19 445 **The barriers of FDCS for disabled older adults in Beijing**

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21 446 However, barriers have occurred on family doctors when they provide contract services for disabled
22
23 447 older adults. In their interviews, the majority of family doctors described how difficult it was to deal
24
25 448 with issues such a lack of personnel, the dangers associated with house visits, the discontinuity of
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27 449 the FDCS, and inadequate promotion of the FDCS, among others. Our study has classified these
28
29 450 barriers into two categories, the exterior barriers and interior ones. The outer barriers mainly focus
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31 451 on three aspects: 1) High risks involved in home visits. Home visits entail family doctors leaving
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33 452 their usual practice space and going to the homes of disabled older adults. Many family doctors
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35 453 expressed concern that accidents might happen while going to their home or while giving them with
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37 454 medical care. In China, there is currently no insurance covering medical mishaps involving house
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39 455 visits; should this occur, family doctors would suffer significant financial losses and legal issues. 2)
40
41 456 Absence of supervisory and incentive mechanism. In some developed countries, such as the U.S.,
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43 457 Canada, French, family doctors' personal income is directly related to their own performance due
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45 458 to fair market competition and free family doctors signing model. However, most FDCS in Beijing
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47 459 follow the Pay-for-Service model, which means the government sets the content and fees of FDCS,
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49 460 and family doctors only can provide these fixed services for disabled older adults. It is inevitable
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51 461 that disabled older adults will generate additional service needs, and family doctors will complain
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53 462 about the incentive mechanism. Family doctors in the interviews expressed that their efforts were
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55 463 not directly proportional to their income, and most of the services were driven by their
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57 464 responsibilities. 3) Lack of government policy support and medical resources input. Shortage of
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59 465 personnel is a major problem which faced by family doctors. It reflects that the current supply of
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466 medical human resources are disconnected from the actual medical needs of disabled older adults.

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4 467 Moreover, there are obvious differences between urban and rural areas in terms of medical resource
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6 468 input. Family doctors in rural areas said that their CHCs lacks basic inspection facilities, which
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8 469 brings a lot of inconveniences to conducting FDCS.
9
10 470 The interior barriers are mainly about three aspects:1)Lack of time and effort. Family doctors must
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12 471 expend more effort and time serving disabled older adults towing to their complex conditions and
13
14 472 varied medical service needs. Many family doctors mentioned that they needed to sacrifice their
15
16 473 personal time to help disabled older adults, which brought a serious pressure on their bodies and
17
18 474 minds. 2) Lack of capacity. According to our results, only 40 (14.4%) family doctors think that
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20 475 disabled older adults have been very satisfied with their services. Additionally, 8 family doctors
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22 476 stated in the interviews that they were unable to handle the issue when disabled older adults and
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24 477 their families demanded extra services that were outside the purview of FDCS, which resulted in
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26 478 low compliance from the old adults with disabilities and their families. 3) Undertaking extra non-
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28 479 professional responsibilities. Most family members of disabled older adults think that since signing
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30 480 up with family doctors, family doctors should take more responsibility for disabled older adults.
31
32 481 Sometimes family doctors feel like they are being filial to disabled older adults. The phenomenon
33
34 482 of shifting care responsibilities will exacerbate the bad relationship between doctors and patients.
35
36 483 At present, there are few studies figuring out the relationship between the barriers and the roles of
37
38 484 functional medical services in the FDCS disabled older adults. Based on our findings, the
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40 485 researchers drew a schematic diagram to describe the relationships between barriers and the roles
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42 486 of family doctors, as shown in Figure 2.

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44 488 **The facilitators of FDCS for disabled older adults in Beijing**

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46 489 By comparing with existing literature, our research finds that the successful implementation of
47
48 490 FDCS in other countries has the following commonalities:1) The development of FDCS is based on
49
50 491 community health institutions or platforms, such as Patient-centered Medical Home (PCMH) in US
51
52 492 [40,41], the family doctor-and-nurse offices in Cuba [42], and family doctors' community private
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54 493 clinic in UK, Germany, Netherlands, French and Canada [43~47]. Although the service model and
55
56 494 service content of FDCS are different from the above countries, their health institutions are all over
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58 495 the country, forming the backbone of primary health care. 2) Education and training of family
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60 496 doctors is an important prerequisite to ensure the implementation of FDCS. The education and

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4 497 evaluation of family doctors in US emphasis on lifelong learning and evaluation, which included
5
6 498 three consecutive stages: pre-medical school, medical school and continuing education [48]. 3) A
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8 499 reasonable and effective incentive mechanism of family doctors is a necessary guarantee for family
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10 500 doctors to insist on FDCS, which is closely related to the government's policy support and the
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12 501 allocation of medical resources [49]. Therefore, in order to solve the problems in FDCS for disabled
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14 502 older adults and improve the quality of FDCS, first of all, the government should improve policy
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16 503 formulation ,support of FDCS, and establish an effective supervision and incentive mechanism to
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18 504 ensure that the efforts of family doctors is directly proportional to their income. Meanwhile, the
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20 505 government should strengthen the training and education of family doctors to solve the lack of hands,
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22 506 and improve the laws and regulations on the risk of family doctors to ensure their security during
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24 507 home visits. Besides, the government should promote the policy publicity of FDCS to raise the
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26 508 social status of family doctors, and to reduce misunderstanding about family doctors. Second, as far
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28 509 as family doctors are concerned, some standards they must be observed in the process of FDCS.
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30 510 Family doctors should consciously fulfill the spirit of the contract, improve the frequency of
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32 511 communication between doctors and patients, pay more attention to their physical and psychological
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34 512 conditions, and establish a mutual trust relationship with disabled older adults and their families.
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36 513 Meanwhile, family doctors should refuse the exorbitant demands of disabled older adults and resist
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38 514 financial or other temptations to agree to their requests which go beyond the scope of contracted
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40 515 services. Third, disabled older adults and their families should understand and cooperate with family
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42 516 doctors [19]. Families of disabled older adults should assume responsibility for them, devote more
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44 517 time and effort to caring for them, and take the initiative to inform family doctors of disabled older
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46 518 adults's most recent physical and mental conditions. By doing this, family doctors will be better able
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48 519 to identify disabled older adults' health risks and lessen the chance of secondary injury.

49 520 5. Strengths and Limitations

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51 521 Our study has investigated the current status of FDCS of disabled older adults, identified five
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53 522 distinct roles of family doctors who have contracted with disabled older adults, and explored the
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55 523 relationships between the barriers and roles of family doctors in the process of FDCS. Firstly, from
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57 524 the new perspective of family doctors, this study has examined many aspects of the current FDCS
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59 525 of disabled older adults in Beijing, such as service content, the workload of family doctors, and
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526 service satisfaction, and enriched the international discussion of similar topics. Secondly, this study

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4 527 has discovered the interests and demands of family doctors as well as potential obstacles and
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6 528 enablers in the implementation of family doctor contract services for disabled older adults. Finally,
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8 529 it is the first time to identify the roles of family doctors in family doctor contract service of disabled
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10 530 older adults in Beijing, and manifest the relationships between the roles of family doctors and the
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12 531 barriers.

13 532 However, our research inevitably has some shortcomings, which can be roughly divided into two
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15 533 aspects. First, this study were collected data from one sector of healthcare provider does not cover
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17 534 the perspective of all stakeholders in FDCS. Second, the representativeness of our study was limited
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19 535 since only a sample of family doctors in 4 districts chosen from 16 in Beijing were interviewed and
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21 536 studied. But we believe it is worth considering conducting similar studies in smaller cities across
22
23 537 the China in the future and putting more related subjects into our research.

24 25 538 6. Conclusion

26
27 539 There is no doubt that family doctors play an important role in the FDCS for disabled older adults.
28
29 540 Compared with contracted healthy senior citizens, disabled older adults need more accessible,
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31 541 comprehensive and humanistic care. Therefore, family doctors should devote more time and effort
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33 542 to caring for them. This study has demonstrated the relationships between barriers, roles played by
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35 543 family doctors, and the process of FDCS and put forward corresponding suggestions to improve the
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37 544 quality of FDCS. Future research must concentrate on removing the current FDCS restrictions to
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39 545 improve the health of disabled older adults and their well-being..

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52 552 Acknowledgements

53
54 553 The author would like to thank all the participants, experts and researchers who participated in this
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56 554 study.

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60 556 Authors' Contributions

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2
3
4 557 ZZ, ZR, and PY contributed to the conception and design of the research. ZZ, ZR, ZS, ZJY and PY
5
6 558 conducted on-site research and data gathering. JQ, ZJJ, LH and CJ analyzed the data. ZZ, ZR, ZS
7
8 559 and PY drafted the manuscript; and other authors revised it. All authors read and approved the final
9
10 560 manuscript. All authors agreed to be accountable for all aspects of the work.

11 561

12 562 Funding

13
14
15 563 This study was funded by Beijing Social Science Foundation Project (Funding Number
16
17 564 19JDSRB008). The funding organization had no further role in the study design, data collection and
18
19 565 analysis, interpretation of the data, writing the paper and the decision to submit the paper for
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21 566 publication.

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23 568 Ethics Declarations

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27 569 All included participants gave their oral and written informed consent and all experiments were
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29 570 performed in accordance with relevant guidelines and regulations. The study was approved by
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31 571 Medical Ethics Committee of Capital Medical University, Beijing, China. (Reference number
32
33 572 Z2021SY027).

34 573

35 574 Competing Interests

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39 575 The authors declare that they have no competing interest.

40 576

41 577 Consent for Publication

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44 578 Not applicable.

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47 581 Availability of Data and Materials

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52 582 Transcripts will not be shared for online access to protect the anonymity of the participants. Readers
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54 583 who wish to gain access to the data can write to the corresponding author.

55 584

56 585 Abbreviations

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60 586 FDCS Family Doctor Contract Services

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4 587 CHC Community Health Service Center

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8 589 Figure legends

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10 590 Figure 1 Process of the mixed methods research. It intuitively reflects the purpose of our research,
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12 591 the main content and methods of each stage.

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14 592 Figure 2 Schematic diagram of the relationships between the roles of family doctors and the
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16 593 barriers. It shows the relationship of six unique roles of family doctors in the contracted services for
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18 594 disabled older adults, three interior barriers and three outer barriers. Interior barriers mainly arise
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20 595 from the family doctors themselves, which directly affects the roles of family doctors. Outer barriers
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22 596 mainly arise from the environment around the family doctors, includes policy environment of FDOS,
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24 597 working environment, which indirectly affects the roles of family doctors.

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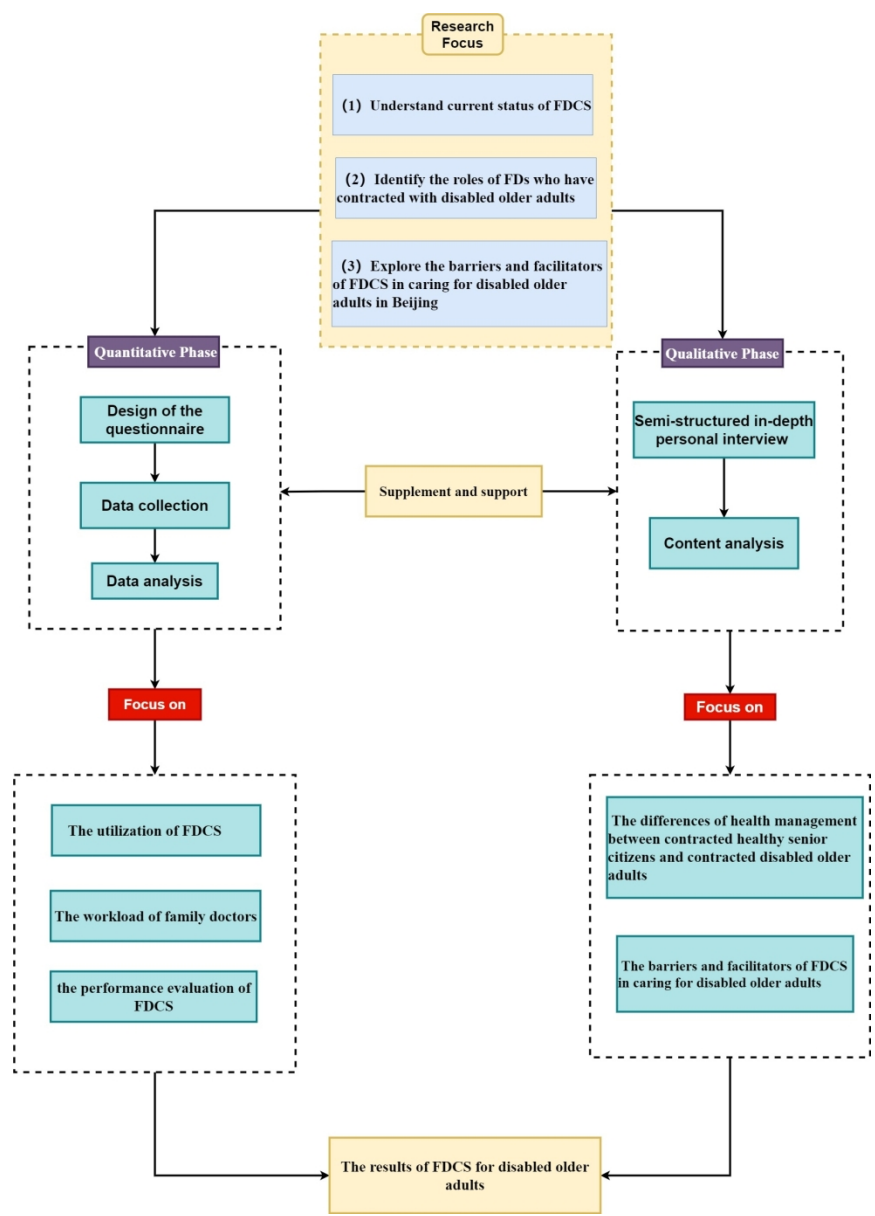
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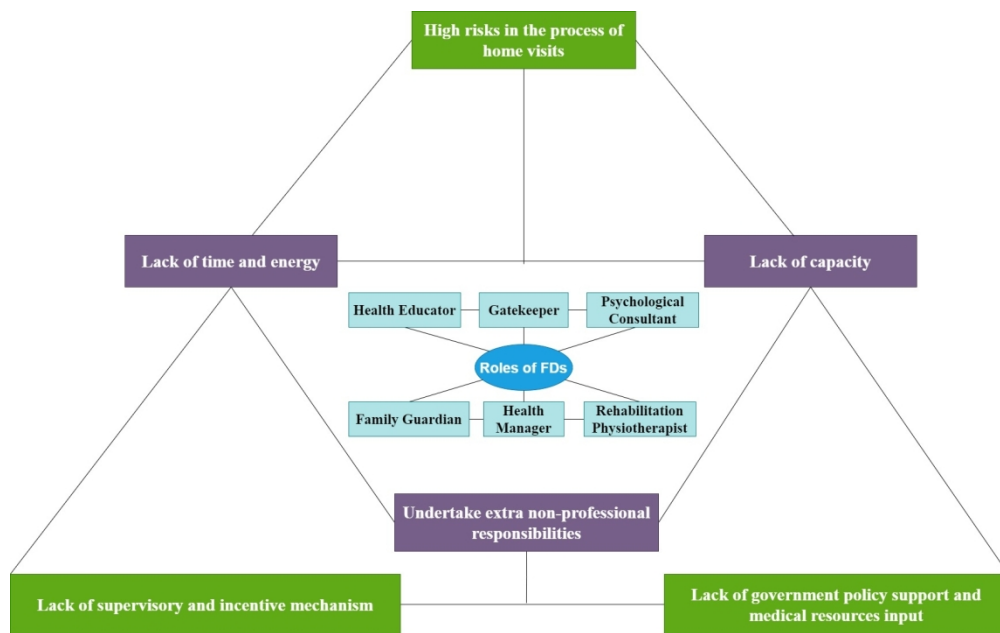
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Process of the mixed methods research

602x841mm (72 x 72 DPI)



Schematic diagram of the relationships between the roles of FDs and the barriers

614x383mm (72 x 72 DPI)

Supplemental Table 1 The analysis process of Family doctors from the interviews

Themes	Associated Sub-themes	Example of Verbatim Transcript
Differences	Health demands (25/30)	“.....disabled older adults have greater health demands, particularly in the areas of Medicare and Medicaid.....” (Family doctor, N7)
	Service content (20/30)	“.....Disabled older adults usually have trouble moving, so we have to provide home-visiting service for them.....” (Family doctor, N5)
	Level of humanistic care (17/30)	“.....Most of disabled old adults are rely on their families, they have little opportunity to communicate with others and receive less social support.....Family doctors should have more communication with the disabled older adults via WeChat or telephone, understand their physical and psychological conditions, and give them more empathetic care.....” (Family doctor, N30)
	Personal energy input (15/30)	“.....Compared with the contracted healthy senior citizen, we need invest more energy and time to provide care for the disabled older adults. For senior patients who are well, the diagnosis takes around 10 minutes, while the home visits we offer to those who are incapacitated take at least an hour.....” (Family doctor, N13)
	Medical resources input (8/30)	“.....The disabled old adults occupy more human and medical resources than contracted healthy elderly, especially the facilities and tools of diagnosis and treatment for home visits service.....” (Family doctor, N21)
	Level of service difficulty and risks (7/30)	“.....Care services for disabled older adults are more difficult due to their complex physical condition. Besides, as risk of home visits service is high, some professional services cannot be offered at the disabled older adults' home.....” (Family doctor, N23)
	Facilitators	Establishing doctor-patient trust relationship (24/30)
Improving the health knowledge of the disabled old adults and their families (20/30)		“..... Family doctors will regularly hold regular lectures on health knowledge for the disabled older adults and their families, and we will teach some nursing skills for them to deal with emergencies.....” (Family doctor, N9)
Improve the frequency of communication between doctors and the disabled old adults (18/30)		“.....Except for telephone follow-up, I have added patients' WeChat through which I could ask their physical and mental conditions every day.....” (Family doctor, N25)
Lightening the financial burden of the disabled old adults and		“.....The disabled older adults and their families bear a huge economic and emotional burden, FDCS can

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4	their families (16/30)	greatly solve the problems of the disabled older adults and their families, facilitate their lives and relieve
5		their economic pressure.....” (Family doctor, N16)
6		
7	Developing humanistic care services (13/30)	“.....The disabled older adults have no the ability to look after themselves and lack the initiative to manage
8		their own health, so as Family doctors, we should pay more attention on them and provide more
9		humanistic care services, such as psychological counseling.....” (Family doctor, N6)
10		
11	Improve the efficiency of medical resources (9/30)	“.....FDCS has greatly eased the pressure of local hospitals. Through home visits services, most of the
12		medical needs of the disabled older adults can be met, and the waste of medical resources can be
13		avoided.....” (Family doctor, N24)
14		
15	Short of hands (23/30)	“.....The staff shortage of Family doctor team is a thorny problem. If the salary is not properly distributed,
16		human resources will be insufficient.....” (Family doctor, N5)
17		
18	High risks of home visits service (17/30)	“.....There are many risks on home visits service. Whether we go to the homes of the disabled old adults or
19		conduct home visiting service in their home, we are faced with many threats.....” (Family doctor, N2)
20		
21	Lack of continuity in FDCS (15/30)	“.....The FDCS just sustain one year, the contractual relationship between Family doctors and the disabled
22		older adults is not very close, some disabled older adults people who I am responsible for them this year,
23		but I may not manage their health next year. The continuity of FDCS cannot be effectively guaranteed.....”
24		(Family doctor, N17)
25		
26	Lack of government policy support (11/30)	“.....FDCS lack the support of government policy, and the medical resources in Beijing are unevenly
27		distributed.....our CHC lack basic inspection facilities, which brings a lot of inconvenience to conduct
28		Family doctor contract services.....” (Family doctor, N8)
29		
30	Poor compliance of the disabled old adults and their families	“..... Most of the disabled older adults and their family are very cooperative with our work, but some
31	(8/30)	patients will put forward additional requirements beyond the scope of FDCS, which are hard to meet. So
32		there are some complaints from the disabled older adults and their families.....” (Family doctor, N11)
33		
34	Lack of supervisory and incentive policies for Family doctors	“..... Our Family doctor team does not have a supervision and incentive policy.....My contribution is not
35	(5/30)	directly proportional to my income, and most of the services for the disabled older adults are promoted by
36		my responsibility.....” (Family doctor, N3)
37		
38	Insufficient publicity of FDCS (4/30)	“.....The propagation intensity of FDCS is a long way to go, many the disabled older adults and their
39		families misunderstand our work, which has brought a lot of troubles to Family doctors.....” (Family
40		doctor, N19)
41		
42	Shift more care responsibility on Family doctors (3/30)	“.....The family members of the disabled older adults believe that Family doctors should take responsible
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to the health of the senior. With my help, they pay less attention to the elderly, trying to evade their care responsibilities. Sometimes I feel like I'm being filial to the disabled older adults....." (Family doctor, N10)

For peer review only

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1,2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	5,7
		(b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case	6,7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6,7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6,7
Bias	9	Describe any efforts to address potential sources of bias	6,7
Study size	10	Explain how the study size was arrived at	6,8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	N/A
		(b) Describe any methods used to examine subgroups and interactions	N/A
		(c) Explain how missing data were addressed	N/A
		(d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	7,8
		(e) Describe any sensitivity analyses	7,8

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60**Results**

Participants	13 *	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6,7
		(b) Give reasons for non-participation at each stage	6,7
		(c) Consider use of a flow diagram	4
Descriptive data	14 *	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9,15
		(b) Indicate number of participants with missing data for each variable of interest	6,7
		(c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15 *	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	N/A
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure	N/A
		<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	6,7
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	14
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	16

Discussion

Key results	18	Summarise key results with reference to study objectives	21,2 2
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	25
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	25
Generalisability	21	Discuss the generalisability (external validity) of the study results	23,2 4

Other information

Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	26
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*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.