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A Study on the Work of Primary Care Physicians in Chongqing during the COVID-19 Epidemic

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Abstract: Since the outbreak of the novel coronavirus outbreak in 2019, China has entered the stage of regular prevention and control. Grassroots doctors are the first line of defense in the prevention and control of infectious diseases, and play a fundamental and vital role, but their work deployment needs to be further optimized. This paper adopts the method of random cluster sampling to conduct a questionnaire survey on 259 primary doctors from 12 community health service centers in the main urban area of Chongqing from August to September 2022, and analyzes their work content, working hours, time allocation and workload, so as to explore the balance point of work allocation under major public health events. The results showed that during the epidemic, 70.27% of Chongqing's primary care physicians worked more than 6 days per week, and 97.68% of them participated in the epidemic prevention and control tasks on the basis of the original workload. The top three tasks were nucleic acid sampling, home and isolation observation, and COVID-19 vaccination, accounting for 90.3%, 29.3%, and 23.6% respectively; At the same time, the results also showed a heavy workload, with a total mental load value of 41.71 ± 12.46. There was a positive correlation between weekly working hours and mental load. The longer the weekly working hours, the greater the total mental load value. Primary care physicians have made positive contributions to the prevention and control of the epidemic in China, but they undertook too many tasks and too much mental heavy mental load. It's necessary to optimize working hours, reduce work intensity, strengthen the construction and rational distribution of primary care physicians, so as to achieve effective response to infectious diseases and public health emergencies.

1. Introduction

The novel coronavirus epidemic (COVID-19) is a major global emergency public health event [1]. Since the outbreak of COVID-19, the prevention and control situation of China's epidemic has continued to improve under the concerted efforts of the whole country, and has entered the stage of regular prevention and control [1]. As the main force of epidemic prevention and control, primary care physicians not only shoulder the treatment and follow-up of routine chronic disease patients in

the community, but also have done a lot of exploration and practices in the aspects of pre-examination triage, personnel screening, home isolation management, epidemic prevention technical guidance, rehabilitation follow-up visits, and health consultation management [2-3]. However, during the prevention and control of the epidemic, some problems have also been exposed in team of primary care physicians, including insufficient personnel, insufficient capacity of some personnel, unreasonable division of labor and high work pressure, etc [4-5]. The phenomenon of "one person with multiple positions" of primary care physicians is common, and the work deployment needs to be further optimized [4-5]. Once the mental workload exceeds the operator's tolerance range, the efficiency of work and safety of operators will be affected, resulting in job burnout and the decline of work efficiency [6]. Therefore, it is of great significance to understand the specific work arrangement and the workload threshold. The purpose of this study was to analyze the work content, working hours, time allocation and workload of primary care physicians in Chongqing during the epidemic, explore the balance point of work allocation under major public health events, and provide relevant suggestions for workload and staffing ratio under emergency public health events.

2. Methods

2.1 Participant information

From August 2022 to September 2022, primary care physicians in 12 community health service centers and township health centers in the main urban area of Chongqing were included for questionnaire survey. All participants received informed consent prior to the survey. A total of 259 questionnaires were issued, all of which were recovered and available, with an effective recovery rate of 100%.

2.2 Research method

Questionnaires were distributed to community physicians participating in epidemic prevention and control through Wechat groups or shared by colleagues, aiming to investigate their work status and assess their workload intensity. The questionnaire included four aspects, which were: (1) Basic information: such as gender, age, education level, marital status and title of primary medical staff; (2) The current work status of primary care physicians during the epidemic: working hours, prevention and control work, medical service and public health service work; (3) Workload: the revised Chinese version of NASA Task Load Index (NASA-TLX) was used to measure the workload. The scale consists of four items: Mental Demand (MD), Physical Demand (PD), Temporal Demand (TD), and Effort (EF). Each entry was marked with a score from 0 to 20 and represented by a straight line divided into 20 equal parts. According to the actual situation of the work they performed, the participants marked a corresponding position on lines representing the four items, respectively. All entries from left to right represented a gradual increase in workload. Then, two items were pairwise paired to form 6 combinations. The participants were asked to select an item from a combination that was more closely related to the total mental load. According to the number of times each item was selected, the weight of each item to total mental load was determined. The calculation of mental load in this survey adopted the principal component method, indicated that the first principal component coefficient of the scale was used to weight each item to calculate the total mental load.

2.3 Statistical analysis

EpiData 3.1 software was used to establish the database and SPSS 26.0 software was used for statistical analysis. A P value less than 0.05 ($P<0.05$) represents a statistical difference. Descriptive analysis was performed for the basic situation and work details. Internal consistency reliability was used to evaluate NASA-TLX scale, and structural validity was performed to evaluated the validity. A single sample K-S test was used for normality test, and the descriptive indexes of data were mean, standard deviation, median and frequency. The multi-factor analysis of influencing factors of mental load was carried out by generalized linear regression analysis.

3. Results

3.1 Demographic characteristics of participants

A total of 259 questionnaires were collected, of which 64 participants were male (24.71%), 195 were female (75.29%), and 211 were married. The age distribution of participants was as follows: 54 cases (20.85%) aged 20-29, 107 cases (41.31%) aged 30~39, 75 cases (20.85%) aged 40~49, and 23 cases (8.88%) aged ≥50. Among them, the academic qualifications from low to high were junior college (59/22.78%), undergraduate (196/75.68%), master or above (4/1.54%), and the professional titles from low to high were junior (91/35.14%), intermediate (108/41.7%) and senior (60/23.17%). In this study, the age structure, educational level and professional title of primary care physicians were basically consistent with that of current Chinese general practitioners, indicating that the sample in this study is representative to a certain extent [8].

3.2 Current work situation of primary care physicians during the epidemic

Table 1: Current work situation of primary care physicians during the epidemic

Variable	People counting	Percentage (%)
Working days per week(day)		
<3	3	1.16%
4-5	74	28.57%
>6	182	70.27%
Working hours per day(hour)		
<4	74	28.57%
5-8	165	63.71%
9-12	20	7.72%
>12	0	0.00%
Undertake or participate in the epidemic prevention and control work		
Yes	253	97.68%
No	6	2.32%
undertake medical services		
Yes	212	81.85%
No	47	18.15%
undertake public health services		
Yes	224	86.49%
No	35	13.51%

Among the 259 primary care physicians who participated in the questionnaire survey, 3 (1.16%) worked less than 3 days a week, 74 (28.57%) worked 4 to 5 days a week, and 82 (70.27%) worked more than 6 days a week. Most working hours were 5~8 hours per day (63.71%). Of the 259 people, 253 were engaged in epidemic prevention, 212 in medical services and 224 in public health services. The specific epidemic prevention and control work was further analyzed. The task of epidemic prevention and control took an average of 10~19 hours per week, accounting for the highest proportion (32.0%). Nucleic acid sampling, quarantining management and vaccination accounted for 90.3%, 29.3% and 23.6%, respectively. 65.6% of primary care physicians thought that the task of epidemic prevention and control took too much time,see Table 1 and Table 2.

Table 2: Prevention and control work of primary care physicians during epidemic

Class	Frequency	Percentage (%)
• Triage by appointment	54	21.34%
• Population screening and epidemiological investigation	35	13.83%
quarantining management	76	30.04%
Nucleic acid sampling	234	92.49%
Vaccination	61	24.11%
Transport of febrile patients	16	6.32%
High speed and pass defense	1	0.4%
Follow-up and counseling of rehabilitation patients	3	1.19%
Prevention and control Knowledge publicity	24	9.49%
Other	17	6.72%

3.3 Mental workload of primary care physicians during COVID-19

3.3.1 Reliability and validity test of NASA Task Load Index (NASA-TLX; the revised Chinese version)

Reliability analysis was used to test the consistency and stability of each variable in the scale, and Cronbach's α coefficient was used to test the internal consistency reliability. The Cronbach's α coefficient of the mental workload variable in this study was 0.845, which was greater than 0.8, indicating that the internal consistency of each variable was high and the reliability of the scale was good.

Factor analysis was utilized to measure the validity of the scale, and KMO value was used as the judgement criterion. When the KMO value was greater than 0.6, and P value was less than 0.001 ($P<0.001$), the results were statistically significant. The Bartlett sphericity test showed obvious effect, and the validity of each variable has passed the test. The results of factor analysis showed that a common factor with an eigenvalue ≥ 1.0 was extracted, and the explanation rate of cumulative variance was 68.49%. The common factor variance of each item was greater than 0.4. The factor loading of mental demand, physical fitness demand, time requirement and effort degree

in the common factor were 0.797, 0.810, 0.845 and 0.856, respectively, which indicated that the questionnaire had good construct validity.

3.3.2 Statistical description and frequency distribution of mental workload in primary care physicians

The descriptive statistics of mental workload showed that the scores of mental demand, physical fitness demand, time requirement and effort degree were 11.83±4.32, 12.00±4.95, 12.37±4.92 and 13.96±4.36, respectively. The total mental workload score was 15.28±47.06. One-sample K-S test showed that the data conformed to normal distribution (Z= 2.476, P<0.05), as is presented in Table3 and Figure 1.

Table 3: Statistical description of each item based on the revised NASA-TLX scale

item	N	Mean	Median	Standard deviation (SD)
mental demand	259	11.83	12.00	4.32
physical fitness demand	259	12.00	12.00	4.95
time requirement	259	12.37	12.50	4.92
effort degree	259	13.96	14.50	4.36
total mental workload	259	41.71	42.38	12.46

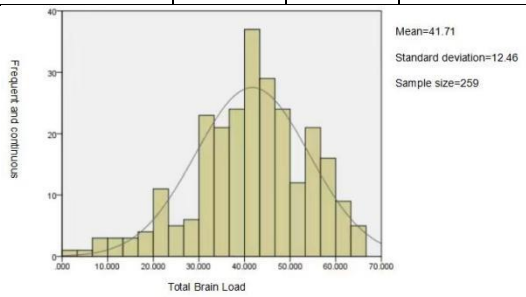

Figure 1: Frequency distribution diagram of mental workload

3.3.3 Regression analysis of mental workload of primary care physicians

Table 4: Regression analysis of influencing factors of mental workload of primary care physicians in Chongqing

Variable	β	Se	t	p
gender	-4.36	6.71	-0.650	0.516
age	4.82	4.59	1.050	0.295
education	-5.39	7.15	-0.755	0.451
marriage	-6.36	8.01	-0.794	0.428
Professional title	0.71	5.20	0.136	0.892
department	2.62	2.30	1.141	0.255
weekly working days	8.88	6.05	1.469	0.143
weekly working hours	19.78	5.17	3.828	0.000
Whether to undertake epidemic prevention and control work	-8.75	19.32	-0.453	0.651
Whether to undertake medical service work	7.37	8.82	0.837	0.404
Whether to undertake public health services	-8.31	8.52	-0.975	0.330

Regression analysis was performed with the total mental workload as the independent variable and 11 parameters as the dependent variables, such as gender, age, education, marriage,

professional title, department, weekly working days and weekly working hours. As shown in Table 4, weekly working hours were significantly correlated with total mental workload, which was an important factor affecting total mental workload. The longer the working hours per week, the higher the total mental workload value.

3.3.4 The relationship between the workload of epidemic prevention and control and mental workload

By comparing the relationship between workload of epidemic prevention and control and mental workload, we found that there were significant differences between physical fitness demand, time requirement, effort degree, workload and total mental workload ($P<0.001$),as is shown in Table 5. The mental workload of primary care physicians involved in epidemic prevention and control was high.

Table 5: The relationship between different tasks and the mental workload during epidemic

	More	General	Less	F	P
mental demand	12.21±4.37	11.27±4.41	7.00±1.41	2.050	0.107
physical fitness demand	13.01±4.78	10.16±4.44	3.50±2.12	8.909	0.000
time requirement	13.29±4.96	10.77±4.30	4.00±2.83	7.446	0.000
effort degree	14.84±4.24	12.32±4.13	12.00±5.66	7.196	0.000
total mental workload	44.46±11.97	36.86±11.54	22.06±0.39	9.018	0.000

4. Conclusions

During the investigation stage of this study, the COVID-19 epidemic broke out again in Chongqing. As the "last kilometer" and the "first line" of the epidemic, the working hours and content of primary care physicians have changed significantly [9]. The results of this study show that 70.27% of the primary care physicians worked more than 6 days per week, mainly 5~8 hours per day. 97.68% of the medical workers also participated in the epidemic prevention and control tasks on the basis of their original workload, and 67.19% of them thought that they spent too much time on epidemic tasks. Primary care physicians have made outstanding contributions in appointment and triage, population survey, nucleic acid sampling, quarantining management, vaccination, transport of febrile patients, high speed and pass defense, follow-up and counseling of rehabilitation patients, prevention and control knowledge publicity and so on. These findings were similar to the results of Huang Lei and Miao Yanqing et al. 's survey on the work status of primary care physicians during the COVID-19 epidemic [3].

This shows that at this stage, the main tasks of primary health care institutions in the prevention and control of COVID-19 include the following eight aspects: early detection and early reporting of cases; training on epidemic prevention and control knowledge and emergency drills; nosocomial infection prevention and control and personal protection; work with communities to prevent and control the epidemic; scientific health education on epidemic prevention and control; health management of key populations; collection and submission of nucleic acid test samples; novel coronavirus vaccination. The situation of epidemic prevention and control in China was in a state of dynamic change, and the tasks during COVID-19 epidemic undertaken by primary medical and health institutions were also constantly enriched and developed. The main tasks of COVID-19 prevention and control undertaken by primary care physicians in this study matched the main tasks of primary medical institutions in previous studies, indicating that primary medical and health institutions played the role of "underlying network"[10,11].

Mental workload refers to the workload of mental activities per unit time, which is used to describe the psychological pressure or information processing ability of people during work. The degree of matching between mental workload and task demand affects cognitive ability and work quality. Medical staffs are mainly engaged in mental work. Studies have shown that high level of mental load could affect the physical and mental health of doctors, the quality of medical services and the medical safety [12-13]. The workload of general physicians is an important standard for the reasonable organization of medical work, improvement of work efficiency and the formulation of medical staff remuneration [14].

The mental workload was measured by NASA-TLX after excluding individual performance and the degree of frustration. Some studies have found that NASA-TLX scale has good reliability and validity in assessing the mental workload of medical staff in the real clinical environment, including physician internist, surgical operator of simulated cavity scope, emergency room medical staff, and anesthesiologists and nurses [6]. However, NASA-TLX scale without individual performance and the degree of frustration is more suitable for evaluating the mental workload of physicians in community health service centers [7]. There was a positive correlation between weekly working hours and mental workload in this study: the longer the weekly working hours, the greater the total mental workload. The mental workload of primary care physicians involved in epidemic prevention and control was heavy. A survey during the non-epidemic period showed that the work pressure of primary carev physicians was mainly related to their professional title and education level. The higher the professional title, the lower the education level, the greater the work pressure [15]. Their work stress mainly came from the knowledge structure that could not meet the work demand, poor working environment, more temporary work, and the existing unreasonable assessment mechanism [15]. During the epidemic, the stressors of primary medical staffs have changed. Since the outbreak of the epidemic, their pressure mainly came from mental workload caused by changes in work content and focus, which was related to gender and working years, and was also affected by social support and incentives, emergency response ability and attitude [16]. This study showed that the working hours of primary care physicians were prolonged during the COVID-19 epidemic, and their priority of work was more focused on the epidemic prevention and control, which took them more time and brought more mental workload. The reasons for this shift in priority of work were twofold. On the one hand, the characteristics of concealed transmission and strong transmission power of Omicron variant in this round of epidemic increased the multi-point spread of the epidemic in densely populated places such as factories, hospitals, schools, restaurants and entertainment places. As a result, it was difficult to quickly identify and track the early infection cases, which may easily lead to insufficient strength in epidemic traceability, isolation management, medical treatment, and community prevention and control. On the other hand, faced with the increase of medical demand and the transfer of responsibilities in the short term, primary medical and health institutions devoted a large number of manpower to health emergency work after the epidemic, which was not conducive to the normal development of other work [17]. The reserve of emergency personnel in some health centers was less than 10%, and temporary support was common during the peak of the epidemic [18]. Overtime work and changes in work content and responsibilities with high demands and heavy responsibilities have led to an increase in workload.

According to the current situation of primary health care institutions in Chongqing, it is recommended to optimize working hours and reduce work intensity, so as to better realize the effective response to infectious diseases and public health emergencies [21]. According to the actual situation, a scientific and reasonable work plan was formulated. It is suggested that public health work such as prevention and control work and routine outpatient service should be distributed to different doctors to ensure that each doctor can undertake his own work and avoid being overworked. On the premise of ensuring the quality of work, working hours can be appropriately

shortened, tasks and work content can be reasonably assigned, or flexible working system can be adopted to reduce the work intensity of general practitioners according to their individual work ability and work demand [22-23]. In addition, the construction and rational allocation of primary care physicians should be strengthened. The following steps can be taken: (1) Strengthen personnel training in primary health institutions. Medical education institutions at differents levels should strengthen the training of primary care medicals to improve the professional skills and the abilities of primary health medicals to respond to public health events [25, 26]. (2) Increase the number of primary health professionals and allocate them rationally. Primary health care institutions should increase human resources investment, especially doctors, nurses, public health professionals and other primary health care personnel. At the same time, health professionals from secondary and tertiary medical institutions are encouraged to learn and train at the grassroots level. Through the integration of medical treatment and prevention and increased communication and training, the talent team can be supplemented [19-20]. (3) Improve the incentive mechanism for primary health professionals. Differentiated incentive policies, such as salary increase, insurance and housing, should be implemented to improve the treatment of primary health technicians. The establishment and improvement of the performance appraisal system can improve the work enthusiasm and initiative of primary health technical personnel [24].

In conclusion, primary care physicians have made positive contributions to the prevention and control of COVID-19 in China. However, they undertook too many tasks and too much heavy mental workload. It is necessary to optimize working hours, reduce work intensity, and strengthen the construction and rational allocation of primary health personnel to achieve effective response to infectious diseases and public health emergencies.

References

[1] WHO. Weekly epidemiological update-24 November 2020[EB/OL].(2020-11-24) [2020-12-01].https: / /www. Who. int /publications/m/item/weekly-epidemiological-update-24-november-2020.

[2] Zhu HY, Xiao X, Jing Q, Zhong S, Liu Y, et al.Experience and effectiveness of"three-person working group"in community prevention and control of COVID-19 in Guangzhou[J].Modern Hospital 2020,20(7) : 948-950.(in chinese).

[3] Huang L, Miao Y. Working status of primary health care workers during the epidemic period: a cross-sectional survey [J]. Chinese Journal of Public Health 2022,38(05):582-584.(in chinese)

[4] Yang D. Research on the construction of Community Health Service System in the Post-epidemic Era [J]. The Northern Literary Studies,2022(04): 95-102.DOI:10.13761/j.cnki.cn23-1073/c.2022.04.011.(in chinese)

[5] Wang J, Lu N, Cui M, Zhu L, Zhang M. Prevention and Control of COVID-19 Epidemic Bring Thinking to General Practice [J]. Chinese General Practice 2020,23(09):1090-1094.(in chinese)

[6] Liang L, Zhao L, Deng J, Ye X. Chinesization, reliability and validity test of National Aeronautics and Space Administration Task Load Index [J]. Chinese Nursing Research 2019(5): 4.DOI:10.12102/j. issn. 1009-6493. 2019. 05. 002.(in chinese)

[7] Li M, Pan Z, Gu J, Gao J. Reliability and validity of Chinese version NASA-TLX and SWAT in evaluating mental workload of community physicians [J]. Chinese Journal of General Practitioners 2015(9):686-690. (in chinese)

[8] The former National Health and Family Planning Commission. China Health and family Planning Statistical Yearbook (2017)[M].China Union Medical University Press 2017. (in chinese)

[9] Cao D, Li S, Wang X, Hu D, Zhu Y, Chen J, Zhang Y. Study on reporting and handling capacity of primary doctors on infectious dieases and public health emergencies [J]. Chinese Journal of Disease Control & Prevention 2023, 27(3): 300-303. doi: 10.16462/j.cnki.zhjbkz.2023.03.009. (in chinese)

[10] Zhou R, Yao N, Chen F. Roles of Primary Care in Response to the COVID-19 Pandemic Defined in Policy Documents [J]. Chinese General Practice 2022, 25(10): 1155-1161. DOI: 10.12114/j.issn.1007-9572.2022.0107. (in chinese)

[11] Zhang D, Yao M, Yang X, Lin K, Xia Q, et al. The existing problems and suggestions of primary health care settings in normalization of epidemic prevention and control infection in novel coronavirus [J]. Chinese General Practice 2020, 23(35): 4407-4411. DOI: 10.12114/j.issn.1007-9572.2020.00.634. (in chinese)

[12] D. A. Bertram, C. O. Hershey,D.A.Opilaet a1.A meagre of physician mental we rk load in internal medicine ambulatory Care clinics[J].Med Care 1990,28(5):458-467

[13] Ronnie D.Homer,Jer'zy P.Szaflarski,C.Jeffi'ey Jacobsonct a1.Clinical Work Intensity Among Physician Specialties: HowMight WeAssess It? What Do Wc FJnd?[J].Medical Cam,201l,49(1): 108-113
[14] Gu C, Jin Z, Qiu, Zhang J, Jin L, et al. Investigation and analysis of workload of general practitioners in community health service centers in different regions of Fengxian District of Shanghai [J]. Shanghai Medical & Pharmaceutical Journal 2021,42(12):11-14+39. (in chinese)
[15] Li S, Zhang H, Zhu L. Status Quo of Occupational Pressure and Job Satisfaction of General Practitioners and Its Influencing Factor [J]. Chinese General Practice 2015,18(04):387-390. (in chinese)
[16] Zhang X, Sun F, Guo S. Research on the Work Pressure and Related Factors of Grassroots Medical Workers in Wuhan City under COVID- 19 [J]. Journal of Jinzhou Medical University (Social Science Edition) 2021,19(03): 52-56.DOI:10.13847/j.cnki.lnmu(sse).2021.03.013.(in chinese)
[17] Huang J, Huang H, Liang H, Fang F, Cui Y, et al. Improving the Development of Public Health Emergency Preparedness and Response System via Reinforcing Primary Care in Pandemic and Non-pandemic Periods [J]. Chinese General Practice 2021, 24(25): 3184-3189. (in chinese)
[18] Sun J, Shao C, Mao H. Human Resources Analysis of Emergency Prevention and Control in Primary Health Care Institutions in Tong zhou District Before and after the Outbreak of COVID-19 [J]. Chinese Primary Health Care 2022, 36(11):23-25.
[19] Ding L, Zhang D, Ding G, Dong Y. Exploration and Practice of Primary Health Care System in Qingdao West Coast New District [J]. Chinese Primary Health Care 2022,36(1):2-4. (in chinese)
[20] Xie K, Hu D, Peng L, et al. Capabilities for diagnosing and treating common diseases in primary care physicians in Henan: current overall status and solutions to problems[J]. Chinese General Practice, 2022, 25 (19): 2399-2403, 2413.(in chinese)
[21] Zhang Y, Yu F, Chen Y, Yu M, Liu L, et al. Prevalence and Influencing Factors for Job Burnout among General Practitioners in China [J]. Chinese General Practice 2019,22(07):764-769. (in chinese)
[22] Fan E, Yan Y. Status of job burnout and turnover intention among general practitioners in suburb communities of Pudong District of Shanghai 2017,33(11):1473-1477. (in chinese)
[23] Chang X, Study on the Relationship among Job Satisfaction Career Burnout and Intent to Stay in General Practitioners [D]. Shandong University 2015. (in chinese)
[24] Xu L, Wang L, Xu M, Li F, Wang J. Study on reconstruction strategy of primary public health service system in the post-epidemic period in Longgang district of Shenzhen city [J]. Chinese Community Doctors 2021, 37(25):189-190. (in chinese)
[25] Houghton C, Meskell P, Delaney H, et al.Barriers and facilitators to healthcare workers' adherencewith infection prevention and control (IPC) guidelines forrespiratory infectious diseases: a rapid qualitative evidence synthesis [J]. Cochrane Database Syst Rev 2020,4(4): CD01358
[26] Wang R, Wu X, Liu W, Zhang Y. Investigation on emergency knowledge and capability of professionals in primary medical institutions[J].Occupational Health and Emergency Rescue 2018, 36(2) : 140-141.(in chinese)