

# A Practical Study of a Nursing Manpower Deployment Program Under Temporary Tasks

Chunfeng Xing<sup>1</sup>, Guilin Liu<sup>2,\*</sup>, Rong Hu<sup>1</sup>, Qiongying Su<sup>1</sup>

<sup>1</sup>Department of Nursing, University of Chinese Academy of Sciences Shenzhen Hospital, Shenzhen, China

<sup>2</sup>Department of Spinal Surgery, University of Chinese Academy of Sciences Shenzhen Hospital, Shenzhen, China

**Email address:**

\*Corresponding author

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**Abstract:** *Objective* We aim to investigate the practical methods and effects of hospital nursing manpower allocation under large temporary tasks and emergency situations of public emergencies. *Methods* A TFF nursing manpower deployment plan based on the principle of a three-level nursing management system, fixed and dedicated shift scheduling, and the assistance of flexible nurses was constructed. Under the condition of ensuring the normal work of in-hospital treatment, 936 nursing staff was flexibly deployed from the whole hospital to support large temporary tasks outside the hospital and emergency tasks of public emergencies. *Results* During the period of facing large temporary tasks, our hospital managed human resources from April to August 2022 on the basis of ensuring the quality and safety of in-hospital nursing work, and efficiently completed all emergency medical treatment tasks issued by the superior. The nursing staff was 95% satisfied with the manpower deployment program, and the SRQ questionnaire after reasonable manpower deployment showed that the nursing staff had good mental health status. *Conclusion* The TFF nursing manpower deployment program, with good operational effect, can smoothly cope with large temporary tasks like COVID-19, optimize nursing manpower organization and management, and complete large temporary rescue tasks in an efficient and orderly manner.

**Keywords:** Temporal Rescue Tasks, Nursing Manpower Deployment, Public Emergencies

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## 1. Introduction

In recent years, people's lives have been affected by various natural and social factors, and the chances of large temporary tasks and public emergencies are rising. When faced with unexpected public events, only adequate preparation and effective use of the healthcare workforce can lead to a rapid victory [1]. Nurses are the primary human resource for health care and play a key role in the response and management of natural disasters and infectious disease epidemics. Various emergencies can affect people's physical and mental health, and the work pressure of nursing staff increases dramatically in the face of these unexpected temporary tasks. On the one hand, it is necessary to improve the staff's ability to deal with emergencies, and on the other hand, in the absence of human resources, the routine diagnosis and care work of hospitals cannot be stopped, and

nursing clinical staff face greater responsibility and pressure [2]. Therefore, when facing large temporary tasks, it is crucial to construct a reasonable manpower deployment plan, scientifically and rationally dispatch nursing manpower, and effectively plan and utilize nursing manpower [3]. From April to August 2022, the nursing department formed a set of "three levels, fixed position, and flexible position" TFF nursing manpower deployment plan (referred to as "TFF plan") based on the guiding principles of integrated management, dynamic adjustment, meeting demand, ensuring safety, and taking efficiency into account through practical exploration, combining the current situation of actual nursing work, and according to the needs of large temporary tasks. On average, 72 nursing staff was dispatched to public vaccination sites daily, and 4,077 vaccinations were completed daily; about 806 nursing staff was dispatched daily during public mass specimen collection, and 580 specimens were completed daily per person; about 55 nursing

staff was dispatched for household collection of key populations, and 62 specimens were completed daily per person. During the COVID-19 pandemic, the TFF program was implemented with great effect, providing a reference for future emergency manpower deployment in hospitals during emergencies.

## 2. Data and Methods

### 2.1. General Information

A tertiary general hospital in Shenzhen, with a total of 1109 nursing staff, the nursing department and other departments such as the prevention and protection department jointly conducted a rigorous online and offline temporary duty training, and a total of 1050 nursing staff qualified through training and assessment, 936 were included in the large temporary duty manpower deployment pool through screening, and a total of 114 were excluded. Exclusion criteria: (1) Pregnant and breastfeeding (2) Nursing staff who are not suitable to join temporary emergency assignments due to physical and psychological constraints. Nurses included in the deployment reserve pool were involved in various large temporary medical treatment missions, vaccinations and specimen collection both inside and outside the hospital.

### 2.2. Specific Methods

#### 2.2.1. Establishment of Nursing Manpower Deployment Management Team

According to the overall deployment and arrangement of the hospital, the director of the nursing department acts as the leader of the group, and forms an effective response, coordination and management network according to the three-level management system of the director of the nursing department - department head nurse - head nurse [4]. The feasibility of implementing the manpower deployment plan was jointly analyzed and discussed. At the same time, five special nursing management groups were formed: human resource training and deployment group, training management group, nursing quality and safety group, magnetic management and care group, and material security and scheduling group. Each special management group has its own duties and clear division of labor to build a grid-based management model.

#### 2.2.2. Assessment of Temporary Assignments and Nursing Manpower Needs

The assessment of nursing manpower needs is an important prerequisite for scientific and rational dispatch of nursing manpower [5]. Before carrying out large temporary tasks, it is necessary to assess: (1) out-of-hospital work tasks: the number of vaccination and specimen collection subjects, the development trend of public events, and the number of outgoing nursing staff; (2) the workload situation in the hospital during temporary tasks: the number of existing nursing staff in each department in the hospital, the total

number of existing patients, and the nursing workload; (3) the priority level of manpower demand in each department: the priority level of nursing manpower deployment in each department was determined based on the results of temporary work tasks and nursing manpower assessment. According to the principle of "meeting demand", priority is given to meeting the nursing manpower demand for temporary tasks outside the hospital.

#### 2.2.3. Establishment of Nursing Manpower Reserve and Pre-Service Training

According to the type of large temporary tasks and the level of nursing manpower demand in each department of the hospital, a nursing manpower reserve pool is established. Large-scale temporary tasks are characterized by temporary, urgent, large scale and overall nature, and the professional requirements for specialties are not high. Nursing personnel with nursing practice certificates and training in theories and practical abilities related to temporary tasks and emergency treatment can meet the execution of the task. Before going on temporary duty, the whole hospital adopts a combination of online and offline training, with theoretical training in the form of online and practical training in the form of situational simulation and group training. The content includes: knowledge and techniques related to public emergencies, specimen collection and vaccination norms and guidelines, etc. The nursing department coordinates the training tasks, and the ward nurse manager is responsible for training job duties and operational procedures, timely conveying various principle learning and superior documents online, and organizing training. Daily, the nursing department assigns a special management team to follow up the training content and supervise the training effect according to the standardized and unified scoring criteria to ensure that all personnel of the nursing manpower reserve pool have gone through the standardized training and assessment and everyone has passed the test. All personnel of the manpower deployment pool pass the QR code questionnaire assessment (theoretical knowledge related to public events and stress reaction questionnaire, SRQ) and operational assessment, and can only be dispatched to perform tasks after meeting the standards.

#### 2.2.4. Implementation of the TFF Deployment Scheme

The characteristics of the TFF deployment scheme for nursing human resources at three level, fixed position, and flexible position are shown in Table 1.

##### (i). Three-level Principles of the TFF Scheme

The Director of Nursing is the overall person responsible for the coordination of temporary assignments and the deployment of nursing manpower throughout the hospital. The district head nurses are assigned as the district leaders of each temporary project and assist the hospital in being responsible for the overall nursing manpower deployment within the district; the ward head nurses are assigned as the community team leaders of the temporary project and are responsible for the manpower deployment in each community. According to the actual bed-to-nursing ratio of each ward, the nursing department

continuously monitors the workload, mental health status and other indicators of the human resource reserve personnel, and makes dynamic assessments and adjustments. Different manpower deployment methods are adopted for the three temporary tasks.

### **(ii). Fixed Position Principle of TFF Scheme**

It is implemented mainly in manpower draws for large temporary vaccination tasks. The tasks at vaccination sites are characterized by concentration and predictability. The workload can be predicted based on the number of vaccines, and the number of posts can be set in advance. Therefore, the principle of assigning fixed positions by department is adopted for deployment. To ensure the clinical workload of each ward, according to the actual bed-to-nurse ratio of the ward, the nursing department set a fixed number of positions to draw, and set a special support shift for each department in the scheduling system. There is a total of 60 nursing units and departments in the hospital. Each ward head nurse set the shift to support vaccination as a fixed shift in the departmental scheduling system, and set the "support shift", one for day shift support and one for night shift support. Each ward head nurse is docked with the community and the street, and as the team leader of the temporary vaccination site, there will be sufficient communication about the vaccine supply the day before the vaccination, and if there is no vaccination task the next day, the department head nurse recalls the nurse of the position and goes back to work in the department. Through this format, not only is the uninterrupted supply of nursing manpower for several large temporary vaccination sites ensured, but it also facilitates the flexible deployment of nursing manpower within the hospital without affecting the safety and quality of nursing work within the hospital.

### **(iii). Flexible Position Principle of the TFF Program**

It is mainly implemented in the manpower drawing of large-scale temporary specimen collection points. Because of the low requirements for the setting of sampling points supporting, the low of the technical operational requirements and environmental requirements, the temporary points are set up more quickly, the time period and number of people sampled by the masses are more flexible, the requirements for the allocation of human resources are broader and more flexible, and the manpower demand is unpredictable, so the principle of flexible position is appropriate. Take the form of volunteer service recruitment can effectively realize the dynamic deployment of manpower. A 500-person sampling volunteer service team was formed by recruiting nursing staff

who volunteered to support the team after work, and the team was managed by two head nurses who were responsible for recruitment, scheduling and communication of temporary sampling to achieve dynamic deployment of manpower.

### **(iv). Combination of Fixed Position and Flexible Position, Magnetic Management Principle**

The manpower of special, household and key population sampling sites is deployed in the form of a combination of fixed position and dynamic recruitment of volunteer services. Since the sampling locations of special and key populations are relatively fixed in each community, while the locations of household sampling are variable, leading to great uncertainty in workload and working hours, so this combination of fixed position and flexible position is an excellent supplement.

The psychological attention and magnetic management of the members of the manpower pool is very important during the implementation of large temporary tasks during the new COVID-19 pandemic. A mobilization meeting was organized in the early stage to mobilize the entire nursing staff through positive guidance; a nursing care group was set up jointly with the hospital labor union and women's committee to care for and take the initiative to solve the problems of clothing, food, housing and transportation during the support period to relieve worries. Pay attention to the workload and physical and mental conditions of front-line nurses, and dynamically adjust the number and structure of nursing manpower [6]. Implement the principle of drawing from the nearest area, and adjust the working area according to the relationship between each nursing staff's home address and the location of temporary sampling or vaccination. Real-time attention to the development trend of public events, real-time monitoring and counseling, good health management, and intermittent shift system for samplers working in isolation suits, at least 4-hour shift, to prevent work fatigue causing physical discomfort and other situations. To provide a psychological counseling platform, the SRQ stress reaction questionnaire was used to investigate and analyze the psychological status of the nursing staff involved in the sampling, and to assess the symptoms and degree of psychological stress reactions of nursing staff, reflecting the magnitude of stress from three aspects: psychological reactions, physical reactions and behavioral reactions, respectively. The scale is scored on a 5-point scale from yes to no, with a score of 140 out of 140, with lower scores indicating greater stress. Regular online psychological counseling classes are conducted to make dynamic job adjustments according to the personnel's psychological state and to provide timely help and psychological support.

**Table 1.** The characteristics of the TFF scheme.

Management level	Transferring personnel	Task Category	Task Characteristics	Realization path
First-level management (Director of nursing)	Fixed position Fixed number	Large-scale vaccination	Centralized/Predictable	Faculty-level deployment (Fixed position)
Second-level management (department head nurse)	Flexible drawing fixed position + flexible position	Large-scale sampling Entering household / key population	Large volume / Unpredictable Scattered volume/Uncertain	District deployment (Voluntary) Department deployment (Fixed position + voluntary)
Tertiary management (Ward head nurse)				

### 3. Results

From April to August 2021, the temporary centralized vaccination site allocated 72 nursing staff on average per day, with a daily average of about 4077 vaccinations; about 806 nursing staff were dispatched on average per day during the mass sampling period (3 shifts of 8 hours work), with a daily

average of 580 samples per nursing staff; 55 nursing staff were dispatched on average per day for community-based special shift sampling and sampling of key populations, with a daily average of 62 samples per person. The human resources were managed on the basis of ensuring the quality and safety of nursing work in the hospital in good order (Table 2).

**Table 2.** Task completion status.

Task category	Average daily number of supporters	Average daily workload
Large-scale vaccination	72 people	4077 stitch counts
Large-scale sampling	806 people	580 stitch counts
Entering household/key population	55 people	62 stitch counts

The nursing manpower pool personnel covered all levels and age groups and were 95% satisfied with the TFF manpower deployment. The general profile of the nursing manpower pool personnel and their satisfaction with the deployment program were surveyed in Table 3. 936 nursing

manpower reserve pool personnel had psychological response scores of  $45.81 \pm 10.59$ , physical response scores of  $26.46 \pm 7.45$ , and behavioral response scores of  $20.68 \pm 5.37$ , with a total stress reaction score of  $100.92 \pm 23.02$ , as shown in Table 4.

**Table 3.** General profile and satisfaction degree of nursing manpower reserve pool personnel ( $n=936$ ).

Survey items	Category	Number	Percentage (%)
Gender	Male	72	7.7
	Female	864	92.3
Age	$\leq 25$ years old	145	15.5
	26~30 years old	391	41.8
	31~40 years old	385	41.1
	$\geq 41$ years old	15	1.6
Degree	College	86	9.2
	Bachelor	848	90.6
	Master and above	2	0.2
Title	Beginner	583	62.3
	Intermediate	320	34.2
	Advanced	33	3.5
Satisfaction degree	Satisfied	889	95
	Basically satisfied	42	4.5
	Dissatisfied	5	0.5

**Table 4.** Stress reaction SRQ score of nursing manpower reserve pool personnel ( $n=936$ ).

Items	Mean	Standard deviation	Maximum value	Minimum value
Psychological response	45.81	10.59	60.00	12.00
Physical response	26.46	7.45	40.00	8.00
Behavioral response	20.68	5.37	30.00	6.00
Total stress score	100.92	23.02	140.00	28.00

### 4. Discussion

#### 4.1. Full Assessment and Quantification of Nursing Manpower Allocation Can Ensure Nursing Service Manpower Response Needs

The good management of nursing organizations in emergency situations after public emergencies, the scientific and rational use of nursing human resources, and the dispatch of nursing manpower to meet the demand for emergency treatment are key issues facing nursing managers in healthcare institutions today [7]. In this process, timely and accurate strategic parameters provided by the human resource information management system are indispensable

[8]. This is the organizational management prerequisite for scientific and rational dispatch of nursing manpower.

In the practice and exploration of the TFF nursing manpower deployment program, it was found that the temporary response strategy at the early stage of performing large temporary tasks, as effective as it is, can only make full use of the existing resources, regardless of the cost, for temporary deployment. If we can start to coordinate and optimize resources from the planning and preparation level, we can coordinate resources more efficiently and respond quickly when responding [9]. Therefore, in the three-level management system, planning and assessment are the keys to manpower deployment: (1) assess the development trend of public events and pay attention to the latest task risk level dynamic alerts on a daily basis; (2) assess the actual number

of patients and beds in each department to ensure the smooth operation of the department where the staff is drawn to ensure maximum patient safety; (3) quickly match nursing staff according to their abilities, qualifications, and titles to give full play to the potential of each level of nurses' potential, so that they can each do their best and show their talents [10]; (4) communicate and evaluate the number of people who may be sampled or vaccinated at each time period with community staff, predict the number of nursing staff needed, and dynamically monitor and adjust to achieve accurate emergency scheduling of nursing manpower.

#### ***4.2. Standardizing the Process and Pre-Service Training can Effectively Ensure the Quality of Nursing Services***

Regardless of whether the position is fixed or flexible, there are standardized corresponding job responsibilities and processes, and managers must optimize and simplify the management processes of people, materials, law, and environment, implement special training for the processes online and offline, pair new and old nurses in the team of any assignment, and perform pre-task scenario simulations so that supporting nurses can be familiar with the site and workflow in the shortest time, shorten the waiting time of the masses, and obtain optimal nurse resource allocation [11]. The training plan levels of our nursing manpower reserve personnel are implemented, regularly supervised, and problems in the process of theoretical and operational assessments and drills of nursing manpower reserve and emergency team members are analyzed and summarized in a timely manner, and effective improvements are made to maintain the clinical practice and emergency response capabilities of team members. Adopt a combination of collective online and offline training of comprehensive preventive care and nursing operation techniques before induction in diverse forms, including scenario simulation and competitive competitions. The training is completed and the assessment is qualified before they can be put on duty. Through these measures, members of the nursing manpower reserve pool were promoted to master operational procedures and improve their ability to deal with emergencies in the face of emergencies within a short period of time, thus ensuring the quality of care [5].

#### ***4.3. Flexible Scheduling Combined with Magnetic Management to Improve Work Efficiency***

Our hospital adopts the combination of fixed and flexible manpower deployment, with the old and new with gradual rotation, comprehensive assessment of the physical and psychological adaptability of nursing staff, ensuring the physical and mental health of nursing staff while making reasonable use of their rest time, and giving appropriate economic subsidies to give full play to the motivation and potential of each person, which not only ensures reasonable rotation of front-line staff, but also circumvents the replacement rest caused by possible risks. The nursing department of our hospital adjusts the rotation time of front-

line nurses by assessing the task characteristics of each position and work area to ensure nursing safety and avoid errors due to overwork. At the same time, the work area is adjusted according to the relationship between each nursing staff's home address and the location of temporary sampling or vaccination, and dynamic and flexible scheduling can ensure the orderly performance of temporary tasks. Through positive guidance, we mobilize the enthusiasm of nursing staff throughout the hospital, provide comprehensive logistical support services for voluntary nurses in a timely manner, collect feedback from nursing staff, and actively address difficulties in work and life. The results of the psychological stress survey showed that the total stress reaction score of nursing staff in our hospital was  $100.92 \pm 23.02$ , and the percentage value of the score was about 72% when compared with the full score of 140 in the SQR questionnaire, and the satisfaction score was 95, which indicated that nurses had good psychological adaptability and were satisfied with the manpower deployment program. Magnetic management, positive guidance and timely deployment of support nurses can reduce the adverse psychological reactions of nursing staff in large temporary tasks, increase the motivation to work, mobilize the activity of the immune system and enhance the resistance to disease, thus enabling them to face their work with a good mind and spirit [12, 13] and better accomplish their tasks.

## **5. Conclusion**

By adopting the TFF scheme for manpower deployment in the face of public emergencies and temporary large-scale tasks, managers at all levels can communicate well and effectively in a timely manner; because nursing managers have a full understanding of the actual bed and workload situation of each department, they can evaluate the workload and capacity of the support points and departments in advance and anticipate the needs of each position. The "TFF nursing manpower deployment program" can realize three-level linkage, which can maintain the safety and quality of nursing work in the hospital, but also achieve rapid improvement in the efficiency of nursing human resources, establish a system of nursing human resources deployment, and complete various large temporary tasks efficiently and with high quality, which is worth adopting and promoting by hospital nursing managers when dealing with large temporary tasks. However, in future management practice, the TFF nursing manpower deployment scheme still needs to be continuously improved, and local medical institutions need to adopt appropriate emergency measures for human resources deployment according to the types of local government public events and the characteristics of nursing manpower structure.

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