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Emergency response capacity among nurses in tertiary hospitals: a latent profile analysis

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CONFLICT OF INTEREST

The authors have disclosed no potential conflicts of interest, financial or otherwise.

DATA AVAILABILITY STATEMENT

Research data cannot be shared at this time due to privacy or ethical restrictions.

Ethical statement

Approval was obtained from Medical Ethics Committee, Sichuan Nursing Vocational College (Number: No. 2024011). At the same time, the content and purpose of the study were explained to all participants and participants were voluntary, and they could withdraw from the study at any time.

Emergency response capacity among nurses in tertiary hospitals: A latent profile analysis

Abstract

Objectives: This study aimed to assess nurses' emergency response capacity and identify its influencing factors.

Methods: An online questionnaire survey of 788 nurses from nine tertiary hospitals was conducted between November 12, 2023, and March 31, 2024. Participants were asked to report their demographics and emergency response capacity. Latent profile analysis was employed to identify distinct emergency response capacity subgroups.

Results: Three unique profiles were identified: a high, a medium, and a low emergency response capacity group. ANOVA and chi-square tests indicated significant differences among the three groups concerning marital status, educational level, parenthood status, professional title, monthly income, and department. Multiple logistic regression analysis confirmed that department and monthly income were significant predictors of profile membership.

Conclusions: Most nurses showed medium to high emergency response capacity. Several demographic and occupational factors were associated with nurses' emergency response capacity.

Keywords: Nurses, emergency response capacity, latent profile analysis

Introduction

In recent years, the increasing frequency of public health emergencies worldwide has posed significant challenges to human health and healthcare systems [1]. In healthcare settings, emergencies may arise from a wide range of situations, including trauma, cardiac arrest, acute medical conditions, and large-scale public health crises. Effective emergency response capacity is therefore a critical component of healthcare systems, particularly in tertiary hospitals, which serve as advanced medical institutions responsible for managing severe and complex cases. As facilities that often treat critically ill patients, tertiary hospitals require healthcare professionals who are well prepared to perform effectively under high-pressure conditions. Among healthcare professionals, nurses play a central role in emergency response because of their continuous contact with patients and their responsibilities in stabilizing patient conditions, coordinating with multidisciplinary teams, and implementing life-saving interventions [2]. Therefore, assessing and improving nurses' emergency response capacity is essential for ensuring patient safety and enhancing overall hospital preparedness.

Emergency response capacity among nurses refers to the fundamental competencies required to effectively manage urgent clinical events and medical emergencies [3]. This capacity includes recognizing and reporting emergency situations, monitoring changes in patients' conditions, providing timely first aid, delivering

psychological support and health education, and collaborating effectively with other healthcare professionals [4]. Although these competencies are particularly emphasized during public health emergencies, nurses across different clinical departments may also encounter unexpected patient deterioration or acute medical events in routine clinical practice. Consequently, emergency response capacity is increasingly recognized as a core professional competency for nurses across diverse clinical settings. Previous studies have reported that emergency response capacity among Chinese nurses remains at a moderate level [4, 5]. Following the COVID-19 pandemic, countries worldwide have placed greater emphasis on strengthening emergency preparedness among healthcare professionals, and nurses' emergency response capacity has improved through intensified training and practical response experience [6].

Nurses' emergency response capacity plays a critical role in determining the effectiveness of clinical responses during public health emergencies. In such situations, nurses are often required to work in hazardous environments with limited resources while managing sudden surges in patient volume. Higher emergency response capacity enables nurses to quickly recognize changes in patients' conditions and implement appropriate interventions under high-pressure situations [7,8]. In addition, nurses frequently serve as the first point of contact for patients and their families, providing essential information and addressing concerns related to health outcomes and quality of life. Consequently, nurses' emergency response capacity is essential for facilitating effective risk communication and maintaining public confidence during public health emergencies [9]. Therefore, determining the emergency

response capacity profiles among nurses who have experienced public health emergencies is a critical step in developing and implementing disaster preparedness educational interventions.

Emergency response capacity among nurses is multidimensional and dynamic, and the traditional one-size-fits-all approach may not effectively improve these competencies. Previous studies have suggested that tailored interventions targeting specific subgroups can enhance nurses' emergency preparedness and response capabilities [10]. Therefore, latent profile analysis (LPA) was employed to explore potential classes of nurses' emergency response capacity. LPA is a person-centered statistical approach used to identify unobserved subgroups within a population based on patterns of observed variables [11]. In this context, LPA can classify nurses into distinct profiles reflecting different levels of competencies and preparedness for emergency situations [12]. Identifying these profiles may provide valuable insights for developing targeted training strategies and improving nursing performance during critical events.

This study aimed to examine emergency response capacity among nurses in tertiary hospitals using latent profile analysis. By identifying distinct capacity profiles, this study aimed to provide evidence for developing competency-based training programs and organizational strategies that strengthen nurses' ability to manage emergencies, ultimately improving patient care quality and hospital preparedness for future public health emergencies.

Methodology

Study design and participants

A cross-sectional survey was conducted among a convenience

sample of nurses from nine tertiary hospitals in Chengdu, Southwest China, between November 12, 2023, and March 31, 2024. Eligibility criteria included being a registered nurse with at least six months of clinical experience during the COVID-19 pandemic. Participants were recruited from 11 departments, including internal medicine wards, surgical wards, operating rooms, intensive care units (ICUs), emergency departments, and pediatrics. A total of 788 nurses completed the questionnaire, yielding a response rate of 86.4%.

Ethics approval and consent to participate

Ethical approval was obtained from the Medical Ethics Committee of Sichuan Nursing Vocational College (Approval No. 2024011). All procedures were conducted in accordance with the relevant guidelines and regulations. Informed consent was obtained from all participants prior to participation. The purpose and content of the study were explained to all participants, participation was voluntary, and participants were informed of their right to withdraw from the study at any time. Completion and return of the questionnaire were considered as provision of informed consent.

Data collection

Prior to data collection, permission to conduct the survey was obtained from the directors of the nursing departments of the participating hospitals, and the head nurses of each department served as coordinators for the web-based survey. A standardized statement explaining the purpose and significance of the study was provided to participants. Members of the research team informed participants that the survey was anonymous and voluntary. Nurses who agreed to participate could scan the QR code or click the WeChat link distributed by the head nurse to complete the

questionnaire during staff meetings. Completion and submission of the questionnaire were considered as provision of informed consent. Based on the requirement of at least 100 nurses per hospital, approximately 900 questionnaires were distributed.

Questionnaires

Demographic characteristics

Demographic information collected included gender, age, marital status, work experience, education level, department, parenthood status, professional title, employment status, monthly income, and position.

Nurse public health emergency response capacity scale

The Nurse Public Health Emergency Response Capacity Scale was used to evaluate emergency response capacity among nurses [13]. The scale consists of 18 items and 3 dimensions: emergency knowledge (5 items), first-aid capabilities (4 items) and comprehensive capabilities (9 items). Each item is rated on a five-point Likert scale ranging from 1 (very poorly done) to 5 (well done). Higher scores indicate greater emergency response capacity.

The total score was converted into a mean score to determine the level of emergency response capacity. A mean score <3 indicated low emergency response capacity, scores between 3 and 4 indicated moderate capacity, and scores >4 indicated high capacity. In this study, the Cronbach's α coefficient for this scale was 0.959.

Statistical analysis

We used Mplus Software (version 8.7) and IBM SPSS Statistics (version 26.0) to conduct data analysis. Descriptive statistics were

conducted to identify the demographic characteristics, including gender, age, education level, nursing experience, professional title, and so on. Continuous variables were described as means and standard deviations. Categorical variables were expressed as frequencies and percentages. One-way ANOVA, chi-square tests and multivariate logistic regression were conducted to determine the influencing factors of different emergency response capacity profiles among nurses. *P*-value <0.05 was considered statistically significant.

LPA was performed to examine the number of unobserved classes using Mplus Software, describing the characteristics of the classes, and evaluating the probabilities of class memberships for each individual. Considering that dimension scores integrate the core information of individual items, retaining the measurement characteristics of specific competencies while avoiding the dispersion and redundancy of single-item data, the three dimension scores (emergency knowledge, first-aid capabilities, and comprehensive capabilities) of the Nurse Public Health Emergency Response Capacity Scale were selected as the indicator variables for LPA. We then gradually increased the number of latent class models starting from the one-class model to explore the optimal classification structure of nurses' emergency response capacity. To determine the best latent class model, several model fit indices were considered, including lower Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), sample size adjusted Bayesian Information Criterion (aBIC), higher entropy values, and statistically significant p <0.05 for the Lo–Mendell–Rubin likelihood ratio test (LMR) and the bootstrap likelihood ratio test (BLRT).

Results

Demographic characteristics

A total of 788 nurses participated in the survey, including 668 females (85.8%) and 120 males (14.2%). The mean age of the participants was 30.08 ± 8.74 years, and the mean nursing work experience was 8.65 ± 9.10 years. Among the participants, 373 (47.3%) were married and 415 (52.7%) were unmarried. Most participants held a bachelor's degree (55.7%, n = 439), 81.9% were contract employees (n = 646), and 50.1% held senior professional titles (n = 395). Regarding monthly income, 238 nurses (30.2%) reported earning less than 4000 RMB per month. In terms of department, 165 nurses (20.9%) worked in internal medicine wards, 133 (16.8%) worked in surgical wards, and 490 (62.1%) worked in other departments, including pediatrics, obstetrics and gynecology, outpatient services, emergency departments, operating rooms, ICUs, oncology, and psychiatry.

Latent profile analysis of emergency response capacity among nurses

LPA was conducted using the three dimensions of the Nurse Public Health Emergency Response Capacity Scale as indicator variables, and models with one to three latent classes were tested. The fit indices for the models are presented in **Table 1**. As the number of classes increased, the values of the AIC, BIC, and aBIC gradually decreased. In addition, the LMR and BLRT were statistically significant across the models. The three-class model showed the highest entropy value (0.946), indicating good classification accuracy. Therefore, the three-class model was selected as the optimal solution, suggesting that nurses could be categorized into three distinct profiles of emergency response

capacity.

Based on the latent classification results, we plotted the scores of the three latent categories on each dimension of the emergency response capacity. **Figure 1 and Table 2** present the latent profile structure of emergency response capacity. The total mean score of emergency response capacity for Class 1 was (1.80±0.34), the mean score of emergency knowledge, first-aid capabilities and comprehensive capabilities was (1.72±0.41), (1.81±0.50) and (1.88 ±0.40), respectively, indicating a low level of emergency response capacity. Thus, this class was named the “low emergency response capacity group”, and there were 47 participants in this group (5.8%). The total mean score of emergency response capacity for Class 2 was (3.10±0.24), the mean score of emergency knowledge, first-aid capabilities and comprehensive capabilities was (2.99±0.31), (3.22 ±0.43) and (3.09±0.29), respectively, also indicating a medium level of emergency response capacity. Therefore, it was named the “medium emergency response capacity group”, with a total of 355 individuals, accounting for 45.1% of the sample size. The total mean score for Class 3 was (4.10±0.32), and the mean score of emergency knowledge, first-aid capabilities and comprehensive capabilities was (4.01 ± 0.42), (4.17 ± 0.44) and (4.11 ± 0.39), respectively. This indicated a high level of emergency response capacity and was therefore classified as the “high emergency response capacity group”. There were 386 nurses in this group, accounting for 49.1% of the participants.

Influencing factors for emergency response capacity

In the univariate analysis and chi-square tests, the three latent profiles were associated with several characteristics, including marital status, educational level, parenthood status, professional

title, monthly income, and department ($p < 0.05$). The results are shown in **Table 3.**

A multiple logistic regression analysis was conducted to investigate the socio-demographic predictors of profile membership (**Table 4)**. In the multivariate logistic regression analyses, we performed three sets of comparisons among emergency response capacity profiles: high vs low, high vs medium, and medium vs low. The low emergency response capacity group was chosen as the primary reference group when comparing with the high and medium groups to identify factors associated with improved emergency response capacity, as the low group represents the most vulnerable nurses who may benefit most from targeted interventions. Conversely, comparisons using the high emergency response capacity group as a reference (i.e., medium vs high) were conducted to explore factors distinguishing nurses with optimal or moderate emergency response capacity from those with optimal performance. This dual-reference approach enhances the clinical interpretability of the results by capturing predictors across the full spectrum of emergency response capacity levels. In addition, for categorical predictors such as department and monthly income, reference categories were chosen based on either the largest subgroup size or conceptual relevance, facilitating stable estimation and meaningful interpretation of odds ratios. Compared with the low emergency response capacity group, nurses working in internal medicine wards were more likely to belong to the medium emergency response capacity group (OR = 3.702, 95% CI: 1.069–12.813, $p = 0.039$). In addition, nurses working in the emergency department showed higher odds of being classified into the medium emergency response capacity group compared with the low-capacity group (OR = 10.280,

95% CI: 1.099–96.194, p = 0.041), although the confidence interval was relatively wide. However, the extremely wide confidence interval indicates substantial uncertainty in the magnitude of this association, and the result should be interpreted with caution. Compared with the low emergency response capacity group, nurses with a monthly income of 6001–8000 RMB were less likely to belong to the high emergency response capacity group (OR = 0.155, 95% CI: 0.033–0.726, p = 0.018).

Discussion

The objective of this study was to identify latent profiles of nurses' emergency response capacity and to explore the predictors associated with different emergency response capacity profiles. To our knowledge, this is the first study to explore latent profiles of emergency response capacity among nurses. Our results revealed three distinct profiles of emergency response capacity characterized by different combinations of capacity dimensions. The three-profile solution demonstrated the best model fit based on multiple model fit indices and consideration of the scale structure. The identified profiles included a high, medium, and low emergency response capacity group. Furthermore, we observed significant differences in predictive factors across the three profiles.

Nurses in the low emergency response capacity group (Profile 1) accounted for 5.8% of the total sample and had the lowest scores across all three subscales. One potential explanation is the extensive emergency training and mobilization implemented in China during and after the COVID-19 pandemic, including centralized command structures and repeated large-scale drills [14-16]. Such exposure may have improved baseline emergency competencies across the nursing workforce, thereby reducing the proportion of nurses with

low emergency response capacity. However, selection bias cannot be ruled out, as nurses with lower confidence or limited emergency experience may have been less likely to participate in the survey, which could have influenced this finding.

Nurses in the medium emergency response capacity profile (Profile 2) represented nearly half of the sample. This group demonstrated adequate but not high levels of emergency knowledge and skills. Rather than indicating insufficient competence, this profile may reflect nurses whose routine clinical environments provide limited exposure to high-acuity emergencies, resulting in fewer opportunities to apply theoretical knowledge in rapid decision-making and coordinated clinical responses. Previous studies have similarly reported that emergency response capacity among Chinese nurses has remained at a moderate level over time, suggesting structural rather than individual-level constraints [17]. Importantly, nurses in this profile may represent a highly trainable reserve workforce whose competencies could be rapidly enhanced through targeted experiential training.

Nurses classified in the high emergency response capacity profile (Profile 3) showed the highest scores across all dimensions. This pattern may be influenced by cumulative exposure to emergency situations, repeated participation in disaster response, and ongoing institutional investment in emergency training following COVID-19. In addition to technical proficiency, these nurses may also demonstrate greater situational awareness and psychological readiness in emergency contexts, which may help them function more effectively under pressure [18-19]. However, it should also be noted that this association may be partly influenced by organizational assignment patterns, whereby nurses with

stronger competencies are more likely to be assigned to high-risk units or emergency roles, rather than reflecting a direct causal effect of exposure alone.

From a disaster preparedness and workforce management perspective, the three identified emergency response capacity profiles provide a practical framework for competency-based deployment and training strategies. During public health emergencies, nursing managers often need to rapidly allocate personnel under conditions of uncertainty and workforce shortages [20]. Our findings suggest that profile membership may help align nurses' competencies with task demands while maintaining safety and team stability. Nurses in the high-capacity profile may be assigned to high-acuity roles such as emergency triage, critical response teams, intensive care support, or rapid response units, and may also serve as on-site coordinators or clinical leaders. Nurses in the medium-capacity profile represent a substantial proportion of the workforce and may be assigned to core clinical care roles while gradually expanding their responsibilities through practical experience. With appropriate support, this group may serve as a critical reserve workforce during large-scale public health crises. Nurses in the low-capacity profile may be allocated to supportive or lower-risk roles, such as logistics coordination, patient communication, or documentation, thereby reducing exposure risk while maintaining system functionality. In addition, the identified profiles highlight the importance of tailored training strategies. Nurses in the low-capacity profile may benefit from foundational emergency training, those in the medium profile from scenario-based simulations and interdisciplinary drills, and those in the high profile from advanced leadership and emergency preparedness

training.

Univariate analyses indicated that emergency response capacity profiles were significantly associated with marital status, parenthood status, educational level, department, monthly income, and professional title. These findings are consistent with previous research reporting that being married, higher educational level, greater clinical experience, and increased exposure to emergency training are associated with higher emergency response capacity [21, 22].

As revealed by the multiple logistic regression analyses, nurses working in internal medicine wards were more likely to belong to the medium emergency response capacity profile. A plausible explanation is that internal medicine settings typically involve relatively stable patient conditions and fewer time-critical emergencies, limiting opportunities for skill reinforcement under acute conditions [23]. Consequently, nurses in these wards may have fewer opportunities to accumulate emergency response experience, which may explain their higher likelihood of being classified into the medium-capacity profile. In contrast, nurses working in operating rooms and emergency departments were more likely to belong to the high emergency response capacity profile. Operating room and emergency nurses, as specialized nursing groups, are expected to demonstrate higher professional skills, first-aid competencies, and comprehensive clinical abilities due to the intensity and complexity of their work environments [24,25]. In particular, research has shown that emergency nurses played important roles during the COVID-19 pandemic, including temperature monitoring, epidemiological history collection, and screening for high-risk COVID-19 infections [26,27]. These responsibilities are aligned with

higher emergency response capacity, as they require rapid and safe patient triage and transfer, which may reinforce relevant competencies through repeated practice. Nurses with a monthly income of 6001–8000 RMB were less likely to belong to the high emergency response capacity profile. Previous research has suggested that objective socioeconomic status may be associated with emergency response capacity [28]. This relationship may reflect the interaction of income with other factors, such as job role, hospital level, and regional policies. Further longitudinal and interventional studies are needed to clarify these relationships.

It should be noted that several observed associations were accompanied by wide confidence intervals, such as the association between emergency department affiliation and medium emergency response capacity. This breadth indicates substantial uncertainty regarding the magnitude of these associations, which can be attributed to three key factors. First, small subgroup sizes, specifically the emergency department (n = 54), constrain statistical power, resulting in greater variability in estimated odds ratios and wider intervals. Second, within-group heterogeneity may play a role: nurses within the emergency department often exhibit considerable variability in emergency response capacity, driven by differences in individual clinical experience, training frequency, or workplace context, which expands the range of plausible effect sizes. Third, department affiliation is an indirect predictor of emergency response capacity, as it may correlate with unmeasured confounders (e.g., access to specialized training, frequency of clinical emergency exposure) [29]. This indirect relationship introduces additional variability that broadens the confidence interval. Given these limitations, although the associations are statistically significant, the

wide range of plausible effect sizes means that the strength of these relationships cannot be definitively quantified. Future studies with larger sample sizes, particularly targeting underrepresented departments, may reduce this uncertainty and yield more precise estimates.

Limitations

Several limitations should be acknowledged. First, the cross-sectional design precludes causal inference between emergency response capacity and associated factors. Second, the use of convenience sampling through an online survey may have introduced self-selection bias, potentially limiting the representativeness and generalizability of the findings. Third, the measurement tool was developed within the Chinese healthcare context and may not be directly applicable to healthcare systems in other countries without further cross-cultural validation. Finally, all participants were recruited from tertiary hospitals, which may have greater access to emergency resources and training. Therefore, caution is required when generalizing these findings to lower-resource or community-based healthcare settings, where emergency exposure, training opportunities, and institutional support may differ substantially.

Conclusions

Our findings identified three distinct profiles of emergency response capacity among nurses, influenced by several demographic and occupational factors, particularly department affiliation and monthly income. These findings provide evidence for assessing nurses' emergency preparedness across different healthcare settings and cultural contexts. The observed variations across

profiles highlight the importance of comprehensive capacity assessment and the need for targeted training strategies to strengthen nurses' preparedness for future public health emergencies.

References

1. Danesh, M. K., Garosi, E., & Golmohamadpour, H. The COVID-19 Pandemic and nursing challenges: A review of the early literature. *Work.* 2021, *69*(1), 23-36. https://doi.org/10.3233/wor-213458

2. Leung, C. L. K., Li, K.-K., Wei, V. W. I., Tang, A., Wong, S. Y. S., Lee, S. S., & Kwok, K. O. Profiling vaccine believers and skeptics in nurses: A latent profile analysis. *International Journal of Nursing Studies.2022,126*. https://doi.org/10.1016/j.ijnurstu.2021.104142

3. Wei, W., Liu, Y., Zhou, N., Tian, M., Xie, L., Watson, R., . . . Hu, W. Constructing an emergency preparedness evaluation index system for public use during major emerging infectious disease outbreaks: a Delphi study. *BMC Public Health. 2023, 23*(1). https://doi.org/10.1186/s12889-023-15980-6

4. He, H., Wang, J., Yuan, Z., Teng, M., & Wang, S. Nurses' mental workload and public health emergency response capacity in COVID-19 pandemic: A cross-sectional study. *Journal of Advanced Nursing*. 2023. https://doi.org/10.1111/jan.15929

5. Song, S., Li, X. Y., Bell, S. A., Yang, X. J., & Zhang, W. Y. Emergency Response: A Cross-Sectional Study of Core Competencies for Nurses Regarding Major Infectious Disease Outbreaks. *Journal of Emergency Nursing. 2021, 47*(6), 902-913. https://doi.org/10.1016/j.jen.2021.04.010

6. Zhang, R. X., You, C. Y., Wang, L., Jiang, Y., He, L. X., Wang, C., . . .

Han, H. A practice-based nursing emergency management system model for public health emergencies: A descriptive qualitative study. *Nursing Open.2023, 10*(6), 3774-3786. https://doi.org/10.1002/nop2.1635

7. Duran, S., Celik, I., Ertugrul, B., Ok, S., & Albayrak, S. Factors affecting nurses' professional commitment during the COVID-19 pandemic: A cross-sectional study. *Journal of Nursing Management.2021, 29*(7), 1906-1915. https://doi.org/10.1111/jonm.13327
8. Kealeboga, K. M., Khutjwe, J. V., & Seloilwe, E. S. Nurses and COVID-19 response in Botswana. *Journal of Nursing Scholarship.2022, 55*(1), 149-153. https://doi.org/10.1111/jnu.12834
9. Hasan, M. K., Younos, T. B., & Ibn Farid, Z. Nurses' knowledge, skills and preparedness for disaster management of a Megapolis: Implications for nursing disaster education. *Nurse Education Today. 2021, 107*. doi:10.1016/j.nedt.2021.105122
10. Jang, I., Kim, J. S., Lee, J. S., & Seo, Y. Educational needs and disaster response readiness: A cross-sectional study of clinical nurses. *Journal of Advanced Nursing. 2021, 77*(1), 189-197.https://doi.org/10.1111/jan.14570
11. Teng, M., Wang, J. L., Jin, M., Yuan, Z. Q., He, H., Wang, S. P., & Ren, Q. Q. Psychological capital among clinical nurses: A latent profile analysis. *International Nursing Review*.2023. https://doi.org/10.1111/inr.12918
12. Yin, Y. Z., Lyu, M. M., Zuo, M., Yao, S. Y., Li, H., Li, J., . . . Zhang, J. P. Subtypes of work engagement in frontline supporting nurses during COVID-19 pandemic: A latent profile analysis. *Journal of Advanced Nursing.2022, 78*(12), 4071-4081.

https://doi.org/10.1111/jan.15361

13. Wang, D.Y, Zhang, W. L, Xiang, S.M, et al. Investigation and analysis of public health emergency response ability of community nurses in Wenzhou [J]. Journal of Nursing. 2016,31(4):82-84. (in Chinese) https://doi.org/10.3870/j.issn.1001-4152.2016.04.082.
14. Dragioti, E., Tsartsalis, D., Mentis, M., Mantzoukas, S., & Gouva, M. Impact of the COVID-19 pandemic on the mental health of hospital staff: An umbrella review of 44 meta-analyses. *International Journal of Nursing Studies.2022, 131*. https://doi.org/10.1016/j.ijnurstu.2022.104272
15. McKenna, H. Covid-19: Ethical issues for nurses. *International Journal of Nursing Studies. 2020, 110*. doi:10.1016/j.ijnurstu.2020.103673
16. Hoogendoorn, M. E., Brinkman, S., Bosman, R. J., Haringman, J., de Keizer, N. F., & Spijkstra, J. J. The impact of COVID-19 on nursing workload and planning of nursing staff on the Intensive Care: A prospective descriptive multicenter study. *International Journal of Nursing Studies.2021, 121*. https://doi.org/10.1016/j.ijnurstu.2021.104005
17. Gu X, Yan P, Zhang X, Peng H, Cao Z, Ma L, Zhang L. Analysis of the emergency response capacity of nursing staff for public health emergencies and the influencing factors: A cross-sectional study in China. *PLoS One*, 2025 , 20(5):e0323992. https://doi.org/10.1371/journal.pone.0323992.
18. Zhang, D. D., Liao, H. W., Jia, Y. T., Yang, W. R., He, P. P., Wang, D. M., . . . Zhang, Y. P. Effect of virtual reality simulation training on the response capability of public health emergency reserve nurses in China: a quasiexperimental study. *Bmj Open.2021,*

11(9). https://doi.org/10.1136/bmjopen-2021-048611

19. Zhang, R. X., You, C. Y., Wang, L., Jiang, Y., He, L. X., Wang, C., . . . Han, H. A practice-based nursing emergency management system model for public health emergencies: A descriptive qualitative study. *Nursing Open.2023, 10*(6), 3774-3786. https://doi.org/10.1002/nop2.1635
20. Aslanoğlu A, Bilgiç N, Murad AA, Elshatarat RA, Abujaber DA, Al Qasim E, et al. The impact of educational and training programs on disaster awareness and preparedness among health sciences students: A quasi-experimental study. Int J Disaster Risk Reduct. 2024, 113:104888. https://doi.org/10.1016/j.ijdrr.2024.104888
21. Li, H., Gu, M., & Yang, X. Investigation and analysis on emergency response capability and influencing factors of nurses in general hospital. *Journal of Nursing Scholarship. 2021,36*(4), 58-61. https://doi.org/10.3870/j.issn.1001-4152.2021.04.058
22. Song, S., Li, X. Y., Bell, S. A., Yang, X. J., & Zhang, W. Y. Emergency Response: A Cross-Sectional Study of Core Competencies for Nurses Regarding Major Infectious Disease Outbreaks. *Journal of Emergency Nursing.2021, 47*(6), 902-913. https://doi.org/10.1016/j.jen.2021.04.010
23. Ganz, F., Sharfi, R., Kaufman, N., & S., E. Perceptions of slow codes by nurses working on internal medicine wards. *Nurs Ethic.2019, 26*(6), 1734-1743. https://doi.org/10.1177/0969733018783222
24. Eskola, S., Roos, M., McCormack, B., Slater, P., Hahtela, N., & Suominen, T. Workplace culture among operating room nurses. *Journal of Nursing Management.2016, 24*(6), 725-734. https://doi.org/10.1111/jonm.12376
25. Mamalelala, T., Dithole, K. S., & Maripe-Perera, D. B. Nurses and

emergency nursing care in Botswana. *African Journal of Emergency Medicine.2023, 13*(2), 68-71. https://doi.org/10.1016/j.afjem.2023.03.002

26. Khordeh, N. K., Dehvan, F., Dalvand, S., Repisti, S., & Gheshlagh, R. The COVID-19 fear, anxiety, and resilience among emergency nurses. *Frontiers in Psychology.2022, 13*. https://doi.org/10.3389/fpsyg.2022.999111
27. Mulyadi, M., Dedi, B., Hou, W. L., Huang, I. C., & Lee, B. O. Nurses' experiences of emergency department triage during the COVID-19 pandemic in Indonesia. *Journal of Nursing Scholarship. 2022, 54*(1), 15-23. https://doi.org/10.1111/jnu.12709
28. Qiu Q, Liu Y, Meng F, Wang X, Su C. Current status of nurses' public health emergency response capacity for emerging infectious disease: a cross-sectional study. *Front Public Health*. 2025,13:1612790. https://doi.org/10.3389/fpubh.2025.1612790.
29. Feng J, Zhang C, Fang S, Zhao R, Wang H, Li D. Influencing factors of nurses' disaster preparedness: a systematic review and meta-analysis. *BMC Public Health*. 2025, 25(1):2673. https://doi.org/10.1186/s12889-025-23981-w.

Table 1 Latent class model fit comparison

Model	AIC	BIC	aBIC	Entropy	LMR (*P* value)	BLRT (*P* value)	Group size for profile		
							1	2	3
Class 1	5376.823	5404.833	5385.779	-	-	-	788		
Class 2	4341.986	4388.668	4219.570	0.882	<0.001	<0.001	367	422	
Class	3612.22	3677.59	3633.13	0.94	<0.0	<0.0	47	35	38

3	0	2	5	6	01	01	5	6

Notes. AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; aBIC = adjusted BIC; LMR = Lo-Mendell-Rubin Likelihood Ratio Test; BLRT = Bootstrapped Likelihood Ratio Tests.

Table 2 Descriptive statistics for indicator variables that constituted the three profles

Variable	High emergency response capacity group (M± SD)	Medium emergency response capacity group (M± SD)	Low emergency response capacity group (M± SD)	F
Emergency knowledge	4.01±0.42	2.99±0.31	1.72±0.41	1160.932***
First-aid capabilities	4.17±0.44	3.22±0.43	1.81±0.50	814.665***
Comprehensive capabilities	4.11±0.39	3.09±0.29	1.88±0.40	1297.901***

Table3 Descriptive statistics in the full sample and each latent profile

Variables	Total sample	High emergency response capacity group	Medium emergency response capacity group	Low emergency response capacity group	F/χ^2	*P*
Age M (SD)	30.08 (8.74)	30.40 (8.43)	29.55 (9.04)	31.50 (8.82)	1.511	0.221
Work experience	8.65 (9.10)	8.86 (8.78)	8.15 (9.38)	10.82 (9.44)	1.934	0.145
Gender					0.735	0.693
Male	120	57	54	9		
Female	668	329	302	37		
Marriage status					14.559	0.001
Single/divorced/widowed	415	188	211	16		
Married	373	198	145	30		
Educational level					9.743	0.045
Junior college	288	122	143	23		
Bachelor's degree	439	231	188	20		
Master's degree	61	33	25	3		
Parenthood status					12.048	0.002
No	438	201	219	18		
Yes	350	185	137	28		
Professional title					6.960	0.031
Junior nurses	393	174	194	25		
Senior nurses	395	212	162	21		
Employment form					0.368	0.832
Authorized employees	142	72	61	9		
Contract employees	646	314	295	37		
Monthly income					27.3	0.00

(RMB)					67	1
≤4000	238	90	130	18		
4001–6000	180	91	78	11		
6001–8000	187	102	82	3		
8001–10000	135	74	52	9		
>10000	48	29	14	5		
Department					40.013	0.005
Internal medicine wards	165	66	93	6		
Surgical Ward	133	79	49	5		
Gynecology and obstetrics	57	23	31	3		
Pediatric department	36	17	16	3		
Outpatient service	60	26	27	7		
Emergency department	54	23	30	1		
Operating room	65	35	25	5		
ICUs	95	57	33	5		
Oncology department	31	16	14	1		
Psychiatry department	29	18	7	4		
Other departments	63	26	31	6		
Position					7.235	0.124
Nurses	612	312	268	32		
Charge nurse	113	52	53	8		
Nursing manager	63	22	35	6		

Table 4 Multiple logistic regression results predicting profile membership

Variables	High emergency response capacity VS low emergency response capacity		Medium emergency response capacity VS low emergency response capacity		Medium emergency response capacity VS high emergency response capacity	
	OR (95%CI)	*P*	OR (95%CI)	*P*	OR (95%CI)	*P*
Marriage status						
Single/Divorced/widowed	0.447 (0.131-1.52)	0.199	2.915 (0.845-10.06)	0.090	1.304 (0.766-2.219)	0.327
Married	Ref		Ref		Ref	
parenthood status						
No	0.514 (0.148-1.779)	0.293	1.764 (0.503-6.187)	0.376	0.906 (0.520-1.578)	0.727
Yes	Ref		Ref		Ref	
Educational level						
Junior college	2.196 (0.584-8.254)	0.244	0.668 (0.174-2.55)	0.556	1.466 (0.809-2.656)	0.207
Bachelor's degree	1.307 (0.344-4.958)	0.694	0.863 (0.223-3.34)	0.832	1.128 (0.636-2.001)	0.679
Master's degree	Ref		Ref		Ref	
Department						
Internal medicine department	0.325 (0.092-1.147)	0.081	3.702 (1.069-12.813)	0.039	1.202 (0.645-2.237)	0.563
Surgical ward	0.210 (0.056-0.784)	0.020	2.551(0.685-9.500)	0.163	0.535 (0.280-1.024)	0.059
Gynaecology and obstetrics	0.437 (0.091-2.086)	0.299	2.923 (0.627-13.635)	0.172	1.277 (0.591-2.759)	0.535
Pediatric department	0.682 (0.137-3.401)	0.641	1.187(0.240-5.872)	0.833	0.810 (0.336-1.953)	0.639
Outpatient service	0.874 (0.236-	0.840	1.083 (0.297-	0.904	0.946 (0.437-	0.889

	3.236)		3.945)		2.050)	
Emergency department	0.105 (0.011-1.004)	0.050	10.280 (1.099-96.194)	0.041	1.081 (0.498-2.350)	0.843
Operating room	0.434 (0.110-1.719)	0.235	1.545 (0.390-6.127)	0.536	0.671 (0.315-1.430)	0.302
ICUs	0.299 (0.077-1.167)	0.082	1.984 (0.506-7.785)	0.326	0.594 (0.295-1.196)	0.145
Oncology department	0.229 (0.023-2.228)	0.204	3.775 (0.389-36.619)	0.252	0.863 (0.347-2.143)	0.751
Psychiatry department	0.609 (0.131-2.835)	0.527	0.593 (0.116-3.030)	0.530	0.361 (0.127-1.029)	0.057
Other departments	Ref		Ref		Ref	
Monthly income (RMB)						
≤4000	1.623 (0.448-5.880)	0.461	1.502 (0.393-5.744)	0.553	2.438 (1.125-5.283)	0.024
4001–6000	0.741 (0.217-2.522)	0.631	2.083 (0.573-7.574)	0.265	1.543 (0.731-3.256)	0.255
6001–8000	0.155 (0.033-0.726)	0.018	10.707 (2.171-52.79)	0.004	1.659 (0.801-3.435)	0.173
8001–10000	0.632 (0.181-2.206)	0.472	2.378 (0.636-8.882)	0.198	1.503 (0.710-3.185)	0.287
>10000	Ref		Ref		Ref	
Professional title						
Junior nurses	1.450 (0.620-3.392)	0.391	0.673 (0.285-1.589)	0.366	0.976 (0.653-1.458)	0.904
Senior nurses	Ref		Ref		Ref	

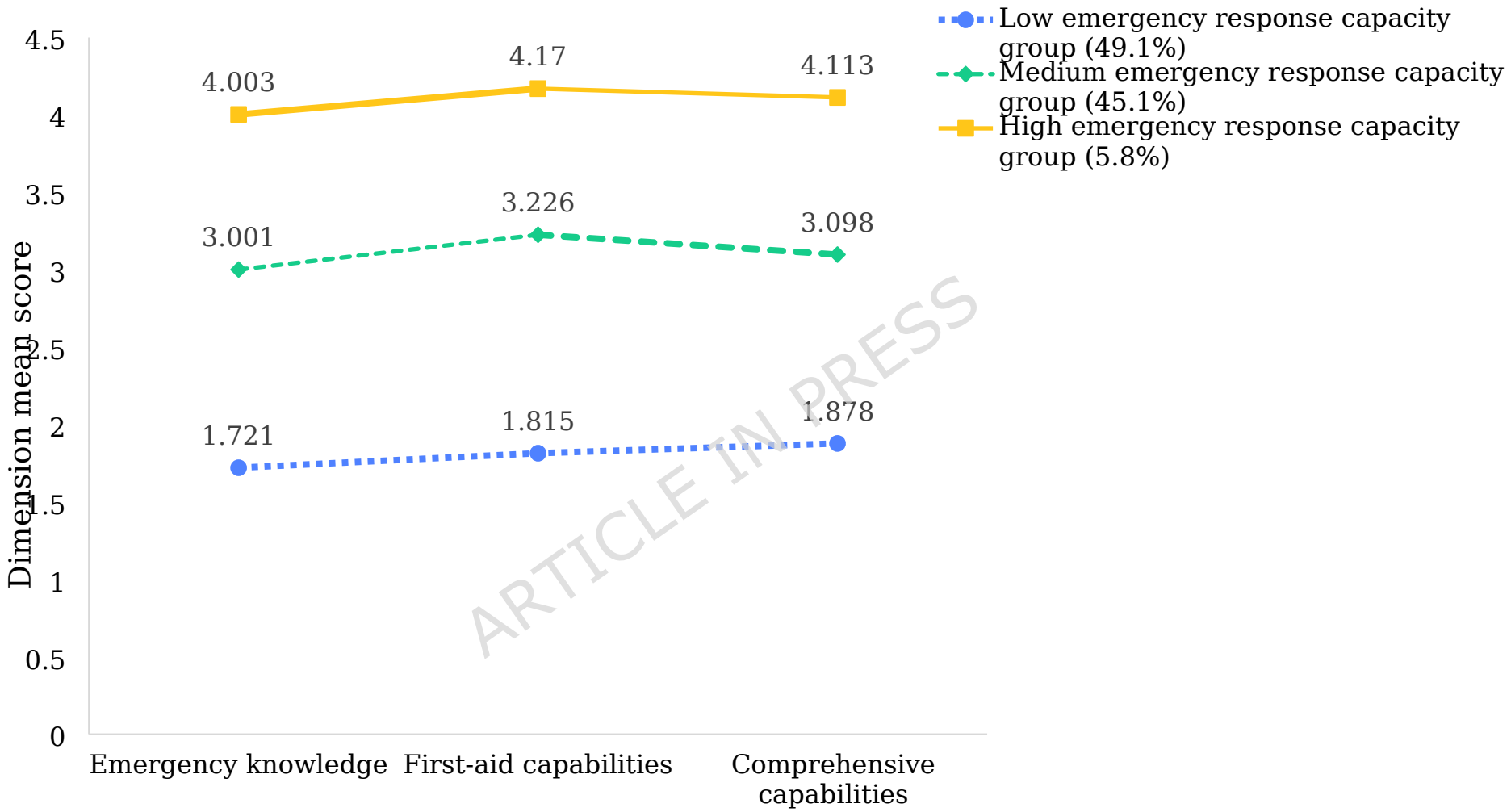

Figure 1. Latent profile analysis result

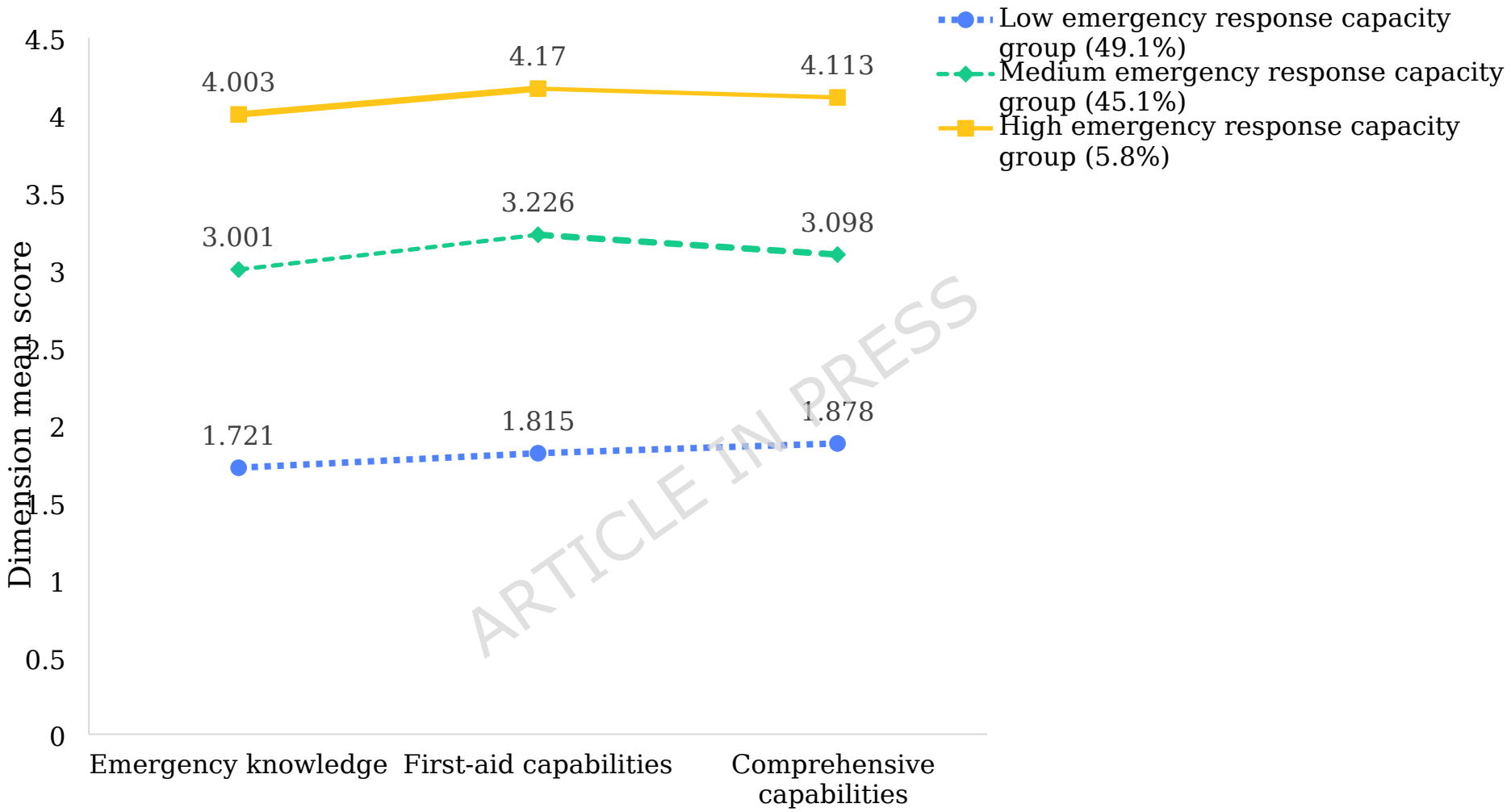

Figure 1. Latent profile analysis result

TABLE 1 Latent class model fit comparison

Model	AIC	BIC	aBIC	Entropy	LMR (*P* value)	BLRT (*P* value)	Group size for profile		
							1	2	3
Class 1	5376.823	5404.833	5385.779	-	-	-	788		
Class 2	4341.986	4388.668	4219.570	0.882	<0.001	<0.001	367	422	
Class 3	3612.220	3677.592	3633.135	0.946	<0.001	<0.001	47	355	386

Notes. AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; aBIC = adjusted BIC; LMR = Lo-Mendell-Rubin Likelihood Ratio Test; BLRT = Bootstrapped Likelihood Ratio Tests.

TABLE 2 Descriptive statistics for indicator variables that constituted the three profles

Variable	High emergency response capacity group M (SD)	Medium emergency response capacity group M (SD)	Low emergency response capacity group M (SD)	F
Emergency knowledge	4.01±0.42	2.99±0.31	1.72±0.41	1160.932***
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Comprehensive capabilities	4.11±0.39	3.09±0.29	1.88±0.40	1297.901***

Table3 Descriptive statistics in the full sample and each latent profile

Variables	Total sample	High emergency response capacity group	Medium emergency response capacity group	Low emergency response capacity group	F/χ^2	*P*
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Work experience	8.65 (9.10)	8.86 (8.78)	8.15 (9.38)	10.82 (9.44)	1.934	0.145
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Marriage status					14.559	0.001
Single/Divorced/widowed	415	188	211	16		
Married	373	198	145	30		
Educational level					9.743	0.045
Junior college	288	122	143	23		
Bachelor's degree	439	231	188	20		
Master's degree	61	33	25	3		
Whether to raise children					12.048	0.002
No	438	201	219	18		
Yes	350	185	137	28		
Professional titles					6.960	0.031
Junior nurse	393	174	194	25		
Senior nurse	395	212	162	21		
Employment form					0.368	0.832
Authorized employee	142	72	61	9		
Contract employee	646	314	295	37		
Monthly income (RMB)					27.367	0.001
≤4000	238	90	130	18		
4001–6000	180	91	78	11		
6001–8000	187	102	82	3		
8001–10000	135	74	52	9		

>10000	48	29	14	5		
Department					40.013	0.005
Internal medicine wards	165	66	93	6		
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Table 4 Multiple logistic regression results predicting profile membership

Variables	High emergency response capacity VS Low emergency response capacity		High emergency response capacity VS Moderate emergency response capacity		Medium emergency response capacity VS Low emergency response capacity	
	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P
Marriage status						
Single/Divorced/widowed	0.447 (0.131-1.52)	0.199	1.304 (0.766-2.219)	0.327	2.915 (0.845-10.06)	0.090
Married	Ref		Ref		Ref	
Whether to raise children						
No	0.514 (0.148-1.779)	0.293	0.906 (0.520-1.578)	0.727	1.764 (0.503-6.187)	0.376
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Other departments	Ref		Ref		Ref	
Monthly income (RMB)						
≤4000	1.623 (0.448-5.880)	0.461	2.438 (1.125-5.283)	0.024	1.502 (0.393-5.744)	0.553
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6001–8000	0.155 (0.033-0.726)	0.018	1.659 (0.801-3.435)	0.173	10.707 (2.171-52.79)	0.004
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Senior nurse	Ref		Ref		Ref	