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"I can't endure it" vs. "I can handle it" - experiencing work fatigue risk for nurses: a qualitative study

Rong Pi[1,2], Yunfang Liu[1], Rong Yan[1], Yan OuYang[1], Wenjing Li[1,2], Zixuan Hou[1,2], Zong De[3], Fang Liu[1,2], Zihan He[1,2], Yuxin Mei[1] and Suyun Li[1*]

Abstract

Background Work fatigue has become a significant challenge for nursing staff, yet there is a paucity of qualitative research that explores their lived experiences in this context. This study aims to examine clinical nurses' experiences with work fatigue risk and to identify the hindering and facilitating factors contributing to this issue.

Methods In this study with descriptive phenomenological method, semi-structured interviews with 25 nurses conducted in the meeting room of a hospital from June to August 2024. Colaizzi's seven-step analysis method was used for data analysis.

Results Three main themes with twelve subthemes were identified. The primary themes included: (1) phases of work fatigue risk experience, (2) hindering factors of work fatigue risk management, and (3) facilitating factors of work fatigue risk management. Nurses faced a combination of facilitators and inhibitors in managing work fatigue. While some nurses demonstrated a positive attitude towards their work, others showed a strong intention to leave the profession.

Conclusions Our findings offer a nuanced understanding of the dynamic stages of nurses' work fatigue experience, highlighting both hindering and facilitating factors that influence the management of work fatigue risk. Nurses encounter multiple challenges in managing work fatigue effectively, underscoring the need for comprehensive strategies. These strategies should address structural barriers while fostering individual resilience, ultimately promoting a healthier and more sustainable work environment.

Keywords Clinical nurse, Nursing, Phenomenography, Qualitative research, Work fatigue risk

*Correspondence:
Suyun Li
lisuyun0503@163.com
[1]Department of Nursing, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, China
[2]School of Nursing, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, China
[3]Department of Cardiology, Lhasa People's Hospital, Xizang, China

Background

In contemporary healthcare systems, nurses play a pivotal role as the foundation of patient care. Nurses are entrusted with a significant range of responsibilities, including direct patient care, resource coordination, and safety assurance [1]. However, amidst the increasing demand for medical care, the advent of new technologies, and the ongoing nursing shortage, the workload and pressures on nurses, particularly those working in clinical settings, have reached unprecedented levels [2]. A recent study conducted in 48 public hospitals in China reported 23.1% high and 24.6% very high levels of work fatigue among nurses [3]. This has resulted in a pressing need to address the issue of work fatigue, which has become a significant concern for both individual nurses and the wider healthcare system [4].

The issue of work fatigue risk among nurses is not merely a matter of physical exhaustion. It is a complex phenomenon that encompasses emotional, physical, and mental dimensions [5], all of which have the potential to significantly impact nurses' ability to perform their duties effectively [6]. The Job Demands-Resources (JD-R) model posits that elevated job demands can result in impaired physical and mental health outcomes [7]. Prolonged exposure to high-stress environments, coupled with irregular work schedules and inadequate rest periods, can lead to chronic fatigue, burnout, and even decreased job satisfaction [8–10]. These consequences not only threaten nurses' personal well-being but also may compromise patient safety and the quality of care delivered. For instance, studies show fatigued nurses are associated with diminished cognitive performance, as well as deficits in attention and vigilance [9]. Work fatigue is a contributing factor in Medication administration errors and near misses in the literature globally [2]. In addition, fatigue increases the risk of drowsy driving, motor vehicle crashes, needlestick injuries, and sharp injuries [11].

In light of the severity of the problem and its potential consequences, it is imperative to take immediate action to address work fatigue among nurses. American Nurses Association (ANA) position stated that fatigue management is a shared responsibility between nurses and their employers [12]. It is recommended by various literature that the following strategies and policies be implemented: scheduled duty-free breaks, strategic rest, employee education on the prevention of fatigue, and the implementation of scheduling guidelines [13]. Nurses' positive coping skills can also reduce work fatigue [14]. However, difficulties have been reported in implementing these strategies within nursing work systems [15]. Researchers have found lack of awareness of nurses' fatigue, nursing professional culture and lack of adequate staffing prevent work fatigue management. Although these conclusions are not comprehensive, they provide some insight into the barriers to work fatigue management.

Despite the growing recognition of this issue, it remains unclear about nurses' process of experiencing work fatigue and detailed factors about work fatigue risk management. Existing research on healthcare workers' fatigue has predominantly employed quantitative methods [16–18]. These studies identified key predictors of nurse fatigue, but they frequently fail to capture the intricate, individual experiences that influence nurses' perceptions and processes of fatigue. Qualitative research, in contrast, provides a distinctive opportunity to explore these experiences in depth, capturing the emotions, motivations, and challenges that underpin nurses' struggles with fatigue. A previous qualitative study found the nursing professional culture affected fatigue risk management [15]. However, to the best of our knowledge, no specific studies have been found that describe the lived experience of work fatigue among nurses, and the hindering and facilitating factors in their management of work fatigue risk.

The present study aims to make contributions to this understudied area by conducting a qualitative study about the experiences of clinical nurses related to work fatigue risk. The study's objectives are (a) to elucidate the lived experiences of work fatigue risk among nurses; secondly; (b) to unravel the hindering and facilitating factors contributing to work fatigue risk management. We intend that this study will contribute to the theoretical understanding of work fatigue risk in healthcare, inform policymaking, and foster a more compassionate approach to nurse well-being, thereby promoting the overall health and vitality of the healthcare ecosystem.

Methods

Study design

Following the principle of the phenomenological method, a qualitative description design was employed to elucidate the experience of work fatigue risk and barriers and facilitators in their work fatigue risk management process among clinical nurses. Descriptive phenomenology is a method based on Husserl's philosophy that entails a process of suspending or bracketing one's natural attitude towards the world, thereby allowing for a direct, nonprejudiced encounter with phenomena. This reduction enables researchers to gain access to the "things themselves", that is, the essential, pre-theoretical givenness of experience [19]. From this point of view, the qualitative design was chosen because we wanted to stay close to the subjective perspective of the phenomenon and capture variance in experiences of work fatigue risk as a clinical nurse. To guarantee the accuracy and transparency of the study, the reporting adheres to the COREQ criteria [20].

Setting and sample

The nurses were recruited through participation in a larger, quantitative questionnaire study (an ongoing investigation about the level and predictive factors of work fatigue among clinical nurses). After the nurses had completed the questionnaire, those nurses who expressed interest in participating in the present interview study were requested to provide their phone numbers, so that they could be contacted. The study was conducted in a class-A tertiary hospital in Wuhan, Hubei Province, China. The hospital has 6,000 beds, 49 clinical and medical technology departments, and four campuses. The survey was conducted on one of the four hospital campuses.

A purposive sampling strategy was employed to recruit nurses who met the eligibility criteria and who were willing to participate in the study. The aim was to achieve variation in the sample with respect to the level of work fatigue risk, age, work experience, department, position, and marital status. For instance, we aimed to include nurses with different levels of work fatigue risk, and a questionnaire exhibiting robust reliability and validity was employed in the ongoing quantitative survey to ascertain the different levels. This questionnaire was developed by our research group in our previous research. Additionally, we also included nurses from diverse departments with varying years of work experience. This approach allows us to achieve comprehensive coverage of the diverse situations pertaining to the study phenomenon. In qualitative descriptive nursing research, 15 to 25 participants are often deemed sufficient to address the study's purpose in a meaningful way and to ensure the findings are representative of the population under study [21, 22]. A total of 30 nurses were invited and 25 nurses responded positively to the invitation and were subsequently interviewed. As the final interviews provided minimal new analytical information, it was established that data saturation had been reached. Accordingly, further invitations to participate in the study were not conducted.

Data collection

The data were collected through in-depth, face-to-face, semi-structured interviews conducted in the meeting room of the hospital from June to August 2024. The interview guide was shown in supplementary file 1 which covered areas regarding the nurses' basic demographic data, cognition, and coping experience of work fatigue risk. For example, questions such as "How has the feeling of work fatigue changed at different stages of your career?" and elaborated with probing questions such as, "Can you give me an example". The interview questions were crafted through a synthesis of literature review and research group discussion. Prior to data collection, the interview guide underwent a preliminary review by two clinical nurses, who recommended minor alterations to the wording of a few questions to enhance clarity.

The interviews were conducted by the first author, who has received training in qualitative research methodology and has extensive experience in collecting data through semi-structured interviews. The participants were informed of the study's objectives, potential risks, anticipated benefits, data confidentiality, and anonymity before the interviews. The interview was conducted in an empty meeting room to ensure a private and quiet environment, and the only other individuals present were the interviewee and the researcher. During the interviews, open-ended questions were employed to gain insight into the interviewees' emotional states and experiences, but guidance and suggestive language were avoided. The sequence of questioning did not strictly adhere to the order in the interview guide. Instead, they were posed in the order that appeared most natural based on the participant's responses. Furthermore, participants were encouraged to pose questions regarding the interview. The interviews were audio-recorded and lasted between 30 and 56 min (mean 33.72 min).

Data analysis

The data were analyzed by the first and second authors, with NVivo 12 employed to encode and classify the data. Colaizzi's seven-step analysis method [23] was used for analysis. The seven steps were: (1) four researchers listened carefully and made a verbatim transcript of the recording to get the original data about the participants' working experiences; (2) main pertinent words and sentences were identified and integrated into significant statements; (3) researchers discussed and extracted meaning units from significant statements; (4) meaning units were classified into themes and subthemes; (5) researchers incorporated themes into a comprehensive description of the phenomenon under study; (6) researchers ascertained the fundamental structure of the clinical nurses' experience of work fatigue risk; and (7) the researcher invited the participants to read, discuss, verify and validate the findings, respectively. We conducted one-to-one Tencent online meetings to ensure that each interviewee could validate and evaluate the findings carefully.

Rigor

To ensure the rigor of this qualitative study, four standards were employed [24]. Firstly, credibility was addressed through rigorous methodology, thick description, and member checking. A purposive sampling enabled the researchers to share their personal experiences. This design facilitated a detailed and nuanced account of the nurses' experiences, ensuring that the findings were grounded in their direct accounts.

Feedback was sought from each participant to ensure that their experiences were accurately represented in the study findings. The study was reviewed by experienced nursing experts in our research group to ensure that the analysis was rigorous and aligned with the phenomenological approach. Secondly, to ensure dependability, audio-recorded interviews were transcribed verbatim to guarantee an accurate representation of the nurses' experiences. Researchers' personal biases and assumptions were acknowledged and reflected upon to minimize their influence on the findings. Furthermore, the researchers received rigorous training in qualitative research methods. Thirdly, to enhance transferability, the data were verified with the participants to confirm that the interpretations were free from bias. Efforts were made to include a diverse range of clinical nurses in terms of work experience, department, and the level of work fatigue risk to ensure that the findings were representative of a wide range of perspectives. The study's limitations in terms of sample size and geographic location were articulated, allowing readers to assess the transferability of the findings. Finally, to facilitate confirmability, all original data were duly preserved in accordance with accepted standards, including recordings, verbatim transcripts, reflective daily records, and analyzed records.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee on Wuhan Union hospital of Huazhong University of Science and Technology (No. 2024-0043). The participants were duly informed and provided written consent for the recording of their voices and their participation in the research.

Results

Characteristics of participants

The participants were comprised of 25 clinical nurses. The nurses were between 26 and 48 years old (mean 34 years old) and the majority of participants were female ($n = 24$). The characteristics of participants are presented in Table 1.

Themes and subthemes

As shown in Fig. 1, three themes and twelve subthemes were identified: (1) the phases of work fatigue risk experience; (2) hindering factors of work fatigue risk management; (3) facilitating factors of work fatigue risk management. Figure 2 shows the dynamic changes during nurses' whole career life.

Table 1 Demographics of participants ($n = 25$)

Participants	Gender	Age	Marital status	Work experience	Department	Position	Level of work fatigue risk	Length of interview (minutes)
N1	Female	30	Married	8	Internal medicine	Nurse in charge	High	32
N2	Female	26	Unmarried	6	Operating room	Nurse practitioner	Moderate	30
N3	Female	29	Unmarried	9	Surgery	Nurse practitioner	Low	31
N4	Female	37	Married	13	clinical laboratory	Nurse	Low	30
N5	Female	39	Married	17	Radiology	Nurse in charge	High	30
N6	Female	26	Unmarried	3	Internal medicine	Nurse practitioner	Moderate	32
N7	Male	26	Unmarried	4	Surgery	Nurse practitioner	Moderate	30
N8	Female	29	Married	7	Intensive care unit	Nurse in charge	Moderate	30
N9	Female	31	Unmarried	9	Internal medicine	Nurse practitioner	Moderate	30
N10	Female	40	Married	19	Gynecology and Obstetrics	Nurse in charge	Moderate	30
N11	Female	36	Divorced	14	Operating room	Nurse practitioner	High	30
N12	Female	35	Married	13	Internal medicine	Nurse in charge	Low	34
N13	Female	32	Married	10	Emergency	Nurse in charge	Low	32
N14	Female	28	Unmarried	5	Intensive care unit	Nurse practitioner	Moderate	32
N15	Female	40	Married	16	Gynecology and Obstetrics	Nurse in charge	High	38
N16	Female	37	Married	17	Internal medicine	Nurse in charge	Low	36
N17	Female	26	Unmarried	4	Emergency	Nurse practitioner	Moderate	38
N18	Female	31	Married	9	Surgery	Nurse practitioner	High	31
N19	Female	33	Married	12	Operating room	Nurse in charge	Moderate	34
N20	Female	42	Married	22	Surgery	Nurse in charge	High	30
N21	Female	42	Divorced	23	Surgery	Nurse in charge	Moderate	40
N22	Female	48	Married	25	Gynecology and Obstetrics	Nurse in charge	High	34
N23	Female	43	Married	23	Internal medicine	Nurse in charge	Low	56
N24	Female	39	Married	19	Geriatrics	Nurse in charge	Low	38
N25	Female	37	Married	17	Surgery	Nurse in charge	High	35

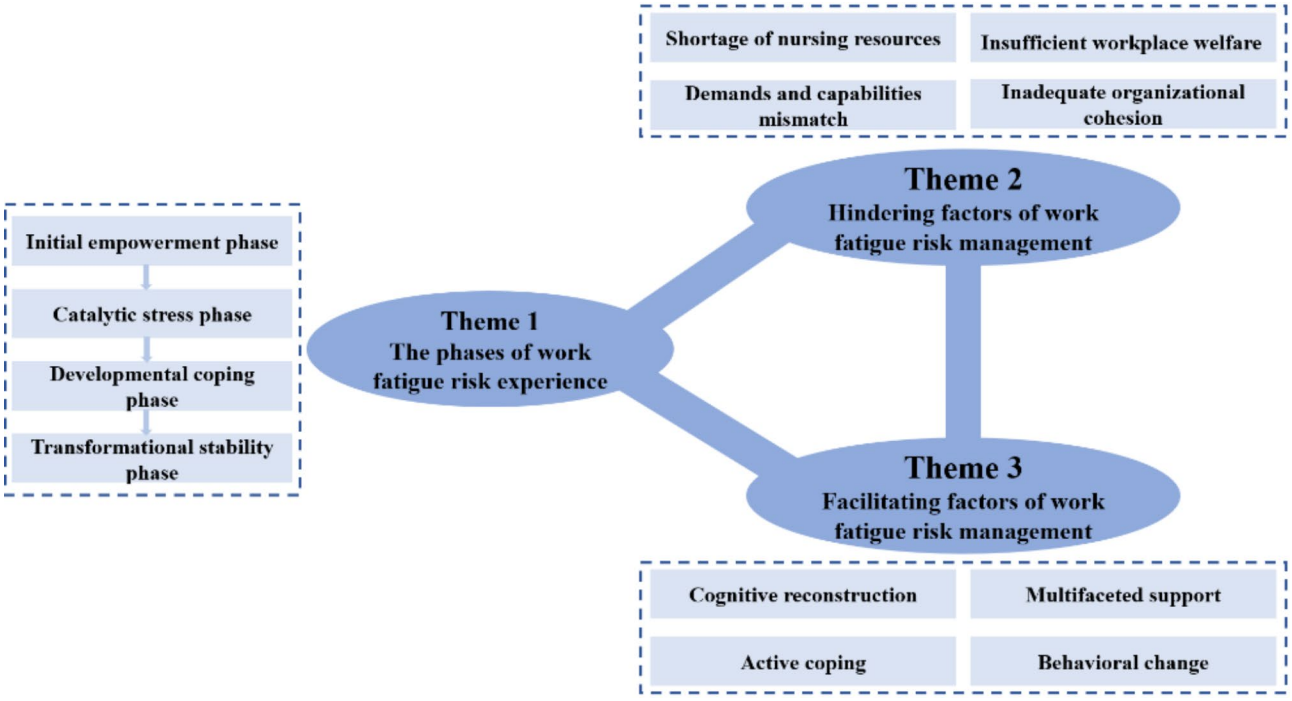

Fig. 1 Themes and subthemes

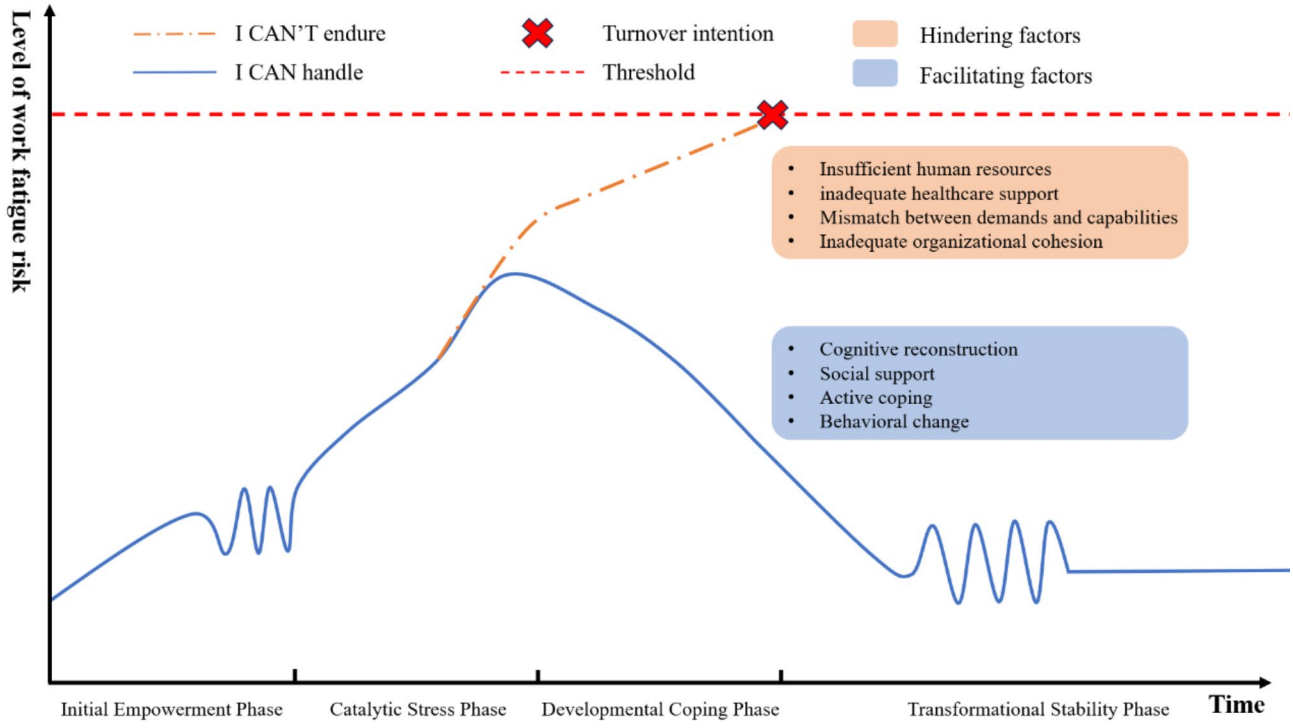

Fig. 2 Dynamic changes of nurses' work fatigue risk during nurses' career lifespan

The phases of work fatigue risk experience

The phases of the work fatigue experience were one of the main themes. According to the participants' s statement, nurses' experience of work fatigue risk can be divided into four phases: initial empowerment phase, catalytic stress phase, developmental coping phase, and transformational stability phase.

Initial empowerment phase The initial empowerment phase was the first stage in nurses' career experi-

ence of work fatigue risk. All nurses interviewed in this study expressed full of hopeful about the profession, they experienced a sense of purpose, high job satisfaction, and confidence in their ability to manage their workload effectively. N1 and N16 said that they were full of confidence and actively learned professional skills at this stage.

When I first entered the clinical environment, I felt that nursing was a profession with great love and a sense of mission. At that time, I felt that I was doing a good deed, and then I would treat it very seriously, and very much look forward to meeting every patient. (N1)

When I first started working, I was younger, I must have had better energy. Then the motivation to work, including the desire for knowledge, was certainly high. (N16)

Although their clinical work experience at this stage was not rich and there was certain pressure, as N10's quotes below described a positive attitude, a sense of faith, strong resilience, and sufficient resources, which helped to reduce the susceptibility to work fatigue.

At that time, I was full of hope and longing for this hospital, and then I also wanted to learn more knowledge, so at that time I wanted to learn some skills, that is, to improve myself. (N10)

Catalytic stress phase With the increase in workload and work demand exceeding personal resources, nurses entered the stage of catalytic stress. As N1 and N16 described below, with the emergence of more stress stressors, the emotional fluctuation of nurses, the appearance of physical fatigue symptoms, and the decline in job satisfaction.

During that time, when I came to the department, I would have diarrhea, especially when I worked at night. As long as I had high-intensity work and my tension was high, I could not help but feel a stomachache and want to go to the toilet. (N1)

Because I am relatively short, the lead clothes worn during the operation are relatively heavy, often after the operation time is long, the lumbar muscle strain is very severe, and often the low back pain can't stand. (N16)

As N12 and N18 pointed out the accumulation of complex and diverse stressors acted as a catalyst, causing nurses to become less resilient and increasing their vulnerability to job fatigue.

In fact, I obviously feel that my emotions are more susceptible to fluctuations than before, and I become more irritable. Sometimes it is difficult to control my temper. (N2)
With the establishment of a new family, the psychological pressure is also a little greater. The work is much busier than before, and the patient's condition is a little more complicated than before, so it is not as easy as before, and the pressure of work is great. (N18)

Developmental scoping phase In the Developmental Coping Phase, Nurses employed a variety of coping strategies to manage the escalating risk of job fatigue. Nurses stated that they tried different approaches to balance the demands of the job with their personal resources. There were two distinct coping outcomes in this stage. One type of nurses like N3 and N16 below successfully coped with all kinds of stress became more confident in their work and were better able to move on to the next stage.

I started to do yoga, doing yoga is still effective for the body, after yoga I can have a good sleep. I can lie directly on the yoga mat can sleep for half an hour. It is particularly comfortable. (N3)

At that time, the impact on me was quite big, and later I changed my view, and I felt that it was still important to live, not to always dwell on the past, not to be defeated by these difficulties in front of me, and to cherish the present every day. (N16)

The other type of nurses coped with failure had a strong desire to quit, and had doubts about themselves and thought that they were no longer suitable for the job. These were further described by N1 and N18 below. More effective and ineffective ways in the developmental coping phase are shown in Table 2.

I also try (choking) not to burden my family, but they may also feel my unhappiness. It also greatly affected my child, so that is why I resolutely chose to quit. (N1)

I think that the same batch of colleagues seem to be stronger than me, and I feel like a failure. (N18)

Transformational stability phase The Transformational Stability Phase represented a turning point where nurses achieved a new level of resilience and stability. Through successful coping and adaptation, nurses developed a deeper understanding of their own limits and learned to manage their workload more effectively. The quotes below

Table 2 Effective and ineffective ways in the developmental coping phase

Categories	Countermeasures	Examples
Effective methods		
	Self-motivation	Every time I face a challenge, I tell myself it's an opportunity to learn and grow. I will also tell myself that the difficulties are only temporary. (N5)
	Pressure release	I also release stress by writing in a journal, doing yoga, etc., which makes me feel more relaxed and at ease. (N7)
	Time management	I prioritize my tasks according to their urgency and importance so that I can get my work done more efficiently and save time for breaks. (N25)
	Seek social support	When I feel tired, I share my feelings with my colleagues and seek their advice and support. I will also spend time with my family and enjoy the warmth of my family. (N19)
	Develop hobbies	Later, I began to try drawing and reading, which not only relaxed me but also allowed me to make new friends and expand my social circle. (N12)
Ineffective methods		
	Escape from reality	Sometimes, I try to escape from reality by scrolling through my phone and playing games, but this only makes me more tired. (N4)
	Neglect rest	Overwork exhausts me physically and mentally and makes me less productive. I now realize that rest is just as important as recovery. (N6)
	Lack of communication	I think asking for help is a sign of weakness. But now I find that being alone only makes me more helpless and tired. (N9)
	Excessive anxiety	I always worry about my future career development, which makes me feel insecure and lost at work. (N20)
	Dependent on bad lifestyles	I will choose to eat snacks, drink alcohol and other ways to relieve the stress, but this can't really solve the problem. (N4)

expressed that nurses had increased job satisfaction, improved well-being, and a more sustainable approach to work-life balance.

> *My idea is completely different from that at the beginning. I think that no matter whether the patients feel grateful to us or not, we will try our best to do a good job for the patients with the most responsibility and professional ethics. (N10)*
> *Now things will be handier than before, whether it is the mentality or their own ability are stronger, I feel the whole person is more relaxed. (N14)*
> *There are also more times when there is a lot of pressure, but my psychological capacity is greater and stronger, and then there are more ways to vent or relax. (N20)*

Hindering factors of work fatigue risk management

The concept was another major theme in this study. Nurses pointed out many barriers that hindered the management of work fatigue risk. Nurses noted the difficulty of addressing these factors individually. In this regard, four subthemes were obtained: the shortage of nursing resources, insufficient workplace welfare, demands and capabilities mismatch, and inadequate organizational cohesion.

Shortage of nursing resources Nurses generally reported that the shortage of nursing personnel was a significant hindrance to effective work fatigue risk management. Nurses stated they were often forced to work extended hours, handle higher patient loads, and undertake tasks that exceeded their scope of practice because of inadequate nursing staff.

> *It is feeling that there are too few staff, one person does too much work, I feel particularly tired, and I work overtime every day. (N5)*

Some nurses said they were seldom able to take sick or personal leave due to a shortage of staff.

> *If there is something really happening, it is difficult to change the shift. Because we all work from Monday to Friday, most of us do. So you do not have Monday to Friday basically no one rest, you change half a day is not good, only ask for leave. (N19)*

Insufficient workplace welfare Participants declared that the lack of healthcare resources specifically designed to support nurses' well-being exacerbates work fatigue risk. This includes inadequate access to mental health services, stress management programs, and physical health screenings.

> *I think, after all, we are in clinical work, the work is still relatively high-risk, and we often contact with various people, so I think the medical examination, I think the hospital should give us great benefits. On the contrary, we have fewer and fewer items to check now. (N16)*

> *I feel that the environment is relatively limited. If we*

can build a resting place so that everyone can have a meal in a place with a window, sit down, and drink a cup of tea, we can rest better, but the environment is relatively limited. (N21)

Demands and capabilities mismatch Some nurses said they were assigned tasks that exceeded their skill level or expertise, they experienced feelings of inadequacy, frustration, and stress. This mismatch could lead to decreased job satisfaction, increased errors, and ultimately, higher work fatigue risk.

Everyone's expectations of me are relatively high, the requirements will be quite strict, and I will have a kind of aversion, this is a vicious circle, the more this may not be so positive for work and life. (N1)

Because I haven't paid attention to this aspect before, many things I don't know how to do, even the most basic ones. (N17)

Inadequate organizational cohesion Some nurses stated poor communication, a lack of teamwork, and an unsupportive work environment can all contribute to nurses' feelings of isolation and stress. As N8 and N13 described below, they could be less motivated to engage in proactive fatigue risk management strategies in this situation.

When I just came to a new environment, I felt psychologically depressed, maybe everyone didn't know each other very well, and interpersonal relationships were not so good, so I felt quite depressed. (N8)

In fact, I think physical fatigue can be tolerated, the most tired is actually from the psychological aspect, because a disharmonious working atmosphere, will make people feel very stressful, very depressed, can not breathe. (N13)

Facilitating factors of work fatigue risk management

The finding confirmed that there were several facilitating factors of work fatigue risk management. Four subthemes were generated: cognitive reconstruction, multifaceted support, active coping, and behavioral change.

Cognitive reconstruction Nurses expressed they could reduce their vulnerability to the negative effects of work fatigue by recognizing that it was a common occurrence and adopting strategies to manage it. Cognitive reconstruction involved reframing one's perception of work-related stressors and developing a more positive outlook. As the quotes expressed below, cognitive restructuring empowered nurses to take control of their emotional responses to stress and develop resilience.

If I'm immersed in an emotion, I may have a very bad state of that emotion, but if I change my mind, I will not think so much and will be much better. (N8)

I am very positive about the difficulties in work, if there is any work arrangement I do not know, I will go to the information, or if not, I will communicate with the leader (ah), I will not think that I am not as good as others. (N15)

Multifaceted support Most of the nurses reported multifaceted support plays a crucial role in facilitating work fatigue risk management. Nurses who have a strong support network of colleagues, friends, and family are better equipped to cope with the demands of their jobs. Examples are presented in the following quotes.

Several of our colleagues are also relatively united, for example, those who have family problems, sick children, or special circumstances, will help each other, are quite well. (N2)

If we have something, we can talk to the head nurse. If we don't feel well, we can apply for a shift change with the head nurse. The head nurse is also very concerned about us. (N8)

My family atmosphere is relatively good, sometimes when I encounter more troublesome problems, my family will solve them. My family members are very supportive of my work, basically, there is no pressure in life. (N22)

Active coping Nurses mentioned that active coping was a vital strategy employed when confronted with adversity, stress, or challenging situations. It involved taking proactive, constructive measures to manage stress and find solutions, rather than resorting to passive or avoidant behaviors.

And then through that, I improved my workflow myself, and I didn't just say it, I truly checked the patient's name in my head. (N10)

At work, I am not familiar with the place, so preparing in advance, or asking colleagues, or asking some

senior teachers, ask them for some work experience, will also help me make better progress. (N11)

Behavioral change Some nurses highlighted that they changed their behaviors deliberately in response to internal or external stimuli They could relieve themselves and get more involved in their work by deviating from established patterns. Some nurses stated below as:

Sometimes I will go to the park with my family or colleagues, or take a walk near my home, which can also ease my mood. (N11)

I pay more attention to my diet. I don't eat too much. (N17)

When I'm stressed out, I watch some relaxed movies or read some inspirational articles. (N20)

Discussion

The stages of work fatigue risk across the nursing career span

Our findings demonstrated that clinical nurses' work fatigue risk stages were dynamic and multi-stage phenomena. This transition can be mainly divided into four stages: the initial empowerment phase, the catalytic stress phase, the developmental coping phase, and the transformational stable phase. Each stage was accompanied by changes in the psychology, behavior, and working environment of nurses, which revealed the complexity and dynamic nature of clinical nurses' work fatigue risk.

Aligning with the findings of previous research [25], a robust sense of professional identity and mission served as a pivotal motivating factor when novice nurses entered clinical practice [26]. However, they also exhibited a certain degree of nervousness and unease that may be attributed to uncertainty regarding their abilities [27]. Fortunately, novice nurses were typically young, energetic, and resilient, which served to mitigate the impact of job stress to a certain extent. As nurses gained experience, they could take on more responsibility and face a more complex work environment and more challenges. Our findings showed in this phase, the increased role conflict, particularly between work, family, and personal life, represented a critical juncture where the risk of work fatigue rises significantly. If not effectively alleviated, long-term emotional and physical exhaustion could readily give rise to job burnout, which in turn had the potential to impair the quality of care provided and the personal well-being of the individual.

Our findings reported in the developmental coping phase, some nurses began to explore strategies for work stress management. They modified their work practices and reoriented their thinking. They developed enhanced emotional regulation and pressure tolerance. Positive changes at this stage not only helped reduce feelings of fatigue but also laid a solid foundation for subsequent career development. Han presented similar findings, positive psychological quality and resilience played a vital role in their facing difficulties [28]. Nevertheless, it is important to acknowledge that not all nurses are capable of successfully navigating this transition. Some nurses may be experiencing difficulties due to limited personal resources, inadequate support systems, or inappropriate coping strategies, resulting in ineffective coping. The long-term high-pressure state, the deepening of job burnout, and the confusion of personal value may make them gradually lose their enthusiasm and confidence in nursing work and finally choose to quit. Consistent with a previous study [29], this phenomenon has a considerable impact on the professional development and mental health of individual nurses, as well as on the stability of the nursing team and the ongoing enhancement of the quality of care. Consequently, healthcare facilities and managers should give due consideration to ensure the provision of sufficient support and resources to enable them to navigate the challenges inherent to their professional growth.

Our findings expressed those nurses who ultimately succeeded in crossing the pre-challenge stages became the backbone of the nursing team, demonstrating not only a high level of skill but also a high degree of professionalism and strong mental toughness. Similar to Mohsen's findings, the improvement of professional knowledge and skills makes nurses more immersed in their work [30]. In this phase, nurses were able to maintain stable performance in a complex and changing clinical environment and experienced a sense of professional fulfillment and satisfaction. In line with this finding, nurses who were satisfied with their work, received constructive feedback, and perceived their roles to be meaningful would display greater job satisfaction [31]. Identifying and understanding the characteristics of these stages not only facilitates the accurate identification of the specific problems faced by nurses at different career stages but also provides a scientific basis for the development of individualized interventions to promote nurses' occupational health and continuous development.

Barriers factors to improving nurses' work fatigue risk

The result of our study showed that the obstacles to work fatigue risk management were the shortage of nursing resources, insufficient workplace welfare, demands and capabilities mismatch, and inadequate organizational cohesion. We found that the principal obstacle was the unequal distribution of human resources. As the demand

for medical care increases, a considerable number of healthcare institutions are encountering significant challenges in terms of nurse staffing, including shortages and an uneven distribution of workloads. Similar to the findings of a longitudinal study, the number of beds per ward significantly influenced nurses' fatigue [32]. A systematic review also pointed worse nurse staffing was associated with adverse nurse outcomes such as fatigue, worse nurse staffing, and adverse nurse outcomes (high burnout, fatigue state, emotional exhaustion, depersonalization, and stress) [33]. To address this, we suggest that healthcare institutions should consider augmented investments in nursing human resources, optimized scheduling, enhanced efficiency, and workload alignment with nurses' capabilities. Additionally, we found a tense organizational climate exacerbates nurse burnout. When communication barriers persist, leadership styles are authoritarian, and team cohesion is weak, nurses experience heightened psychological stress, impacting both work efficiency and quality, and intensifying burnout symptoms. Consistent with the findings of a previous study, the high communication competence of nurse managers was associated with better positive staff outcomes [34]. Nurses expressed bolstering team-building activities can enhance cohesion and belongingness, mitigating work fatigue risk in this study. Therefore, it's imperative to foster a positive organizational environment, which entails reinforced communication channels, encouragement of open dialogue, a shift towards democratic and participatory leadership, and a focus on nurses' mental well-being and career aspirations.

In addition, we found inadequate welfare provisions contribute to nurse burnout. Low salaries, poor benefits, and limited career progression foster a sense of dissatisfaction, which in turn leads to work fatigue. A study from Gunn also reported a positive association between the development of nursing and welfare state measures [35]. Therefore, we suggested that it is vital to establish comprehensive remuneration and benefit systems, aligning compensation with workload and contributions, and offering diverse benefits and growth opportunities, such as training, promotions, and health insurance. Finally, we found a discrepancy between job requirements and nurses' capabilities represents a substantial obstacle. As medical advancements and patient demands evolve, nurses must continually upgrade their skills. However, excessive demands without adequate training and support can overwhelm nurses, impairing their performance and fostering anxiety. A recent study also demonstrated nurses are overloaded due to occupational demands [36]. To address this, structured training programs, personalized learning support, and realistic job expectations aligned with nurses' abilities are essential. We also suggest that nurses should be encouraged to research engagement and academic exchanges to foster professional growth.

Promoting factors to eliminating nurses' work fatigue risk

The findings indicated that the principal strategies for mitigating the risk of nurses experiencing work fatigue were cognitive reconstruction, multifaceted support, active coping, and behavioral change.

Our findings reported that cognitive reconstruction and the implementation of positive coping strategies enable nurses to modify their mentality, respond to challenges at work with a more constructive and proactive approach, and enhance their psychological resilience and work efficiency. The findings of Jiao's study also supported that positive coping style could improve nurses' professional quality of life [37]. Concurrently, we found the assistance provided by management, colleagues, family, and society fosters a more salutary and supportive work environment for nurses, which serves to mitigate occupational stress and advance physical and mental well-being. It's well identified by findings of other studies [38–40]. Furthermore, nurses are obliged to adopt a healthy lifestyle through behavioral change to prevent the onset of work fatigue and maintain optimal energy levels and good working conditions. The elimination of the nurses' work fatigue risk is a systematic undertaking that requires the collective input and collaboration of individuals, organizations, and society at large.

Limitations

Our study has several limitations. Firstly, although the participants were selected to ensure diversity in terms of work experience, department, and position, the sample was limited geographically. The participants were from an ongoing investigation into the level and predictive factors of work fatigue among clinical nurses with work experience of two years or more. Due to the practical constraints of access to participants, we were unable to achieve an equal distribution across all position titles. Consequently, the findings may not be fully representative of the diverse experiences of nurses across different regions and cultural backgrounds. Further research is required with multiple geographical regions and larger sample sizes to strengthen the generalizability of the results. Secondly, qualitative data is inherently subjective and may be influenced by individual biases and self-report tendencies, the potential for underreporting may have underestimated the true extent of work fatigue. To mitigate this, we established a secure and quiet setting where participants could express their genuine experiences without fear of recrimination. We also guaranteed the confidentiality and anonymity of the participants. Finally, our findings may not be directly applicable to all nursing populations or healthcare systems due to the

unique contextual factors involved. Comparative research across different systems and cultures is warranted to provide valuable insights for tailoring interventions to specific contexts.

Conclusions

The findings from this study highlight the process of work fatigue risk among nurses while this issue was rarely acknowledged in previous studies. Nurses experience different challenges in different work fatigue phases during their careers; therefore, there is a necessity for targeted strategies that address specific problems. The hindering and facilitative factors of work fatigue risk management were identified in this study. These findings have the potential to assist stakeholders and policymakers in the healthcare sector in designing and implementing measures such as a supportive work environment and reducing nurse-patient ratios, thereby ensuring that nurses have sufficient resources and support. Furthermore, it is also important to improve nurses' awareness of work fatigue risk management and their ability to cope with stress. In conclusion, the management of work fatigue risk among clinical nurses is a complex and multifaceted endeavor that necessitates both individuals and society.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12912-025-03022-y.

Supplementary Material 1: The interview guide is available in Supplementary file 1

Supplementary Material 2: The COREQ checklist is available in the Supplementary file 2

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Author contributions
R. P. involved in interviewing, data collection, data analysis, data curation, drafting the manuscript, reviewing, revising and submission. YF. L. and R. Y. involved in data analysis, data curation, and review. Y. OY., Z. D. and WJ. L. involved in data analysis and drafting the manuscript. F. L., ZH. H., ZX. H. and YX. M. involved in data analysis, review and revising. SY. L. involved in designing, writing, reviewing, revising and final submission.

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Data availability
The survey data used to support the findings of this study have not been made available because it is part of the ongoing project.

Declarations

Ethics approval and consent to participate
We followed the ethical guidelines as stated in the Declaration of Helsinki. Informed consent was obtained from all participants. The research protocol was approved by the Ethics Committee on Wuhan Union hospital of Huazhong University of Science and Technology (No.0043).

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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