TITLE

Effectiveness of Psychological Stress and Coping Mechanism Training Program for Nurses and its Impact on Glycemic Control among Patients with Type 2 Diabetes Mellitus at the Hail Region

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Abstract

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and persistent hyperglycemia, which can lead to severe complications if not effectively managed. Nurses play a crucial role in patient education, self-management support, and promoting adherence to treatment plans; however, psychological stress and inadequate coping mechanisms among nurses can negatively impact the quality of care and patient outcomes. This study aimed to evaluate the effectiveness of a psychological stress and coping mechanism training program for nurses and its impact on glycemic control among patients with T2DM in the Hail Region, Saudi Arabia. A quasi-experimental design was utilized, involving nurses who participated in a structured training program focusing on emotional regulation, stress management, and coping strategies, while patients under their care were monitored for glycemic control using HbA1c and fasting blood glucose levels before and after the intervention. Findings demonstrated that nurses who completed the training program exhibited improved stress management, coping abilities, and patient communication skills, which corresponded with significant improvements in patient glycemic outcomes, including better HbA1c levels and adherence to self-management practices. The study concludes that implementing psychological stress and coping mechanism training for nurses has a positive and substantial effect on both nurse well-being and patient glycemic control, highlighting the importance of integrating such programs into nursing practice to enhance patient-centered care and chronic disease management in the Hail Region.

Keywords: Type 2 Diabetes Mellitus, Glycemic Control, Nurse Training, Psychological Stress, Coping Mechanisms, Hail Region, Saudi Arabia

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CHAPTER ONE: INTRODUCTION

Introduction to chapter

Diabetes mellitus, specifically type 2 diabetes mellitus, remains a great global public health problem as it places considerable burdens on individuals affected by it, health care practitioners and health care systems in general. According to studies by Ke et al. (2022) and Dunlay et al. (2019), the condition impacts not only individuals' physical health but also their mental and psychological state. Thus, a multi-faceted approach is required in order to treat the illness as adherence to prescribed medication alone is not enough. For instance, the American Diabetes Association (2020) states that proper management of diabetes should include lifestyle changes, monitoring of glucose levels and medical consultation. Gradually, people might face problems coping with all those facets of managing the illness. In places such as Hail, where healthcare systems are improving in order to manage chronic illnesses, nurses take an important place. As nurses are the front-line providers, they have direct contact with people suffering from diabetes providing them with education, motivation, and counseling. Nevertheless, nurses often suffer from high occupational stress and emotional exhaustion. This could harm their performance and the quality of treatment they give to patients (Rechenberg and Koerner, 2022). There are other ways to control type 2 diabetes besides taking medicine. Liu et al. (2024) observed that psychological health is getting attention as a factor that is playing a significant part in glycemic control determination. As the studies by Akbarizadeh et al. (2022) and Saudelli et al. (2024) have shown, individuals suffering anxiety or depression are more likely to display the reduced level of adherence to the advice supplied to them by their physicians and higher swings in their blood sugar levels. This is why the holistic approach should be integrated, and psychological well-being should be considered in the process of diabetes care. In this regard, training nurses on the ability to deal effectively with the stress and build coping skills is one of the important activities to enhance the outcomes of treated patients. They are also more likely to offer emotional support and empathetic communication that will help the patients trust themselves and feel like they can control their illness. Mentally strong nurses can execute these crucial services better. According to Vakharia et al. (2023), the motivation of the patients to adhere to the treatment programs and maintain a normal level of blood sugar can be influenced directly by the emotionally responsive care that patients experience.

Stress and coping strategies represent interrelated psychological concepts that play a significant role in influencing healthcare professionals' ability to work efficiently. As Chen et al. (2022) note, stress negatively impacts concentration, empathy, and decision-making, which are all necessary competences in nursing. Coping strategies refer to the methods used to cope with stress in a less harmful way (Yue et al., 2020). These include such approaches as problem-solving, getting help from others, and reevaluating problems. Through the use of coping strategies, people can reduce negative impacts of stress on their performance. Apart from improving psychological resilience of nurses, these skills help to enhance cooperation with other people and job satisfaction as well. Liu et al. (2024) state that nurses who receive enough psychological training tend to create positive relationships with their patients. Thus, it contributes to the improvement of the glycemic status of the patients. It is especially important in diabetes when emotional stability is needed. There is also growing evidence that psychological interventions targeting healthcare workers might provide some indirect benefits for patients because the well-being of caregivers is associated with better quality of clinical care (Sękowski et al., 2022).

With the increase in the number of diabetes cases in the Hail Region as in other countries (Yang et al., 2021), it is necessary to understand the importance of nurses' well-being for patient outcomes. The most effective method to deal with the problem would be the introduction of the training program for nurses. It will help to make nurses stronger emotionally and mentally and create a better care environment. As a result, type 2 diabetes patients will have the opportunity to keep their glycemic status under control. If nurses feel less stressed and have better psychological condition, they will be able to help patients to take care of themselves (Saudelli et al., 2024).

The goal of this research is to assess the effectiveness of a training intervention of nurses based on the issues of psychological stress and coping strategies and to determine the effects of this intervention on glycemic control of patients with Type 2 diabetes mellitus in Hail Region. Based on the findings of this study, the quality of care in the healthcare sector does not depend solely on the skills of the personnel; however, it should also include their psychological preparedness and psychological well-being. Healthcare institutions can develop an environment that will help nurses learn coping mechanisms for managing stress. In turn, this environment will positively affect the performance of physicians and improve the outcomes of treatment (Liu et al., 2024; Vakharia et al., 2023).

Background of the study

T2DM (type 2 diabetes mellitus) has become a serious problem in the modern world. It shows the multifactorial causes of this disease, when biological, behavioral and environmental determinants interact in a complicated manner to cause the illness. The disease is increasingly becoming prevalent in recent years and especially in rapidly developing economies and in countries with middle-range incomes. Urbanization and changes in lifestyles have influenced people's dietary habits, level of physical activities and psychosocial stresses. As mentioned by Ke et al. (2022), diabetes affects physical and mental health of people. As a result of chronic and multifactorial character of the disease, it becomes a lifelong illness. Patients with T2DM have a lot of metabolic disturbances, including the ones associated with the development of insulin resistance, impairment of beta-cell function and continuous state of inflammation. According to Dunlay et al. (2019), these issues can cause serious complications like cardiovascular diseases, renal failure, neuropathy and retinopathy, thus making people's life much more complicated. Recent researches have shown that changes in gut microbiota and virome can lead to the development of insulin resistance and glucose dysregulation and therefore make the disease even more complicated (Yang et al., 2030).

Diabetes is a disease which affects people around the world. According to Sękowski et al. (2022), the disease increases morbidity and mortality and leads to huge financial costs of the healthcare system because of frequent hospitalization of patients. There are several reasons why prevalence of diabetes is increasing in Saudi Arabia and other Gulf countries. These include physical inactivity, high calorie diet and obesity. Media in local community report about increasing numbers of patients with diabetes. The Hail Region is in a really bad state right now, and one reason for this is that diabetes is becoming increasingly common there. In order to properly treat this chronic disease, competent management is important. A diversified strategy that includes medical, behavioral, and psychological therapy is necessary. A considerable number of patients persist in exhibiting inadequate glycemic control, notwithstanding the progress achieved in medical technology and the enhancements integrated into pharmaceutical therapies. Liu et al. (2019) primarily ascribe this phenomenon to the psychological and behavioral aspects of diabetes self-management. The psychological well-being of a diabetic patient is a critical aspect that is often neglected in diabetes management. People with long-term illnesses like diabetes need to monitor their health all the time, stick to stringent eating rules, and take their medicines. All of this can be quite stressful. If you have a long-term illness like diabetes, it might be hard to live your life. Research conducted by Akbarizadeh and Saudelli (2022) and Saudelli et al.

(2024) Anxiety, despair, and discomfort associated with diabetes are critical factors that correlate strongly with adverse glycemic outcomes. Patients with diabetes are more likely to experience these challenges. Patients who are mentally distressed often adopt coping mechanisms that don't work, forget to take their medicine, or don't take care of themselves, which can all cause blood sugar levels to be unstable. A significant number of studies have substantiated this. Additionally, there have been gender disparities, with women reporting higher instances of both anxiety and sadness related to diabetes (Saudelli et al., 2024). These findings have led to a greater understanding of how important it is to include psychological therapy in diabetes treatment plans. Cognitive-behavioral therapy, mindfulness-based stress reduction, and training in coping skills are some of the treatments that fall under this area. According to Cyranka et al. (2024) and Chen et al. (2021), the goal of these therapies is to make both the emotional and metabolic results better.

A nurse is an important professional when it comes to the management of diabetes patients in the healthcare setting. Nurses are supposed to undertake clinical activities such as monitoring glucose levels in the blood of diabetic patients and administering insulin to the patients. Nurses are also supposed to educate patients and motivate and help them take good care of themselves daily. Since patients and their families often look up to nurses for advice, nurses have great power in influencing the actions and compliance of patients with treatment programs. Nursing also happens to be one of the most psychologically prepared professions out there; hence, nursing is considered a challenging career choice. As Sarazine et al. (2021) state, people who are constantly exposed to patients in pain, heavy workload, or stressful situations may end up suffering from constant stress, exhaustion, and compassion fatigue. Psychological stress may become a barrier to the delivery of quality care to patients by nurses, decreasing nurses' motivation and affecting the health of patients negatively. According to Vakharia et al. (2023), nurses who are tired physically or mentally may find it difficult to give diabetic patients knowledge, empathy, and support on a consistent basis. Because nurses face so many problems, training programs that try to make them more mentally strong and better able to deal with stress have become more important. (Huffman et al., 2023; Pan & Yeung, 2023; Sarazine et al., 2021) Evidence indicates that stress management therapy, mindfulness workshops, and positive psychology programs can effectively alleviate burnout and improve the mental health of healthcare professionals. Nevertheless, there is limited evidence demonstrating that these therapies successfully reduce the risk of burnout. Once nurses have reached a stable mental state, they can form meaningful relationships with their patients, which will lead to more individualized and caring treatment. As a result, better communication and emotional support lead to more motivated patients, better adherence to therapy,

and better glycemic control (Liu et al., 2024; Cha et al., 2024). Because of this, the patient can better control their blood sugar levels. As Puig-Perez et al. (2017) and Huffman et al. (2023) express, the application of positive psychology concepts in the healthcare background, specifically thankfulness, optimism, and emotional well-being, has been proven to raise the level of satisfaction of the healthcare provider and the outcomes of the patients, in particular.

The above claims are supported by empirical evidence. The strategies under discussion focus on the role of individuals and health practitioners in yielding positive results, especially in treating type 2 diabetes. For example, in their research studies, Chen et al. (2021) and Lenze et al. (2022) found out that there is a link between the improvement of glycemic control and decreased emotional distress due to the implementation of mindfulness and stress reduction interventions among patients with diabetes. Additionally, systematic psychological training of health practitioners has been found to increase empathy, emotional regulation, and the quality of interaction between patients and caregivers which contributes to positive health outcomes (Wang et al., 2025). Implementing such training programs among nurses is an important proactive step to improve the diabetes treatment in the Hail Region of Saudi Arabia that experiences the increased number of cases of diabetes. This will provide hospitals with necessary instruments and knowledge to handle stress of clinicians and employ coping strategies.

The focus on the mental health of nurses is necessary not only for the sake of these professionals themselves but also to ensure the quality of treatment of patients. The research of Sarazine et al. (2021) and Cha et al. (2024) revealed that the nurses who received stress management and coping skills training are more concentrated, better collaborate in teams and have high patient satisfaction level. Besides, when being mindful and practicing emotional regulation, nurses interact with patients in a more empathic and solution-driven way. This encourages patients to take an active part in their own health management (Jung & Kim, 2023). This, in turn, promotes psychological adaptation and improves adherence behaviors, hence resulting in more regular glycemic control. Thus, the mental readiness of nurses is a vital element in connecting the health services delivery process and positive patient outcomes.

In conclusion, type 2 diabetes mellitus represents a complicated disease that goes beyond drug treatment. Control of such a disease entails provision of psychological, behavioral, and emotional support. Nursing personnel make up the heart of patients' treatment; therefore, they should have the skills to cope with the emotional stresses involved alongside necessary clinical skills. Introduction of a training program on how to cope with psychological stress will ensure that nurses are capable of

handling the stress better. This has been shown to lead to quality patient care and effective glucose control. The current study carried out in the Hail Region aims at investigating the link: whether improvement in nurses' coping mechanisms improves the psychological status and hence the patient's health outcome due to diabetes. This study brings to light the significant connection between caregivers' mental and patients' physical health; therefore, the significance of holistic treatment of diabetes across the world (Ke et al., 2022; Liu et al., 2024; Pan & Yeung, 2023)

Statement of the problem

Diabetes mellitus, and more specifically type 2 diabetes mellitus (T2DM), has arisen as a serious global public health problem, making a considerable contribution to morbidity, death, and the costs of healthcare all over the world. Effective glycemic control continues to be a difficulty in many groups, despite the considerable progress that has been made in diabetes screening, prevention, and treatment measures. Diabetes management needs not only medical and pharmacological therapies, but also significant behavioral and psychosocial components. Diabetes management is a multifaceted process. As a result of recent research (Noohi & Mirzazadeh, 2011; Bennett, Guo, & Dharmage, 2007), it has been underlined that the psychological well-being of both patients and healthcare personnel is an important factor in determining the success of diabetes management. Despite the fact that they are the backbone of patient care, nurses are constantly confronted with emotionally charged situations, heavy workloads, and complex tasks. All of these things make them more stressed, which makes it harder for them to give patients the best care possible. Not being able to deal with these stressors can make you feel tired, burned out, and less empathetic, which makes it harder for you to talk to patients and, in the end, affects how well people with diabetes stick to their treatment and the clinical outcomes they have.

The concept of psychological stress refers to a complex term having considerable meaning for both patients and healthcare professionals. There is no doubt that stress is able to affect physiological mechanisms, including diabetes-related glucose metabolism. Thus, it makes glycemic management worse and causes insulin resistance (Feng et al., 2020). Besides, stress affects the cardiovascular system. Chronic exposure to stress hormones, including cortisol, results in metabolic dysregulation and makes the diabetes treatment less effective (Mishra et al., 2020; Amiri et al., 2021). Constantly high level of stress experienced by nurses is connected with poor mental health. It reduces nurse well-being and limits the possibilities of providing proper emotional support and advice to the patient. Thus, patients may feel neglected, less motivated, or anxious, which decreases

the willingness of adhering to the medication plan and performing self-care activities (Didarloo et al., 2011; Toobert et al., 2000). This problem becomes especially evident for the patients having chronic diseases like type 2 diabetes. The described phenomenon shows the cyclic relationship in which nurse stress is harmful for patients' health and, conversely, patients' health issues negatively impact nurses.

In Saudi Arabia, there is an increased rate of diabetes cases and Hail region is not an exception. There are some changes in people's lifestyles including lack of physical activity and changing diet, which increase the risk of developing diabetes (Alsaedi et al., 2020). Despite of numerous awareness campaigns and governmental efforts, many patients are still unable to reach the appropriate glycemic control. In addition to that, the psychological aspect of treating this disease is often overlooked. There is a focus on pharmacotherapy and diet instead of managing patient's mental state and stress. According to existing evidence, the training program aimed at coping with occupational stress and improving psychological condition of nurses positively influences their health and professional performance (Fatemi et al., 2023; Ural & Kizilkaya Beji, 2021). In particular, according to Kim et al. (2019), when nurses are emotionally ready to deal with their stress, they are able to make an empathic and motivating connection with patients.

Research evidence shows that stress management measures, such as coping skills training and stress inoculation therapy, can contribute to enhanced emotional regulation and resilience in both patients and healthcare professionals (Fatemi et al., 2023; Finik, 2017). Such interventions are not limited to the health field only. Empirical data proves that these therapies successfully decrease symptoms of anxiety, depression, and stress in the clinical setting, leading to better care outcomes and well-being of patients. This aspect is especially relevant in the context of the effective management of chronic illnesses, as it requires the stability of the psychological condition and the patient's motivation (Beaufort et al., 2017). However, there is a lack of empirical studies in Saudi Arabia, Hail Region in particular, on the ways in which nurse training programs, which emphasize the issues of stress and coping strategies, can help to indirectly improve glycemic control in people suffering from type 2 diabetes mellitus. Taking into account the stated knowledge gap, it is necessary to conduct empirical research regarding the ways in which psychological interventions affect clinical markers such as HbA1c level, adherence to self-management and treatment satisfaction of people with diabetes (Bennett et al., 2007; Kordi et al., 2016).

Moreover, nurses experience significant psychological pressure while working with patients with diabetes mellitus. There are numerous studies which found the correlation between occupational stress, emotional exhaustion, and lower quality of care of the nursing staff (Daley et al., 2019; Lee et al., 2019). This type of pressure is especially evident in resource-poor environment, characterized by high workload and lack of support system. Inability to cope with emotional burden can result in visible signs of stress or emotional detachment in relation to the patients, thus reducing their adherence to medical advice and their confidence in nurses' competence.

On the other hand, training on coping with stress, stress reduction, and emotional intelligence allows nurses to deal with psychological challenges of the job more effectively and create a more therapeutic atmosphere in the clinical environment. Previous studies conducted by Rani and Begum (2016) and Xu et al. (2017) prove that such atmosphere can significantly influence adherence, self-efficacy, and glycemic control.

Furthermore, recent studies have shown that programs designed to support psychological well-being of healthcare professionals can indirectly result in the improvement of the patients' clinical outcomes due to better communication, higher empathy levels, and increased patient satisfaction (Niroomand et al., 2019; Sadeghi et al., 2023). Such results were obtained in two different studies. Thus, highlighting the need for an integrated approach that would take into account mental health of nurses as well as physiological health of patients, the current findings show the importance of conducting such interventions. In addition to the fact that stress management and coping skills training for nurses can be considered as a requirement related to their occupation, it can also be viewed as an intervention directed at patients which can have significant public health implications. The study argues that improving psychological resilience of nurses can result in improvements in glycemic control among their diabetic patients in Hail Region on the basis of the existing correlation between well-being of nurses and their patients' health.

Therefore, the key problem that will be investigated in this research is the lack of knowledge about how psychological preparedness and coping mechanisms of nurses affect patients' health, especially in relation to glycemic control in case of Type 2 Diabetes Mellitus. In this study, it is hypothesized that implementation of a Psychological Stress and Coping Mechanism Training Program for nurses can increase their ability to cope with occupational stress and positively affect glycemic control of their patients in Hail Region.

Thus, the key research question of this study is as follows: How much can the implementation of a Psychological Stress and Coping Mechanism Training Program for nurses improve their stress management skills and help improve glycemic control among patients with Type 2 Diabetes Mellitus in the Hail Region?

General Objectives

1. To measure the effectiveness of the stress and coping mechanism training program that is meant to help nurses deal with occupational stress and at the same time provide healthcare services to Type 2 Diabetes Mellitus patients in the Hail Region.
2. To find out the impact of increased ability of nurses to cope with stress and its consequences on blood glucose levels and health of patients with Type 2 Diabetes Mellitus.
3. To explore the connection between nurses' psychological state and quality of the care offered to diabetic patients in the region.
4. To examine the long-term effects of stress management techniques on the performance, emotional state, and engagement of nurses.
5. To explore how training in stress and coping mechanisms could affect the establishment of an empathic environment that would make the patients adhere to diabetes management programs.
6. To provide inputs into the elaboration of integrated healthcare programs that would take into consideration both psychological resilience of nurses and physiological stability of patients with diabetes and other chronic diseases.

Specific Objectives

1. To measure occupational stress experienced by the nurses before and after attending a training course on psychological stress and coping methods.
2. To determine the impact of the nurses' training program on patients' glucose control by measuring HbA1c.
3. To determine the relationship between the coping methods used by the nurses and adherence of patients to medications, diet and other self-management practices.
4. To find out the main coping methods used by the nurses which help to reduce stress and promote positive mood while providing nursing care to diabetic patients.

5. To learn patients' perception of the quality of care and communication after attending the nurses' training program on psychological stress and coping mechanisms.
6. To make recommendations about implementing the psychological training and stress management programs into the continuing professional education of nurses working in diabetes care units in Hail Region.

Research Questions

1. What is the efficiency of the program aimed at the development of coping and stress training of nurses working with Type 2 Diabetes Mellitus patients in the Hail Region?
2. Is there any effect of improved stress management skills of nurses on the level of glycemic control of their patients, which is measured in terms of HbA1c values?
3. What are the connections between coping mechanisms of nurses and the adherence of their patients to prescribed treatment regimes?
4. What kind of coping strategies help nurses to feel better psychologically and be more satisfied with their job while working with Type 2 Diabetes Mellitus patients?
5. How does the implementation of stress and coping mechanisms training affect patients' perception of the quality of the care provided and communication with nurses?
6. Can psychological training programs have an impact on health care delivery and patient outcomes among Type 2 Diabetes Mellitus patients in the Hail Region?

Research Hypotheses

- **H1**: The psychological stress and coping mechanism training program significantly reduces occupational stress levels of nurses dealing with Type 2 Diabetes Mellitus patients in the Hail Region.
- **H2**: Post the psychological stress and coping mechanism training program for nurses, there is significant improvement in the glycemic control of patients as evident through decreased levels of HbA1c.
- **H3**: There is a positive and significant correlation between coping strategies of nurses and adherence to diabetes management protocols of patients.
- **H4**: Certain coping strategies, namely problem-solving and emotional regulation, significantly contribute towards improving nurses' psychological wellbeing and job satisfaction.
- **H5**: Psychological stress and coping mechanism training program significantly influences patients' perceptions of quality of care and communication with nurses.
- **H6**: Incorporation of psychological stress and coping mechanism training program in nursing practice significantly improves healthcare service delivery and patient outcomes in managing Type 2 Diabetes Mellitus.

Significance of the study

This research has profound implications in the areas of nursing practice, healthcare service delivery and chronic disease management. In particular, this study examines the complex relationship between the psychological state of healthcare professionals and the health of the patients who receive care from them. As such, this study is very relevant within the current healthcare system. Nurses have been found to experience a lot of mental and physical pressures in terms of emotional issues arising from chronic illnesses like diabetes mellitus, long working hours and large patient load. This stress causes increased stress and burnout, reducing the performance of professionals and affecting job satisfaction as well as the quality of the services offered to patients.

The importance of the proposed study will arise from the development and testing of an advanced training program on psychological stress and its management. The goal of the project is to

establish an alternative strategy for the management of stress amongst nurses. The training will help to create a better working environment for employees and improve their well-being and eventually the outcome for patients. Employees will learn how to identify, understand and handle the stress.

This study is very important as it brings together two main components, namely nurse health and patient health. Both aspects have been studied independently in many cases but in this research they are brought together and in the case of type 2 diabetes mellitus management, there is a need for consistency in service provision. In addition, the research also stresses the significance of ensuring that there remain clear lines of communication between nurses and their patients. The research argues that nurses will be able to provide more compassionate care if they have a stable mind and emotions. In such a scenario, it is possible that the patient will be in a better position to follow the management programs designed by doctors. Adherence will improve and result in proper monitoring of blood glucose levels, healthy living practices, and ultimately proper glycemic control. The paper reveals an important link, which is often neglected despite its importance, between the mental wellbeing of nurses and the physical well-being of patients that they serve. The findings reveal the same. The importance of understanding this link cannot be stressed enough from both theoretical and practical points of view because the prevalence of diabetes in the Hail region is growing amid difficulties faced by healthcare workers.

Additionally, this discovery is not only limited by the clinical importance but it also plays an important role in the wider field of occupational health psychology in healthcare facilities. The paper provides valuable evidence to introduce psychological training into continuing education programs of the hospital personnel. Evidence-based strategies can be used to create a work setting which will contribute to nurses' mental health and safety of their psychological wellbeing. This study is a challenge to traditional approaches in healthcare training which emphasize technical competencies since the paper reveals the fact that psychological training brings clear benefits to both nurses and patients. The authors argue that it is necessary to focus on such aspects as emotional intelligence, self-awareness, stress coping skills in order to provide comprehensive training in professional nursing.

The results can influence the way nursing schools and professional development courses prepare curriculums useful for nurses. If the stress coping training model developed and tested in the paper will show its effectiveness then it can become a prototype of similar programs implemented in

other settings. The results can be used by nursing educators and healthcare administrators to build a support system aimed at protection and empowerment of nurses as they play a critical role in patient care. This way the patients will receive much better care particularly for such diseases as type 2 diabetes mellitus.

The present study contributes to general public health goals and sustainable development of healthcare systems in Saudi Arabia by dealing with one of the major problems of the society. The study corresponds to the principles of Vision 2030 and highlights the need to improve the quality of healthcare services, efficiency of the medical workforce, and overall patient satisfaction. Furthermore, by considering the case of the Hail Region, the study helps to address the specific problem of the area while providing a model which might be applicable to other regions of the country. Thus, it should be said that better healthcare outcomes are the result of both technological advances in medicine and psychological efforts of the caregivers.

Overall, the significance of the study may be reflected in the fact that it has the potential to affect both attitudes and practices in the healthcare sector. On the one hand, the study confirms the idea that nurses suffer from stress and that the psychological resources of healthcare providers have a significant effect on the health of patients. Therefore, the study can make the issue of stress management and coping trainings crucial in the process of reforming the healthcare systems, thus, once again proving that caregiver support is an important stage in the process of creating healthy communities.

Scope of the study

The present research aims at evaluating the efficiency of a psychological stress and coping strategy training course designed for nurses and further impact of such training on glycemic control in patients suffering from type 2 diabetes mellitus in Hail Region. This study involves an analysis of psychological and physiological components with a focus on the connection between nurses' ability to cope with their occupation stress and clinical outcomes in patients receiving medical assistance. It is important to analyze how the process of providing nurses with adequate stress management and coping skills could help to improve the emotional state of nursing specialists, their professional abilities and patient interaction, as well as the health of diabetes patients.

The geographical and professional boundaries of the research include hospitals and healthcare organizations within Hail Region, Saudi Arabia. The target population of the research is licensed nurses working with patients suffering from type 2 diabetes mellitus. By limiting the area and scope of professionals involved, one can obtain contextually relevant information about the problems that arise during the work of nurses in this region, as well as the impact of stress management techniques in such an environment. In addition, there is going to be a representation of diabetes patients who are being treated by the target population in order to see the indirect influence of nurses' training on patient health. To make sure that participants of the research receive theoretical and practical knowledge on how to handle occupational stress, the course will include psychological education and coping skills development.

To define the time frame of the study, it is limited to the implementation period of the training program and the evaluation of its results, covering all stages of baseline and post-intervention evaluations. This approach allows one to analyze the changes in psychological factors, such as stress levels and coping skills, and physiological ones, for instance, HbA1c, of patients during the specified period of time. Nevertheless, the results of the study are applicable to the hospital system of Hail only and will not be valid elsewhere unless the research is conducted once again. In fact, the study covers the specific geographical area and the specific time period completely. Despite this, it is expected that the knowledge gained will provide valuable information to the emerging literature regarding psychological training in clinics.

Overall, the study is aimed at proving the relationship between the provision of mental support for nurses and the achievement of tangible clinical results in the management of chronic diseases. It is important to demonstrate the necessity to provide psychological assistance as an essential part of efficient health care delivery. In this way, the empirical connection between stress management of nurses and glycemic control of diabetic patients will be established. The expected outcomes will allow providing practical suggestions to healthcare administrators, policymakers, and educational institutions in order to implement stress and coping strategies programs into the nursing education process.

Definition of terms

Psychological Stress

Psychological stress is a multifaceted phenomenon that manifests itself when an individual has the perception that the demands placed upon them are greater than their capacity to successfully cope with situations. This perception is not only a brief emotional state; rather, it is a prolonged psychophysiological condition that combines cognitive, affective, and behavioral characteristics. This perception is not comparable to a fleeting emotional state. Stress can have a negative impact on cognitive abilities such as attention, working memory, and executive function, which can result in a slower decision-making process, an increased probability of making mistakes, and trouble prioritizing activities. Anxiety, impatience, weariness, and a feeling of being overwhelmed are some of the emotional manifestations of stress. On the behavioral level, stress can cause avoidance, withdrawal, or maladaptive coping techniques to be triggered. Because of the high-pressure nature of clinical practice, the cognitive, emotional, and behavioral impacts of stress are especially prominent in the nursing profession. This is because of the nature of the profession themselves. When it comes to providing ongoing emotional support, responding to emergencies, monitoring complex patient situations, and making key decisions, nurses are frequently forced to do all of these things simultaneously, all while balancing the expectations of the institution, the limitations of the resources available, and the time demands that they face.

In more concrete terms, the nature of T2DM characterized by chronicity and multi-dimensionality increases the level of stress experienced by the patients during their treatments. Treatment of diabetes implies continuous monitoring of blood glucose levels, proper dosing of medication, dietary advice, education on lifestyle changes, and repeated visits for follow up. Nurses are not only responsible for carrying out clinical interventions, but they also take responsibility of encouraging patients, coping with their fears of possible complications, helping them adjust psychosocially to being chronically ill. They usually serve as the major channel connecting patients with the health care system. In cases when patients have problems with compliance, refuse to accept certain suggestions, and demonstrate unstable levels of glycemia despite the efforts of nurses, these tasks may result in continuous emotional strain. It tends to be especially true in the case of poor adherence of patients. Numerous scientific studies demonstrate that this continuous emotional stress is

strongly associated with nurses' experience of emotional exhaustion and low satisfaction from their work.(Faramarzi & Pasha, 2018).

The stresses that nurses experience go beyond individual experience, but are influenced by the working environment. Critical components such as inadequate staffing, extended hours, lack of administrative support, and high patient to nurse ratio cause heightened stress. The state of chronic stress which has proven to impact negatively neuroendocrine function, raise cortisol levels, and depress immune systems is induced by these factors. As a result, the ability of nurses to maintain their mental and emotional balance becomes compromised through stress. Nurses might become unable to counsel patients effectively, provide precise insulin dose, and evaluate diet adherence because of physiological changes that occur in them when handling diabetics. The other outcome of stress is the risk of developing burnout, which is described by three components: depersonalization, emotional exhaustion, and low personal accomplishment. Under these circumstances, nurses could carry out patient interactions in an impersonal way, reduce the number or frequency of education sessions, or apply standard procedures without creating customized plans for each patient. These practices may affect the blood glucose level of patients negatively. Psychologically speaking, stress affects the quality of relationships between nurses and patients and, therefore, interpersonal interactions. Patients with type 2 diabetes often face many emotional obstacles: fears regarding long-term effects of their disease, dissatisfaction with the need for restricting themselves from various aspects of their life, as well as fear of hypoglycemia. Thus, nurses experiencing much psychological stress can hardly provide sufficient empathy, compassion, and motivation needed by patients to overcome these challenges. As a result, patients will be demotivated and will follow doctors' prescriptions poorly, making them more susceptible to changes in their blood glucose level. Therefore, emotional regulation and stress management are not additional abilities; these competences are vital for patients' capability to manage their condition.

In this research, "psychological stress" refers to the total emotional, cognitive and physical load experienced by nurses due to the nature of their work. It includes stress experienced while managing multiple tasks in a demanding working environment, emotional distress due to continuous observation of people's pain or disobedience to doctors' recommendations, and stress associated with safety concerns of their patients. Psychological stress is not an isolated phenomenon; it interacts with nurses' competencies, their ability to communicate with patients and with organizational support to produce the final effect on the quality of nursing practice. Since the management of blood glucose is the most

significant factor affecting patient's behavior and adherence in the case of type 2 diabetes, psychological stress experienced by nurses becomes an important predictor of the success of treatment.

To successfully deal with psychological stress in nursing, a comprehensive strategy is needed. The nurses have sufficient skills to handle stress factors in both acute and chronic forms by using techniques such as mindfulness, cognitive therapy, and building resilience. Organizational approaches involving proper staffing, supportive management, training, and mental health services create a setting in which nurses will be able to achieve their professional competencies. Combined, these methods help nurses make better clinical decisions, engage in therapeutic communication, and improve glycemic outcomes of people who have type 2 diabetes. Therefore, apart from being related to occupational health, the knowledge of psychological stress and its handling strategies is essential for providing effective and quality diabetes care.

Coping Mechanisms

Coping mechanisms refer to an ability of an individual to cope with stress, reduce emotional discomfort and respond effectively to demands seen as threats to his/her physical and psychological health. It includes a set of sophisticated cognitive, emotional and behavioral techniques used by an individual. The mechanism implies the dynamic estimation of the stressors, assessing the resources available and finding the ways how to lessen the impact of internal or external stressors. Coping mechanisms do not only involve reacting to particular situations but also imply the processes which are developing. Generally speaking, there are two basic kinds of coping strategies: problem-focused approaches and emotion-focused ones. Problem-focused coping implies active searching for the sources of stress and their resolution. It may mean, for instance, restructuring the work load, defining the roles in the workplace, organizing some system of patient's education. It is critical for problem solving. On the contrary, emotion-focused coping implies regulating one's emotional response to stress. There may be different strategies in this sphere, like mindfulness, cognitive reframing, relaxation techniques, peer support and reflection.

Considering the professional situation where there is constant making decisions, unexpected patient situations and emotionally loaded meetings, coping mechanisms become even more important in healthcare in general and in nursing in particular. Dealing with patients who have Type 2 Diabetes Mellitus (T2DM), nurses face a unique set of stressors connected with chronic character of the disease, complicated glycemic control and the necessity to guide patients' behavior. It means, for instance, that

the nurse has to deal with patients not following her recommendations concerning diet, the refusal from changing drugs and psychological tension because of the fear of complications, including neuropathy, retinopathy and other complications related to cardiovascular system. These continuous situations might increase psychological stress and result in cognitive overload, emotional exhaustion and reduced attentional capacity.

From an empirical point of view, it is evident that highly-developed coping strategies play a crucial role in shaping nurse performance and patient outcomes. According to Ghasemi, Vakilian, and Khalajinia (2021), adequate coping skills have a considerable impact on developing proper self-care practices, psychological resilience, and improving the quality of life. Motahari-Tabari et al. (2023) support this idea since tailored programs aimed at increasing behavioral skills and motivation help improve not only patient self-management practices but also the capacity of nurses to cope with stress adaptively. Therefore, based on this information, one can conclude about the existence of reciprocal relationship in question, which means that implementing appropriate coping strategies helps develop psychological stability, which, in turn, positively affects the ability of nurses to motivate and instruct patients to manage diabetes.

Personal psychological features and training intervention techniques used are closely related to the choice of coping strategies in nursing. The training intervention involves a set of evidence-based strategies that allow nurses to cope with the stress adaptively instead of reactively, promoting resilience in various conditions. In particular, the training may include such practices as stress evaluation, exercises to identify the emotional condition, problem-solving practices in hypothetical situations, and peer debriefing after stressful events. This way, nurses become able to prepare for the stressful event, analyze possible options, and choose the most appropriate strategy, which is beneficial not only for nurses' health but also for the quality of patient care. Accordingly, nurses should stay calm while dealing with hypoglycemia episodes, be empathic to those patients who repeatedly fail to reach glycemic target, and motivate them to adhere to the proposed changes in lifestyle.

Moreover, coping mechanisms function in the organizational and social context of nursing practice, along with personal interventions which are typically used in order to address this problem. In order to create structural factors that would improve the effectiveness of coping mechanisms, it is required to offer supportive environment, good leadership, peer collaboration, and psychological services to nurses. Workplaces which have heavy workload, lack of autonomy, or insufficient access to

education will increase stress responses and prevent nurses from using adaptive coping mechanisms. As a result, coping mechanisms training needs to be included in professional development programs as both tool of personal training and organizational approach towards building up resilience, creating psychological safety, and improving the capacity of nurses to deal with such chronic conditions as Type 2 diabetes.

Speaking of the definition of the concept of "coping mechanisms" in this research, it is important to understand that it includes all psychological strategies that nurses use in order to cope with stress, to concentrate their attention on work and to deliver better care to patients with Type 2 Diabetes Mellitus. Training intervention, which uses cognitive, emotional, and behavioral methods, is designed to develop and to maintain these skills. They are not inborn, but they can be built up through appropriate learning process. When nurses have them, they are able to offer patient education, glucose testing, and motivation even in highly stressful situation. Therefore, coping mechanisms can be viewed as one of the factors that protect nurses from the negative consequences of stress and at the same time determine clinical outcomes of patients.

Training Program

The purpose of the educational and psychological intervention is to improve the nurses' awareness and coping skills to enable them better deal with the difficulties encountered while working with patients. There is a special focus on patients suffering from Type 2 Diabetes Mellitus (T2DM). The training program proposed in this case study is intended to include several different approaches, such as group work and role-playing, solving problems using scenarios, reflective activities, as well as psychological skills development exercises. Unlike a workshop or informal continuing education, the training proposed does not imply the incorporation of several different modalities of learning. According to Algorani and Gupta (2023), the training program has an objective to develop the nurse's skills to recognize stressors, regulate emotions, use coping techniques and make high-quality decisions even under pressure.

In this regard, one of the objectives of the training program is the need to raise the awareness of the nurses about the level of their stress and influence of the occupational pressure on their performance and patient results. Nurses, who have to care about patients with type 2 diabetes, often face complex activities like monitoring changes in blood sugar levels, adjusting the medications, offering nutrition advice, and providing psychological support. All these activities are carried out in the

conditions of high pressure and fast pace, in which there is an emotional and cognitive overload. Like stated by Alharrasi (2023), the self-esteem, self-image and psychological well-being of nurses are closely connected to the effectiveness of their care and support provided to patients, which affect the control over glycemia. The ability to recognize stressful situations, understanding the reasons of triggering stress emotions, and development of coping skills to avoid a cascade of negative effects caused by stress can be achieved through the proposed training program.

Knowledge- and competency-based programs often combine knowledge modules and skill-building activities. Nursing curriculum includes advanced communications, patient-centered counseling, motivational interviewing, and behavioral coaching aimed at encouraging patients to follow medical advice and become more engaged in their own care. This is especially important when working with patients from locations such as Hail, because there are many social factors which affect patient behavior and adherence to therapy. Patients who present with repeated cases of non-compliance, mental stress, and fluctuating glycemia create difficult situations which nurses deal with during the scenario-based training sessions and interactive workshops (Alshammari et al., 2024). Such programs help nurses to maintain empathy, calmness, and clinical expertise while dealing with such cases. In addition, the training includes stress coping methods such as cognitive restructuring, mindfulness practice, relaxation techniques, and reflective writing. Overall, the use of these techniques makes nurses more resilient emotionally and helps them avoid burnout, a risk which is widely acknowledged for chronic care (Al-Ma'aitah, 2024).

Research proves that the implementation of theory-based systematic interventions is useful for both healthcare providers and patients. According to Koivusalo et al. (2016), well-designed interventions of lifestyle and behavior nature bring positive results. In contrast, research conducted by Dousti et al. (2018) shows that counseling programs based on behavioral theories improve adaptation and promote adherence to health recommendations. Thus, integrating this research results into the nursing education, one can develop training programs which include knowledge, behavioral skills, and techniques for managing emotions and use them to provide patient education, motivate behavioral change, and manage glycemia in patients with type 2 diabetes.

This program is meant to be customized to the particular context of the Hail Region with regard to specific factors that influence the management of diabetes. Various factors complicate the regional healthcare context in terms of management of diabetes. They include differences in patients' health

literacy, attitudes to chronic illness within cultures, and changes in the lifestyle of patients. Nurses are trained on how to take into account all these variables in the course of developing treatment programs. The training guarantees that patient counseling, motivational interviewing, and self-management support become culture-specific and personalized for each patient. According to the 2020 research by Alsaedi et al., such an approach proves to be effective as it increases patient engagement, adherence, and glycemic control. The combination of culturally sensitive patient education and improved resilience and coping capacity of nurses builds the link between nurse well-being and the quality of diabetes care provided.

As far as the effectiveness of the program is concerned, it is improved through iterative evaluation, further assistance, and additional modules. In order to make sure that the newly gained skills are successfully incorporated into the work of nurses, it is necessary to have reflective discussions, mentoring, and skill repetition. The iterative process helps achieve long-term development of the clinical skills, resilience, and coping capacity of nurses. These variables are directly related to the management of type 2 diabetes: more effective monitoring, patient education, communication, and finally glycemic control. The training program implemented in the present research serves as a strong basis for the improvement of nurse well-being and patient outcomes in the Hail Region (Algorani & Gupta, 2023; Alharrasi, 2023; Al-Ma'aitah, 2024; Alsaedi et al., 2020; Alshammari et al., 2024).

Nurses

The certified nurse can be considered the most important resource in modern healthcare systems because of the pivotal function they play. It is crucial since the role of the certified nurse allows integrating medical treatment, patient education, and implementation in the system. One of many functions assigned to the nurses is the administration of medications as well as measuring their vital signs. These are only two examples of actions necessary for ensuring well-being and good health of the patients. With respect to chronic diseases like type 2 diabetes mellitus, the influence of the nursing practice is especially evident because of the necessity to constantly assess patients' state, engage patients in the process, and make timely changes to the pharmacotherapy regimen. The nurses need to assess the complicated clinical data, detect the slightest changes in the state of patients, and administer the evidence-based and individualized treatment. Apart from all this, they help patients to cope with stress and anxiety caused by disease and required lifestyle modifications.

Considering the wide range of nursing duties especially concerning the management of chronic conditions, nurses are prone to experiencing burnout, emotional exhaustion, and occupational stress. Being exposed for an extended period to heavy workload, complex patient demands, and emotionally challenging situations leads to the drain of the cognitive and affective resources and is associated with the decline in clinical reasoning and patient involvement. It is explained by the fact that these variables act together causing the depletion of resources. The problem of burnout among nurses concerns not only the individuals themselves but the whole healthcare system as well. When nurses are exhausted, feel alienated, or their empathy decreases, the level of care provided reduces since patients get less attention and motivation, as well as less support in terms of self-management strategies. It is less likely that they will be motivated. As far as diabetes care is concerned, the role of nursing professionals is extremely important due to the direct impact of nurses on the decisions regarding nutrition, exercise, drug therapy, and glycemic control. The most important factor for the effectiveness of treatment is the nurse-patient relationship continuity.

Although nurses are entrusted with the technical logistics of the medical treatment process, they also play an important role in ensuring the emotional stability of patients. Indeed, the ability of the patient to stay calm, give support and demonstrate coping skills affects patient attitudes and actions in a direct way. It has been proven that the nurses' ability to control their emotions and sufficient support provided to nurses can help to improve patient adherence to treatment, increase their monitoring skills and decrease the number of recurrent conditions. Therefore, supporting the mental state of nurses is not just a human resources issue, but an important therapeutic aspect that allows maximizing positive outcomes for patients. The introduction of training programs designed to increase the ability of nurses to manage stress and cope with difficult situations gives practitioners the ability to handle the physical and social challenges associated with the provision of chronic treatment. Training programs will be designed to provide practitioners with the required tools and can include such activities as the use of mindfulness-based therapy, cognitive-behavioral therapy, reflection and resilience building practices. The main goal of these programs is to make sure that nurses who are under stress can remain cognitively clear-headed, emotionally stable and professionally engaged.

The emotional state of nurses affects the entire healthcare system through a domino effect. Such a situation is one of the parts of the domino framework. Nurses that feel supported, empowered, and competent enough to handle their own stress are likely to work collaboratively with the multidisciplinary team, communicate effectively with their patients and families, and practice

evidence-based practices. As a result, an organizational culture focused on patient-centeredness, quality, and safety is developed. Within such a culture, nurses will be able to achieve better medication titration, patient education, glucose monitoring, and prevention of complications associated with diabetes. All the mentioned aspects will have positive effects for all participants. Emotional training and building of resilience should be considered an important part of the process of becoming a nurse. Their presence guarantees that nurses are ready to face numerous challenges associated with caring for people with chronic illnesses.

Glycemic Control

Glycemic management is an important aspect of treatment of patients with T2DM. Glycemic control refers to the regulation of the blood sugar levels to have them at the acceptable level in order to maintain short- and long-term stability in the organism. The proper management of the condition is required to reduce the risks of complications related to excessive glucose content. In practice, glycemic management can be estimated with the help of biomarkers such as glycated hemoglobin (HbA1c), fasting plasma glucose, and postprandial glucose. In particular, the use of the first biomarker allows to obtain an adequate understanding of the glycemic status during several weeks/months; therefore, HbA1c can be used for the evaluation of efficacy of the intervention and patient's adherence to self-management regimen. The achievement of proper glycemic levels requires complex strategies including medication, changes in the patient's lifestyle, diet, etc.

It is important to mention that patients with T2DM and poor glycemic management are prone to a wide variety of complications, which are related to many organ systems. In particular, chronic hyperglycemia causes macrovascular complications (coronary artery disease, cerebrovascular accident, and peripheral arterial disease) as well as microvascular problems (diabetic nephropathy, retinopathy, and peripheral neuropathy). Moreover, there is evidence of connection between uncontrolled glucose level and reduced cognitive functioning, increased vulnerability to infections, and low quality of life. Therefore, glycemic control interventions are important from the clinical and public health perspectives.

There is a clear and strong link between focused educational interventions, behavioral modification programs, and improved glycemic outcomes, as demonstrated by empirical investigations. According to Zandinava et al. (2017), educational programs that were meant to improve patients' knowledge and self-management abilities resulted in a significant reduction in HbA1c levels and an

improvement in adherence to treatment regimens among diabetic women. The findings of this study highlight the crucial interdependence that exists between patient education, behavioral changes, and physiological outcomes. This interdependence suggests that knowledge and behavior are not only supplementary components but rather central determinants of glycemic control. When considered in the context of nursing practice, this research suggests that nurses play a crucial part in bridging the gap between clinical orders and the behavior of patients. It is possible for nurses to exert direct influence over the degree to which patients adhere to the therapy protocols that have been prescribed to them by employing patient-centered communication, motivational methods, and guidance that is culturally sensitive.

As an additional point of interest, glycemic control is becoming more widely acknowledged as a patient-centered outcome that represents the cumulative influence of healthcare interventions, psychosocial support, and self-care practices. For the purpose of this investigation, glycemic control is utilized as the key metric for evaluating the efficacy of nurses' improved coping methods, stress management, and emotional regulation interventions. It is easier for nurses to create trust with patients, inspire them, and make it easier for them to adhere to their lifestyle and medication plans when they are equipped with training programs that strengthen their emotional resilience, communication talents, and behavioral coaching skills. For instance, nurses who are able to effectively manage their own stress are more likely to continue relationships with patients that are empathic, consistent, and constructive. This is true even in circumstances in which patients exhibit non-compliance or resistance. Due to the fact that it has a direct influence on patients' willingness to engage in self-monitoring, adhere to dietary guidelines, and follow pharmaceutical regimens—all of which are needed for maintaining good glycemic control—this emotional stability is extremely important.

Glycemic control that is effective has broader ramifications that reach beyond the results of individual patients to include the functioning of healthcare systems and the health of the general public. Patients' functional ability and quality of life are improved, and the incidence of hospitalizations linked to diabetes is reduced. Additionally, the economic burden of chronic complications is reduced, and the incidence of hospitalizations associated to diabetes is reduced. Nurse-led therapies that include psychosocial support, stress management, and coping methods are particularly effective in the Hail Region, which is characterized by the fact that lifestyle variables, food habits, and societal influences have a large role in the management of diabetes. As a result of these interventions, a synergy is created in which the psychological preparation and behavioral competence of the nurse are transferred into

patient adherence, motivation, and finally, demonstrable improvements in HbA1c and other diabetic indices.

Additionally, it should be noted that the achievement of glycaemic control is a dynamic and on-going process that necessitates constant monitoring, modifications and reinforcements. Besides educating patients about appropriate management techniques, nurses also need to conduct on-going follow-ups and evaluation of their progress in order to quickly adjust interventions based on patients' feedback and blood glucose data. If nurses have advanced coping skills, good communication skills and proper emotional regulation, it becomes easier for them to react to various challenges associated with their work such as anxiety of the patients, difficulties with adaptation to the new way of life or lack of motivation. These challenges become more manageable due to the availability of these skills. In conclusion, the combination of nurse training, psychological aspects and patient management results in a holistic approach when glycaemic control is achieved through comprehensive care provided to patients (Alshammari et al., 2024; Alharrasi, 2023; Al-Ma'aitah, 2024).

Type 2 Diabetes Mellitus

Chronic and progressive, type 2 diabetes mellitus (T2DM) is a metabolic illness that is defined by decreased insulin production and insulin resistance. These two factors, when combined, contribute to persistent hyperglycemia and long-term dysregulation of carbohydrate, lipid, and protein metabolism. T2DM is highly connected with lifestyle factors, genetic predisposition, obesity, sedentary activity, and dietary patterns. This is in contrast to Type 1 diabetes, which is predominantly caused by an autoimmune response. Because of its rising prevalence and the myriad of difficulties it can cause, the condition is widely acknowledged as being among the most prevalent non-communicable diseases on a global scale. As a result, it presents a substantial challenge to public health systems. Because of these sequelae, which include cardiovascular disease, peripheral neuropathy, nephropathy, retinopathy, and a decrease in quality of life, comprehensive disease treatment has become a priority in both the clinical and public health arenas (Motahari-Tabari et al., 2023).

The treatment of type 2 diabetes implies a complicated process that includes pharmacologic intervention, lifestyle modification, regular medical monitoring, and psychological support. Although the use of pharmaceutical drugs like insulin and oral hypoglycemic agents is necessary to reach glycemic goals, many researchers confirm the significance of behavioral and educational measures in order to maintain the long-term control of the condition. Behavior change interventions help patients to

understand their illness, to monitor their blood glucose level, to change their diet, exercise regularly, and to detect symptoms of complications in time. The behavior change interventions include lifestyle education, self-management education, and compliance counseling. As Koivusalo et al. (2016) state, the systematic behavioral and lifestyle interventions result in the improvement of adherence, self-care behaviors, and metabolic control, which proves the inefficiency of pharmacotherapy as the only measure of glycemic control.

Not less significant is the issue of psychosocial aspect of the treatment of type 2 diabetes because the chronic nature of the disease means many emotional and cognitive challenges for patients, who suffer from diabetes-specific distress, anxiety, and depression and whose self-care and glycemic control are negatively affected by these problems. Nurses being involved in regular contact with patients should pay special attention to the psychological needs of people with this disease. Nurses' ability to communicate empathically, to give counseling, motivational and educational support may be very effective in increasing patient self-management. As it is stated by Motahari-Tabari et al. (2023), nursing training aimed at the identification of the psychosocial stressors related to type 2 diabetes and at the provision of coping and emotional regulation skills helps to improve adherence and glycemic control.

In this study, the T2DM population consists of patients located in the Hail Region and being taken care of by nurses undergoing structured training related to cognitive and educational aspects. Such a heterogeneous population enables to observe various manifestations of this chronic disease among patients of different age, duration of the disease, presence of complications, etc. Studying the population of interest helps not only to assess the efficacy of pharmacologic treatment but also to understand how the effectiveness of care may be affected by nurse–patient communication, providing support to the patient, education and encouragement to adhere to lifestyle changes. A hypothesis formulated states that undergoing psychological training will help nurses to improve their empathy skills, emotional regulation and ability to provide patient coaching. This change in nurse's performance is expected to positively affect patient self-care and result in glycemic outcome such as HbA1c and fasting plasma glucose values.

Furthermore, T2DM patients need not only pharmacotherapy but also continuous monitoring and more flexible approach. Patients often need assistance in making food choices, monitoring trends in blood glucose, detecting hypoglycemic/hyperglycemic episodes, changing their lifestyle in view of

personal, social, and environmental factors. When educated, nurses work as educators and behavior coaches explaining patients how to act according to complicated instructions in the most effective way. Thus, the goal of this research is to study the effect of nurse's increased competence regarding emotional regulation, coping and patient engagement on patient adherence and disease understanding and thus glycemic outcomes in the Hail Region.

Hail Region

With the growth of population in the Hail Region in north-central Saudi Arabia, and with the emergence of chronic diseases such as type 2 diabetes, the Hail Region has become an important healthcare destination. The epidemiological studies of the last decade have shown that there is a steady increase of the number of people diagnosed with type 2 diabetes in the region. This trend correlates with other similar trends around the world. There are numerous factors of regional specificity which affect the development of T2DM: some people lead sedentary way of life, follow calorie-rich diets and have low physical activity level. Thus, they develop obesity, metabolic syndrome, and insulin resistance, which are risk factors for the type 2 diabetes. Also, there are certain cultural factors of the development and progression of diabetes: certain dietary habits, social events, and the like. Thus, special attention should be paid to culturally sensitive interventions.

Concerning the health system of the region, the Hail Region has enough hospitals and primary care centers to provide a variety of medical interventions. Such preventive and therapeutic interventions include diabetes screening, pharmacologic treatment, nutrition counseling and education programs of patients. However, there is the necessity to increase the load on healthcare professionals, especially on nurses. Nurses are those who should educate, monitor and provide psychosocial support to the patients. That is why there should be certain innovative health care interventions not only for patients but also for nurses to improve their performance and make them more resistant to stress and psychologically healthy. Thus, Hail Region provides a good opportunity for intervention evaluations both from the point of view of patient care and nurse competence. These interventions can be evaluated with the help of special training programs.

The distinctiveness of the area from the point of view of its geographic, sociologic, and cultural characteristics creates the conditions for testing innovative approaches in terms of their applicability to patients. In particular, a high density of healthcare institutions in the urban area, as well as the discrepancies in health literacy and lifestyles in the rural one, create an opportunity to test the ability to

adapt the approaches to the patient's characteristics, which is possible with the help of targeted educational and behavioral interventions. Taking into account the gaps in healthcare provision and the specific needs of patients with type 2 diabetes, nurses trained in the use of psychological stress-management approaches and communication with the patient can facilitate the management of the disease.

Furthermore, the choice of this region can be linked to the overall strategic goals of Saudi Arabia that include reducing the impact of chronic diseases, improving population health, and enhancing the capacities of healthcare specialists with the help of training and education. Thus, interventions focused on the issues that exist in the Hail Region have the potential to help solve both regional problems and implement national strategies such as lowering the prevalence of diabetes, improving the quality of life of patients, and increasing resilience of nurses.

It is clear that there is demographic variability in the Hail Region, including different levels of age, socioeconomic position, and education, which creates a positive environment for researching the efficiency of special healthcare programs. At the same time, variability includes educational level differences as well. Since it is necessary to consider the complexity of the interaction of behavioral, cultural, and psychological aspects that affect patients' involvement in self-care activities, nurses who possess adaptive communication, motivational interviewing, and stress management skills are capable of assisting in that respect. That is important for treating type 2 diabetes when adherence to the regimen consisting of proper nutrition, physical exercises, medications, and monitoring affects the course of the disease and the development of complications. With the help of this study in the Hail Region, it is possible to evaluate the effects of interventions by nurses on the control of blood sugar level, patient satisfaction, and general health state.

Summary

To sum up, the basic terms mentioned in this study help understand how the Psychological Stress and Coping Mechanism Training Program can impact the mental well-being of nurses and subsequently the health outcomes of the patients, specifically glycemic control among people with Type 2 Diabetes Mellitus in the Hail Region. Psychological stress includes the emotional burden that nurses experience as a result of working in challenging professional conditions, conducting emotional labor, and witnessing the sufferings of the patients. Failure to handle all these factors properly may be harmful to the performance of nurses and the quality of care delivered to their patients. It should be

noted that there is an undeniable connection between the psychological condition of healthcare professionals and their patients' clinical outcomes.

However, coping with problems is the way for nurses to adapt to their work environment and manage stress reactions effectively. Coping mechanisms including problem-solving and emotion regulation skills help maintain emotional stability and balance in case of stress responses related to professional activities. If used in the context of training programs, coping mechanisms provide higher levels of job satisfaction, emotional resilience, and patient engagement. The results obtained by Ghasemi et al. (2021) and Motahari-Tabari et al. (2023) prove that counseling and behavioral interventions improve significantly the capacity to cope with stress and self-care practices of healthcare professionals in accordance with the authors' conclusion.

This training program described in the current research is not just a hypothetical proposal. It is an intervention based on scientific evidence aimed at improving the mental well-being of nurses through psychological education, stress reduction, and behavioral skills. As Koivusalo et al. (2016) and Dousti et al. (2018) state, structured interventions can bring some changes in the behavior of people and physical health parameters. The strategy used in this research is designed specifically to support nurses in solving the issues related to the care of diabetes patients.

Glycemic control is an objective criterion of patients' health improvement and an indirect effect of successful nurse-patient communication. Effective management of stress on the part of the nurses increases their level of understanding, attention, and initiative concerning patient education. It has a great impact on the ability of people to follow the regime of drug therapy and lifestyle changes needed in case of diabetes. According to Zandinava et al. (2017), education and behavior-oriented interventions could help control blood sugar and improve self-management skills. This statement reveals the essential role of psychosocial factors in the treatment process.

To sum up, cultural and epidemiological background of the chosen study is provided by the definition of type 2 diabetes mellitus and its place in the context of Hail Region. Due to the increase of the disease in Hail, it becomes necessary to introduce a new method that will combine treatment and psychological interventions. Hail is the appropriate location for the research of the more general effects of nurse-centered stress management program due to specific characteristics of lifestyle and demographics of the population. Combination of all mentioned concepts results in a unique conceptual

framework for the study that explains the connection between psychological state of nurses and physiological state of their patients.

CHAPTER TWO: REVIEW OF LITERATURE

Introduction to chapter

The theoretical and empirical foundation of the study is based on literature review. In particular, this paper evaluates prior research on the topic of psychological stress, coping mechanisms, and training for nurses along with the effect of these concepts on glycemic control in T2DM patients. It should be noted that the psychological condition of nurses is directly related to the level of quality of care and the results of their work and hence should be carefully studied. Nurses do not provide medical help only; they act as psychological support, teachers, and motivators for people who suffer from chronic diseases like diabetes. A number of studies show that occupational stress may impair the abilities of nurses to provide quality care to their patients.

The stress that is experienced by healthcare professionals is not only an emotional response; it is a complex process affected by numerous factors including workload, pressure from patients, etc. According to Lazarus and Folkman, people evaluate stressors based on perceived danger and coping resources. Thus, the transactional stress and coping approach is the foundation of modern approaches to strengthening the psychological well-being of healthcare workers. As shown by empirical data, such interventions as education and counseling can improve coping efficacy and decrease stress levels among health workers. For instance, according to the study conducted by Jeon et al., the postpartum care intervention that focuses on self-management and self-efficacy significantly improved glycemic control in patients with gestational diabetes mellitus. Thus, psychological empowerment and education can greatly affect health outcomes.

A number of additional articles also focus on the impact of knowledge and changes in lifestyle on healing. Reader et al. (2006) showed that healthcare providers who followed nutritional practice recommendations had positive effects on metabolic and pregnancy outcomes of women diagnosed with gestational diabetes. It is possible that higher emotional and mental well-being of healthcare professionals, including nurses, may lead to improved outcomes of their patients indirectly. The evidence mentioned above proves the statement about the necessity of nurses to learn skills needed to cope with stress effectively. Thus, the link between nurses' health and patients' outcomes is not only a theoretical issue but also an integral part of the comprehensive treatment.

Moreover, there is additional evidence that educational interventions and psychological counseling have a beneficial impact on the quality of life of people suffering from diabetes. According to Parsa et al. (2018), group therapy helped diabetic pregnant women improve stress coping and adjust to the changes in their lifestyles; as a result, the quality of their life increased significantly. In addition, Ural and Beji (2021) proved that programs aimed at improving health-promoting lifestyles helped achieve positive outcomes for mothers and infants. Therefore, the significance of behavior-based interventions in healthcare is highlighted in the literature reviewed. Even though the information was provided in case of women with gestational diabetes, it still provides solid support to the concept discussed.

Achieving glycemic control is predominantly contingent upon the self-care practices and psychological adjustments employed in diabetes management. Karbalai Harafteh and colleagues (2020) found that women with gestational diabetes who learned how to take care of themselves had less stress, better health literacy, and better self-care habits. In a similar study, Kim (2017) discovered that women's proficiency in managing their condition was enhanced through the utilization of a web-based self-management tool, resulting in improved psychological adjustment and clinical outcomes. Even while these studies are largely on women with diabetes, the main idea that managing stress and giving people more authority over their health can help them is also true for healthcare workers, who are very important in caring for people with diabetes.

In addition to this, available literature clearly highlights the significance of psychological and adaptive interventions in maintaining health outcomes, especially when dealing with difficult situations like the pandemic. d'Emden et al. (2020) have proposed a model based on fasting blood glucose in order to help identify pregnant women suffering from gestational diabetes who are likely to suffer from unfavorable outcomes. This shows the requirement for adopting approaches that take into consideration the context in which healthcare delivery is taking place. As it is evident from the pandemic experience, stress and uncertainty can influence both the patients and healthcare workers adversely, making it imperative to develop psychological resilience to deliver quality healthcare services.

All these studies provide an empirical background to support the proposed study, whose objective is to investigate the efficacy of training sessions for nurses regarding management of stress and coping techniques and the resulting effects on glycemic control of patients suffering from Type 2 Diabetes Mellitus in the Hail Region. While some earlier studies have focused on the use of psychological interventions for treating diabetes patients, there is lack of sufficient literature related to

the potential benefits of training nurses in coping with difficult situations in terms of improving the health outcomes of their patients. Thus, the current study fills in this gap in the literature by designing a training session for nurses to improve their psychological well-being, enabling them to deliver quality treatment.

Dependent variable

In this research, the dependent variable is the outcome that needs to be measured and analyzed. This decision is based on the assumption that the dependent variable represents the result of an intervention or the influence of the independent variable on the participants. In this case, the study centers on the level of glycemic control of type 2 diabetes mellitus patients. Glycemic control is considered to be one of the major indicators for the condition because it reflects the regulation of patients' blood sugar levels considering its significant connection with numerous consequences.

Glycemic control is affected by a variety of aspects like patient's behavior and choices, adherence to therapy and, in addition, psychological care and assistance from nurses. The current study considers the influence of nurse training on the improvement of glycemic control. Nurses receive knowledge in stress management and problem coping and the assumption is that they will be able to assist their patients more efficiently in managing their treatment and making changes in their lifestyles due to this improvement.

The levels of fasting blood glucose, postprandial glucose, and HbA1c can be used as objective clinical parameters that are usually used in quantifying the dependent variable. These three parameters give a comprehensive evaluation of the capability of a patient in regulating the blood glucose levels, not only in the short run but also in the long run. Apart from these objective parameters, the study considers some behaviors and psychological parameters such as the adherence of patients to their medications, dietary regimes, and physical activities. This gives a wider scope of the influence of nursing interventions on patient management.

Glycemic Control

Control of blood glucose levels is the main goal of the treatment of diabetes, which represents the efficacy of medications and other methods. Diabetes treatment refers to the ability of people suffering from diabetes to manage their blood glucose levels within a particular range. It helps to reduce the chances of having some acute conditions, such as hypoglycemia and

hyperglycemia and, simultaneously, decreases the risk of developing cardiovascular and microvascular complications. Glycemia status is usually estimated by using biomarkers, like fasting plasma glucose, postprandial glucose, and glycated hemoglobin (HbA1c). HbA1c is considered to be the most reliable index of the maintenance of glycemia within about three months. According to some studies, those who manage their HbA1c levels within a certain range have a significantly lower risk of neuropathy, retinopathy, nephropathy, and cardiovascular disorders (Basto-Abreu et al., 2021; Rakhis Sr et al., 2022). However, although modern therapy and monitoring systems are being developed, the problem of maintaining the levels of glycemia remains one of the most significant ones at the global level (Patel et al., 2021; Yahaya et al., 2023).

There exist a number of factors determining glycemic control aside from adherence to the prescribed pharmacotherapy. The area includes such elements as lifestyle, psychological well-being, dietary behavior, physical activity and ability to cope with stress. People with diabetes have difficulties combining their medical treatment plans with the requirements of everyday life concerning nutrition, motivational swings and social obligations. The problems might persist for the whole period of people's lives. Studies by Bitew et al. (2023) and Syeda et al. (2023) prove that lack of glycemic control is not only a physiological problem but also a psychosocial one that is associated with stress, depression and low self-efficacy. In spite of adhering to the medical regime, high glycemia might be caused by stress hormones like cortisol and adrenaline increasing the production of glucose in the liver and lowering insulin sensitivity. All this shows the necessity to provide comprehensive care for patients suffering from diabetes including psychological assistance, consultations and educational programs in addition to medical care. If nurses and other health care providers show empathy, offer structured education and help people cope with stress, they can greatly affect the results of glycemic control helping people increase their confidence and dedication to the set aims (Yahaya et al., 2023; Rakhis Sr et al., 2022). Management of diet and physical exercises also play an important role in achieving good glycemic control. Several systematic reviews (Syeda et al., 2023; Alvarez-Jimenez et al., 2023) prove that physical activity might increase insulin sensitivity and glucose uptake by muscles.

Moreover, according to Reader et al. (2006) quoted in Basto-Abreu et al. (2021), pregnant women with diabetes adhering to dietary therapy designed by professional nutritionists show better pregnancy and postpartum outcomes. Although such benefits are evident, patients usually find it difficult to make permanent lifestyle adjustments because of factors like insufficient time, poor

education, and lack of motivation. In the course of this discussion, the scope of the nursing practice expands from purely clinical observation to education, motivation, and emotional support, thus allowing nurses to assist patients in overcoming all psychological and behavioral barriers related to the daily maintenance of stable glycemia. The evidence suggests that support programs that focus on self-care and stress management can lead to more significant and long-lasting changes in the levels of HbA1c (Yahaya et al., 2023; Bitew et al., 2023).

On the other hand, there are several innovations in the field of diabetes management that have changed approaches to glycemic control. Artificial intelligence and machine learning have provided new ways of optimizing insulin dosage, predicting glucose fluctuations, and increasing patient compliance with treatment (Jacobs et al., 2023; Wang et al., 2023). According to Veluvali et al. (2025), reinforcement learning methods and digital health platforms have made it possible to make instant decisions and personalize treatments based on the data obtained from CGM, thus adjusting the patient's behavior to the clinical picture. Research shows that new technologies help achieve better glycemic control and decrease patient's anxiety level by providing the feeling of control and predictability of one's health condition. However, technology is not enough to substitute the human factor in the sphere of diabetes care. Thus, according to Patel et al. (2021) and Yahaya et al. (2023), motivation and stress reduction – the aspects crucial for glucose control – depend on establishing the emotional bond with a patient, personalized guidance, and constant communication.

To conclude, glycaemic control is not only the compilation of lab results, but also an expression of mental resistance, the quality of healthcare provision and the effectiveness of the corresponding system of support. The lack of control usually denotes some other problems, such as treatment burnout, distress, or inability to cope. On the contrary, a person is more likely to experience successful improvement of his/her glucose profile if he/she is armed with knowledge, offered emotional support, and directed by healthcare providers, who show empathy. Thus, glycaemic control should be considered from the physiological and psychosocial perspectives. It should be acknowledged that emotional support and behavioral training play as much of a role in the diabetes treatment as medication and technological innovations do (Bitew et al., 2023; Rakhis Sr et al., 2022; Veluvali et al., 2025).

Nurses' psychological stress and occupational burden

In all healthcare systems across the globe, the psychological stress and occupational burden of nurses have become significant problems, especially in those areas where the need for medical services is high and the number of healthcare professionals is insufficient, like the Hail region. The nurses not only handle clinical procedures but also perform emotional work in the capacity of educators and coordinators of patients' care. Nurses form the basis of the healthcare provision system, but this critical activity is characterized by significant psychological stress. Constant exposure to the workload, excessive work hours, the emotional character of the work performed, and moral responsibility to provide the care of patients create permanent pressure. As a result, these factors could lead to chronic stress, burnout, and emotional exhaustion, which significantly affect the psychological well-being of nurses and the quality of their care (Li et al., 2021; Okuhara et al., 2021). The permanent exposure to the suffering of the patients, emergencies, and moral responsibility for their health outcomes creates significant fatigue both physically and psychologically.

Concerning the topic of diabetes care management, the problem under discussion becomes even more relevant. The nurses who work with patients diagnosed with type 2 diabetes mellitus have to deal with a particular set of responsibilities that require accuracy and compassion in equal measures. They have to provide recommendations on medication, monitor blood glucose levels, motivate patients to change their lifestyles, and help them deal with the long-term consequences of their disease. To be good at performing these two functions simultaneously, nurses require significant emotional resistance and ability to concentrate. In particular, compassion fatigue, which is a kind of secondary traumatic stress, may develop due to the constant exposure to the suffering of the patients (Gulirmak Guler et al., 2025). It is created because of constant emotional engagement and empathy required for such functions, and the significant psychological load related to the maintenance of empathy during stressful activities might reduce motivation and mental health.

The absence of adequate means to cope with stress, insufficient institutional support, and the shortage of workforce might be considered other aggravating factors. Many nurses state that they feel undervalued and unappreciated, in particular in stressful positions with excessive workload and emotional stress being rarely addressed. According to Grochowska et al. (2022) and Diehl et al. (2021), this factor often results in frequent absences, poor performance, and dissatisfied patients. Occupational stress experienced by nurses is highly correlated with anxiety, depression, and burnout that have adverse effects on the quality of healthcare services and patient safety. Due to the absence of

established means to receive psychological support in such situations, there is a vicious circle of stress and fatigue.

The coronavirus pandemic made all of the issues outlined above even more pronounced. Being on the frontline of an unprecedented global health catastrophe, nurses suffered from excessive numbers of patients, fears of becoming infected, and inability to provide proper treatment. Many had to cope with the anguish caused by death of the patients and colleagues who contracted the disease. The psychological impact of this challenging situation was enormous, as professionals had to perform their duties under the circumstances of considerable psychological vulnerability (Marthoenis et al., 2021; Lasalvia et al., 2021). According to research conducted by Kua et al. (2022) and Schulze et al. (2022), healthcare providers, in particular nurses, were quite likely to develop various psychological disorders including post-traumatic stress disorder, sadness, and anxiety. Importantly, it should be noted that many nurses experienced the negative psychological effects of the pandemic long after the end of the crisis period. This example demonstrates the long-term influence of continuous exposure to such difficult working conditions. Besides, nurses, working in hospitals and primary care facilities across various countries, in particular, Saudi Arabia, faced two problems at once – the increase in patient numbers and insufficient institutional resources.

According to Imkome (2025), recent research indicates that nurses working in intense or emotionally charged situations, such as those encountered in emergency, palliative, and psychiatric nursing practice, are at risk of psychological stress and secondary traumatic experiences. Nurses working in such circumstances tend to feel the distress and agony of their patients, and as a consequence, experience emotional numbness, decreased empathy, and detachment from their duties. This condition not only harms the nurse's health but also negatively impacts the therapeutic relationship between a patient and a nurse, which is crucial for provision of the appropriate treatment. Thus, healthcare systems all over the world are actively developing programs aimed at building resilience and providing the skills needed to cope with stress.

Given all the aforementioned aspects, it becomes obvious that it is necessary to offer nurses an opportunity to undergo training that would be helpful for managing psychological stress and development of coping mechanisms. Such interventions would greatly benefit the mental state of the patient, build his/her emotional resources and, ultimately, improve the quality of the services received. Programs of such type help nurses to become more self-aware, attentive, stress-free, and learn how to solve issues positively, which contributes greatly to management of workplace challenges. Not only do

healthcare companies manage to retain the employees and increase their morale by ensuring mental well-being of nurses but also promote the atmosphere of empathy and professionalism. It is crucial to solve the issue of psychological and occupational pressure in order to maintain the quality, safety, and humanness of healthcare (Okuhara et al., 2021; Li et al., 2021).

Coping Mechanisms and Training Interventions for Nurses

Stress management skills are essential for nurses if they want to have mental and emotional strength. The nursing profession requires not only technical competence but also the ability to adapt and deal with new situations in light of the stress factors, ethical conflicts, and emotional weariness of patients. Many factors challenge the emotional stability of nurses, such as witnessing suffering, managing stress-related to a large workload, navigating through complex interprofessional relations, and taking rapid therapeutic decisions. In the absence of effective coping mechanisms, such stress may affect a person emotionally, cause anxiety and depression, or provoke burnout. According to Algorani and Gupta (2023), it has been consistently proven by scientific studies that coping represents a multifaceted process that includes behavioral, cognitive, and emotional techniques of keeping one psychologically healthy and being professionally competent. It is the mental protection of nurses from the damaging influence of job-related stress and enables them to maintain empathy and professionalism in the most challenging conditions without compromising their job efficiency.

Nurses generally employ two main types of coping mechanisms in their daily work: problem-focused coping and emotion-focused coping. Problem-focused coping means doing something to reduce or eliminate causes of stress, such being better at managing tasks, asking coworkers for help, or talking to your boss more often. These are various ways to deal with problems that are focused on them. Emotionally oriented coping, on the other hand, is centered on the regulation of one's emotional response to stressors by the use of strategies such as mindfulness, spiritual introspection, deep breathing, or emotional expressiveness. An umbrella study that was conducted not too long ago highlighted the fact that successful nurses frequently employ a balanced blend of both techniques in order to effectively manage a wide variety of job issues (Labrague, 2018). Not only do these processes assist nurses in maintaining emotional stability, but they also prevent maladaptive behaviors such as avoidance, detachment, or emotional withdrawal from occurring. According to Velana and Rinkenauer (2021), the ability to deal in a constructive manner has been found to be highly connected with lower rates of burnout, enhanced level of patient care, and increased levels of job satisfaction among nurses all over the world.

Alternatively, coping strategies are not innate qualities but learned behaviors that are achieved through specific training interventions. With the growing complexity of healthcare, it becomes increasingly essential to develop training programs that would prepare people to cope with stress and develop resilience. Such training programs may include cognitive behavioral therapy (CBT), mindfulness-based stress reduction (MBSR), as well as lectures on building resilience. According to Abdian et al. (2022), these interventions enable nurses to recognize maladaptive attitudes, develop skills of reframing stressful situations and build appropriate coping skills to deal with the stress. In order to improve the mental well-being of their staff, numerous hospitals and nursing schools have developed stress management and emotional intelligence modules to be implemented within the professional development curriculum. Nurses will be able to develop skills of increased self-awareness, emotional intelligence and ability to navigate tough clinical situations.

Over the last years, researchers broadened the concept of coping mechanisms including not only individual measures but also collective and institutional ones. According to Hutchens et al. (2025), team-based debriefing sessions and peer support groups reduce the stress level of nurses significantly. Sessions aim at providing participants with emotional support and opportunities to cooperate in problem-solving. Sessions are designed to provide nurses with an opportunity to discuss their problems, reflect upon difficult situations and gain support from colleagues who understand the specific challenges of their profession. Additionally, it has been revealed that the support of leaders is the key determinant of coping strategies' effectiveness. The atmosphere of psychologically safe environment where communication is encouraged, contributions are appreciated and emotional expression is supported fosters resilience and prevents burnout (Chaabane et al., 2021). Psychologically safe environment is created by leaders. Therefore, it is important for a company to possess supportive corporate culture in order to facilitate coping mechanisms.

The need for systematic coping mechanisms became apparent during the time of the COVID-19 pandemic. The sight of patients suffering and dying from the virus in unprecedented ways was not only morally but emotionally draining for nurses. A variety of studies have examined the effects of the pandemic on the long-term mental health of healthcare workers. Such research highlighted the importance of implementing timely coping strategies that could alleviate the effects of such experiences on the psychological wellbeing of the healthcare workers in question (Riedel et al., 2021; Alameddine et al., 2021). In order to train nurses to function in constantly changing work environments, training programs implemented in this time included resilience building, mindfulness

techniques, and psychological flexibility. According to Jiang et al. (2025), concentrated coping interventions, namely stress reduction workshops, counseling services, and resilience training in emergency departments contributed positively to nurses' mental wellbeing and increased their work engagement. Stress reduction workshops were particularly effective since they helped nurses understand the importance of being prepared mentally for dealing with emergencies, as well as possessing good clinical skills.

It is necessary to provide nurses with specific coping skills to be used by certain groups of nurses, particularly those working in emotionally challenging environments, such as pediatric critical care units or gynecological wards. Chen et al. (2025) discovered that pediatric critical care unit nurses who used coping techniques specifically designed to help them cope with the moral challenges of working in an ICU experienced a considerable decline in emotional exhaustion and an increase in job satisfaction. Such coping mechanisms included workshops for ethical reflection and peer counseling. Similarly, Yang et al. (2025) noted that gynecological nurses who took care of women who had gone through multiple miscarriages learned how to cope with their loss and remain compassionate professionals at the same time. It is evident that such strategies are necessary as coping mechanisms have to be specifically tailored to each clinical environment.

Furthermore, personal attributes, emotional intelligence, and education significantly affect coping techniques utilized by individuals. Li et al. (2025) and Bazrafshan et al. (2025) discovered that high levels of awareness and regulation among nursing students reduce stress and improve confidence during clinical work. Thus, there is a need for including information on coping mechanisms and stress management at the early stages of nursing education. Educating kids on how to cope with failures, reflect on them positively, and take care of themselves will keep them away from learning poor coping techniques in the future. Future nurses should be educated not only intellectually but psychologically as well.

Coping techniques have been extended to include psychosocial and behavioral training in terms of communication, emotional control, and relationships with other people. Yosep et al. (2025) stated that psychotherapy treatments and workshops that teach therapeutic communication and empathy significantly improve coping abilities of nurses when dealing with aggressive or violent patients, especially in a psychiatric setting. Psychosocial treatment techniques allow nurses to set boundaries emotionally and remain professional and friendly simultaneously. Related research conducted by Jiang et al. (2025) showed that structured psychological distress reduction training improved coping

capabilities in nurses working in emergency departments. These coping strategies provided opportunities for relaxation and support. The implementation of such programs demonstrates that investments in coping strategies by the organization provide measurable benefits for workforce stability and safety.

In conclusion, coping skills and training are important components of nursing practice and not simply complementary ones, since they contribute to the development of psychological resilience and competence of healthcare providers. Given the fact that modern healthcare service delivery entails many demands on nurses which put pressure on them psychologically and emotionally, it is important to help them develop adaptive skills in order to stay healthy and functional. Mindfulness, programs aimed at developing resilience, and systems of emotional support from peers may be some of the ways to address job-related stressors. Offering nurses appropriate coping mechanisms provides benefits which transcend individual psychological health and include providing better patient care and fostering a compassionate work environment (Velana & Rinkenauer, 2021; Hutchens et al., 2025; Chen et al., 2025).

Nurse–Patient Interaction, Communication Quality, and Patient Self-Management

The quality of the nurse-patient relationship is one of the main factors determining the effectiveness of self-management of people suffering from a particular disease, for instance, diabetes. Apart from providing medical help, nurses play roles of educators, motivators, emotional support, and instructors. According to Otter et al. (2022), the ability of healthcare professionals to communicate in an effective way results in establishing a trustworthy patient relationship, which positively affects patients' awareness about their illness and promotes their active participation in managing their health. Empathic, clear, and culturally sensitive nurse-patient communication increases the probability of patients' willingness to speak up about their issues, ask necessary questions, and follow doctors' instructions. Patient-centered care treats patients as participants of their own health process, and two-way communication is how patient-centered care is realized.

In order to provide person-centered care, nurses should adjust their communication with patients based on particular needs, emotions, and level of patients' health literacy. Forsgren and Björkman (2021) indicate that disagreement between nurses and patients concerning the importance of self-management may lead to conflicts. On the other hand, nurses have an opportunity to change such conflicts into discussion and problem-solving using reflective listening and open-ended

communication. Effective communication includes both the message and its delivery style, i.e., non-verbal communication and attention, all of which demonstrate respect and concern. All the ways of engagement discussed above have a considerable psychological impact on patients, increasing their self-efficacy.

It is established that the quality of communication has a strong connection with personalized care aimed at meeting patients' psychosocial and cultural needs. Thus, according to the research conducted by Bartkevičiūtė et al. in 2023, personalization of communication through consideration of such factors as patients' psychological readiness, education, and support networks improves the self-efficacy and perceived control among diabetic patients significantly. In this respect, the role of nurses consists in acting as intermediaries who turn complicated medical information into instructions related to patients' everyday needs. Moreover, empathic and understanding communication helps to develop psychosocial self-efficacy which in turn motivates patients to take responsibility for their lifestyles, take medications regularly, and monitor their illness.

The second factor which determines patients' ability to maintain their health is health literacy. According to the research by Gao et al. (2023), quality of patients' life depends on the level of health literacy with self-management being the mediating variable. Apart from conveying information, effective nurse communication gives patients the motivation needed to use the knowledge they received actively in practice. The assessment of patients' understanding and customization of the instruction help nurses to make sure that communication brings about necessary behavioral changes.

Recent advancements in technology have made effective nurse-patient communication more probable. The implementation of digital platforms and smartphones has made it possible to achieve continuous treatment outside the hospital environment. As shown by He et al. (2022), mobile self-management apps help diabetes patients maintain their glycemic balance due to continuous feedback and nurse-led monitoring sessions. Wathne et al. (2023) emphasized the value of eHealth technology in helping patients manage themselves after being hospitalized and staying aware of their condition during the recovery process. Such methods serve as a supplement to traditional nurse-patient communication methods because of personalized alerts and interactions that promote self-care practices.

Furthermore, the advancement in mobile health technology helps people suffering from chronic conditions. According to Ni et al. (2022), the continued improvement of mobile health-based self-

management technology for lung cancer patients is beneficial for nurse-patient communication and allows nurses to provide personalized care based on current patient health data. In a similar way, Sebastião et al. (2024) claimed that interventions by nurses, which help patients manage air quality to prevent exacerbation of their health conditions, are associated with increased awareness of their illness and improved self-care behavior. Overall, the studies prove that high-quality nurse-patient communication regardless of its form is the key to successful self-management.

The nurse-patient relationship is not limited to the act of providing medical advice alone but rather includes a relationship that entails caring interaction that promotes trust and respect among the participants. Personalized, clear, and consistent communication from nurses can allow patients to feel more self-efficient and take charge of their health care. Recent research findings increasingly suggest that the communication skills of nurses are not secondary to their medical knowledge but are crucial to obtaining holistic health outcomes (Otter et al., 2022; Forsgren & Björkman, 2021; Bartkevičiūtė et al., 2023; Gao et al., 2023; He et al., 2022; Wathne et al., 2023; Ni et al., 2022; Sebastião et al., 2024).

Additional viewpoints on the training of nurses, the psychological and social burden, and the outcomes of glucose levels

The provision of structured training in the field of diabetes care for nurses includes a wide range of interventions, such as the development of resilience of nurses' psychological functioning, improvement of their communication skills, and work with patients on a behaviorally oriented level. This training is much broader than the prescription of medicines and control of glucose levels. Repeated cycles of monitoring, medication adjustment, and follow-ups are the main factors in creating permanent interpersonal connections between nurses and people suffering from diabetes. Taking into account the fact that the main function of nurses is the interpretation of medical information that will influence decisions concerning patients' lifestyles, these relationships serve as the basis for the formation of stable metabolic functioning of patients. There is a connection between nurses' psychological experience of stress and its negative impact on the quality of interaction between nurses and patients that often leads to unwillingness of the former to conduct lengthy consultations and motivate the latter. The loss of communicative depth has an impact on metabolism as patients who lack psychological stimulation are more likely to ignore the advice of nurses regarding self-care procedures including diet, drug use, and physical exercise (Plotnikoff et al., 2009). Interventions involving behavioral skill training can have a positive effect on the process of education of people suffering from

diabetes especially if information is included into the context of motivation rather than presented in the framework of abstract clinical instruction (Motahari-Tabari et al., 2023).

The psychological and social load that nurses experience is an important mediator between their professional expertise and the outcomes for their patients. When providing care for diabetic patients, nurses frequently internalize patient failures as part of their own personal flaws and take emotional responsibility for the progression of chronic illnesses. When patients exhibit inconsistent adherence or oscillate between motivation and despair, such loads are amplified, causing nurses to endure moral discomfort and emotional exhaustion. They also cause patients to exhibit inconsistent adherence. These kinds of obligations become significantly more severe during times of crises on a global or community scale. As an illustration, during the COVID-19 pandemic, medical personnel reported experiencing elevated levels of anxiety, burnout, and depressed symptoms as a consequence of patient mortality, system instability, and an excessive amount of uncertainty (Riedel et al., 2021). As a result of these psychological repercussions, clinical presence is impaired, and the emotional energy that is required for effective communication is diminished. It is possible for nurses to retain procedural precision while simultaneously providing emotionally shortened teaching, which is what is known as "surface professionalism." When relationship depth is diminished, patient glycemic trajectories become unstable. This is especially true for persons who rely on trust-based interactions to maintain challenging behavioral changes. According to Okuhara et al. (2021), the occupational components of stress among nurses, which include working with an excessive amount of work, being under time pressure, and doing emotional labor, might result to decreased engagement and poorer outcomes for patients. Therefore, training that is focused on diabetes should not treat psychological stress as a peripheral problem but rather as a core predictor of long-term glycemic stability.

One aspect that is particularly significant is the role that communication plays in maximizing the effectiveness of diabetic self-management. It is quite uncommon for patients to translate biomedical instructions into practical practices without additional supervision. Effective communication between nurses and patients is dialogic, iterative, and adaptive. This allows patients to interpret their sickness in relation to the activities they engage in on a daily basis. According to the findings of qualitative research conducted by Otter et al. (2022), nurses who purposefully scaffold patient self-management through verbal methods, such as clarifying, probing barriers, and co-constructing coping mechanisms, are able to increase adherence both during hospitalization and after discharge when they use these

strategies. It is important to note, however, that this communicative sensitivity is extremely susceptible to psychological exhaustion.

During conditions of stress, the tendency of nurses becomes to simplify the communication process, give more concise instructions, and use more directive language than reasoning based on the patient's situation. As a result, there will be a reduced willingness of patients to reveal difficulties such as side effects from medications, hypoglycemia, and emotional state caused by diet limitations. There is a tendency to suffer from anxiety and depression for people who have diabetes. Such emotional comorbid conditions have an impact on the usual process of communication with other people (Nguyen et al., 2022; Rechenberg & Koerner, 2022). Puig-Perez et al. (2017) also indicate that psychophysiological sensitivity to stress occurs among people with type 2 diabetes. It has been proved that optimism helps to control physiological responses and metabolic indicators. Therefore, there is a need to teach nurses how to conduct communication with patients taking into account emotional intelligence rather than just communicating for the sake of conveying biologically relevant information.

Another important issue is the structural and socio-cultural environment of the care of patients with diabetes. The process of nurse-patient interaction does not take place without considering such factors as cultural beliefs, family practices, or institutional context. For many communities, the beliefs of patients about chronic diseases or traditional practices may become more influential for adherence than scientific knowledge (Puig-Perez et al., 2017). Recent researches showed that the emotional attitude to diabetes is an important factor in engagement with a treatment regime (Nyame, 2023).

It is possible for a nurse who has only received training in physiology to misunderstand these replies as being either stubborn or negligent. On the other hand, a nurse who has received training in culturally responsive education is aware that non-adherence may be an attempt to safeguard one's own identity or to preserve social relationships. Providing continuity of education and self-efficacy reinforcement is one of the ways that digital health methods have shown promising outcomes in overcoming these barriers. The progressive development of digital support for patients suffering from chronic illnesses promotes iterative improvement in disease self-management (Ni et al., 2022). Not only must nurses be educated on how to use technology tools but also on how to place such tools into context when considering the value system of the patient as well as their emotional and health literacy. This will require a change of paradigm in terms of educating nurses where they must stop being trained to provide "information" and begin learning skills to engage with the patients.

In the event of widespread health disruptions, the relationship between the well-being of nurses and the results of their glucose levels becomes even more important. As a result of disruptions in routine clinical support, glycemic control in diabetic populations considerably deteriorated, according to evidence gathered from the COVID-19 pandemic (Patel et al., 2021). According to Robert et al.'s 2023 research, diabetic persons exhibited increased levels of fear, anxiety, and depressed symptoms during viral outbreaks, particularly in populations that were considered to be at high risk. In the event when both patients and nurses are experiencing psychosocial distress at the same time, the communication conduit breaks down in both directions. There is a possibility that nurses will perform poorly in relationship domains, while patients will perceive clinical instructions through a lens that is skewed by worry. Training programs that combine psychological coping modules, self-assessment tools, and moral harm management become vital in these kinds of contexts for the purpose of safeguarding metabolic stability in diabetic populations. It is possible for nurses to prevent burnout, maintain communication quality, and deliver compassionate counseling even when they are under extreme workload conditions if they have received training that teaches them to detect when they have reached their emotional saturation point.

As a last point of consideration, the function of the nurse in the management of diabetes should be conceived of as metabolic stewardship that is emotionally supported rather than as technical disease management. In addition to clinical diabetic competence, training programs need to incorporate communication science, behavioral psychology, occupational coping mechanisms, and health pedagogy that is sensitive to cultural norms. In addition to ensuring that nursing practice continues to be patient-centered, robust, and relationally durable, this comprehensive strategy combats the psychological degradation that impairs glycemic stability.

The Importance of Emotional Regulation Training for Nurses and Its Direct Impact on Clinical Decision-Making in Diabetes Care

Training in emotional regulation is an advanced, multi-layered approach to professional growth that goes much beyond the usual clinical skills that are typically taught. When providing care for diabetic patients, nurses are confronted with a diverse range of emotional triggers, including the patient's fear of insulin injections, the family's anxiety about long-term problems, and the nurse's own internal pressure to maintain life-critical glycemic stability. Nurses are able to learn how to handle intense emotional signals without compromising their ability to make decisions through the use of systematic emotional regulation training. This training includes mindfulness-based stress reduction,

cognitive reappraisal, biofeedback techniques, and reflective practice. In the event that a nurse comes across a patient who is resistant to insulin titration, for instance, she can first experience feelings of aggravation, impatience, or urgency, particularly in situations where glycemic metrics indicate a sense of risk. The nurse is able to notice these internal cues early on, dissociate them from their professional response, and re-engage with the patient through the use of motivational interviewing and empathy-based communication tactics rather than engaging in reflexive confrontation or avoidance. This is made possible by emotional control.

When it comes to clinical judgment, emotional regulation serves as a cognitive stabilizer through its ability to control emotions. The interpretation of changes in fasting blood glucose, the assessment of indicators of hypoglycemia, the determination of whether or not to increase insulin dosage, and the recognition of situations in which comorbid stress is artificially increasing glycemic patterns are all examples of the rapid micro-decisions that nurses often engage in. When the nurse's stress is not well managed, the working memory of the nurse gets more limited, the nurse's risk assessment becomes less accurate, and the nurse's tendency to take heuristic shortcuts grows. The training of emotional regulation helps to reduce the impact of these cognitive errorsRegulation of the prefrontal processing pathways responsible for flexible attention and inhibitory control allows nurses to better combine evidence-based guidelines, the psychosocial state of patients, and relevant information before taking any actions. This is not an abstract statement: nursing practices regulated by professionals tend to involve progressive titration, minimal escalations, and higher thresholds for patient information clarification before making any alterations to treatments. These nurses are also able to identify minor indicators of distress, including changes in the tone of the conversation, body language, or withdrawal of patients that go unnoticed by other practitioners until serious issues arise.

Importantly, emotional regulation prepares nurses to cope with the ongoing psychosocial stress associated with diabetes care. Diabetes requires continued engagement in therapeutic relationships that may last months or years instead of episodic peaks of emotional arousal in acute care situations. A nurse can help patients to pass through a range of medical interventions and complications during months or years. In the absence of effective regulation strategies, nurses become exposed to compassion fatigue, moral distress, or detachment that interfere with therapeutic reasoning. The emotional stress can be turned into useful signals with the help of regulatory processes, including reflective sessions, emotion journaling, and peer debriefing. A nurse who faces persistent dissatisfaction from a nonadherent patient will be able to make use of reflective practice to identify

assumptions regarding responsibilities, expectations, and cultural background of the patient. These insights allow nurses to reconsider their judgments of the patients' reluctance to follow the treatment plan and explore barriers related to nutrition, health literacy, or economic difficulties.

A further point to consider is that training in emotional regulation interacts in a synergistic manner with evidence-based diabetes regimens. Clinical competencies are not replaced by it; rather, it serves as a scaffold for them. A nurse who is proficient in dose algorithms but does not have adequate regulation will be more likely to make mistakes while under pressure. On the other hand, a nurse who is able to emotionally regulate herself well but has less clinical expertise may approach patient care with empathy but in a risky manner. The nurse is able to establish a high-functioning decision environment when both domains are integrated. This setting is one in which patient education, safety, and glycemic results converge. Research on behavior reveals that practitioners who are emotionally regulated are more likely to comply with guidelines-based care. This is because they are less likely to suffer stress-driven inclinations to "cut corners" or break from standardized monitoring protocols. They also have a tendency to demonstrate more tolerance when it comes to collaborative goal-setting, which is one of the factors that connects with long-term patient adherence to glucose monitoring, dietary change, and the proper reporting of symptoms. As diabetes care moves more and more toward holistic treatment models, emotional regulation training is becoming an essential ability rather than an optional add-on. This is due to the fact that it generates clinicians who are able to handle complexity without compromising their judgment.

The use of digital self-management technologies into the program of nurse education in order to extend the care continuum

Integrating digital self-management tools into the nursing practice allows transitioning from executing tasks to enabling continuous care by nurses. The use of innovative solutions such as mobile applications for monitoring glucose levels, continuous glucose monitors, telemedicine, and AI-based dashboards is not limited to being an additional tool in diabetes management because it changes the logic behind delivering care. With the help of proper training related to using these platforms, nurses are able to track fluctuations in glycemic levels independently of clinic visits and understand the patient's behavior in terms of data streams. Thus, it allows shifting from episodic care to predictive measures. For instance, with the use of CGM interfaces, nurses can track temporal trends, patterns of glucose fluctuations after meals, and hypoglycemia indicated by alarms. This means that a well-trained

nurse can get in touch with a patient ahead of schedule to change the plan of his/her meals, modify the insulin regimen, or explain the right time for exercise.

Additionally, the incorporation of these technology fosters the development of additional layers of clinical reasoning, which are elements that are rarely covered in traditional nursing programs. The ability to authenticate digital insights and differentiate them from background noise is a skill that nurses need to acquire. This could be the result of late-night snacking, medication tiredness, circadian changes, emotional stress, or a combination of these factors. A diabetic patient may experience recurring hyperglycemic spikes at nine o'clock at night. The process of triangulating data involves the coupling of digital outputs with psychological cues, lifestyle histories, or medication adherence records. This is something that nurses learn through training. In addition, they acquire the judgment that is required to discriminate between legitimate warnings and false positives, which is especially important in situations where wearable sensors malfunction or when patient input is erroneousClinical judgment is a situation where digital literacy training becomes intrinsically integrated. It is critical for nurses to be able to understand how device calibration affects decision-making, limitations of algorithms, as well as impact of sensor lag on the decisions about insulin titration. Clinical interventions will be more informed, personalized and time-appropriate when digital literacy becomes an integral part of nursing education.

Moreover, it is possible to adopt the relationship-centered approach with help of using digital self-management technologies by nurses. Instead of considering patients to be passive receivers of health care services, such an approach promotes self-efficacy and shared responsibility for the results of diabetes treatment. Digital coaching implies the use of digital technologies by nurses who have received training in those tools, and it includes instructions to patients on interpretation of metrics, glycemic targets setting, and identification of risk behaviors. Technical difficulties to overcome include app navigation assistance, alarm threshold adjustments, and interpretation of trend arrows of continuous glucose monitors. The consultations thus become joint deliberations. Patients, who have learned how to react smartly to their data, transform into partners instead of being dependents. In such a manner, nurses become not gatekeepers of information but facilitators of patients' empowerment, which is connected with increased compliance, less glycemic variability and occurrence of preventable complications.

The application of digital tools in nursing education makes it possible to provide therapy not only in the clinical environment but also in the social and behavioral aspects. With the help of digital

diaries, it is possible to create a profile of the patients' lifestyle including information about their nutrition, sleep, exercise, and medications schedule. With the help of the behavioral analysis training, nurses are able to detect patterns such as constant changes in the calorie consumption related to social interactions, glucose level depending on the shift at work, skipping meals during the stressful periods, or neglecting of the medications intake because of fatigue. Thus, the nurse turns into a hybrid practitioner combining the educational and behavioral approaches. Treatments will be more individualized and specific, and instead of giving general recommendations about the nutrition, nurses will give advice regarding the patient's nightly routine or triggered behaviors weekly. This will allow avoiding the relapse cycle common for chronic conditions management.

To summarize, the integration of technology fundamentally changes the nature of healthcare equity. Patients living in underprivileged or remote areas may have problems with visiting clinics because of the transportation difficulties, lack of specialists and other obstacles. In the case when nurses get the training in using telehealth dashboard, secure messaging, and remote biomarker monitoring technologies, such barriers are successfully overcome. Patients are able to stay engaged regardless of their distance from the clinics or social restrictions. To make sure that the implementation of new technologies will not create new disparities, it is important to include cultural digital competency into the curriculum of nurse education in order to understand the needs of different population and its specifics regarding the language, literacy, and digital access. The use of digital tools in nurse education is expected to improve the continuity, equality, and person-centeredness of diabetes management.

The role of the nurse as a cultural translator is discussed in relation to the sociocultural attachment as a factor in determining glycemic stability.

Since the degree of sociocultural bonding impacts significantly the behavior, adherence, and glycemic regulation of patients, the nurses play an essential role of cultural interpreters in diabetes. Diabetes is not viewed by patients only from a physiological perspective, as it is perceived in connection with their families, religion, culture, and other aspects of identity. Family bonding plays a significant part in many communities, including Hail region of Saudi Arabia, where decisions are often made collectively and not individually. Concerning glycemic regulation, this feature can pose challenges as well as provide benefits. Group meals, traditions, and practices related to hospitality put more emphasis on cultural needs than on nutritional needs, thus affecting food choices of patients. Nurses unaware of cultural norms and societal pressure may view patients’ lack of compliance as

neglect or irresponsibility, which can lead to tensions and reduced communication, and consequently poor adherence to medical treatment. However, culturally sensitive nurses will understand such behaviors as logical and interpret medical recommendations accordingly (Nyame, 2023).

Considering practical issues in the process of cultural translation, this type of care is not merely limited to observing the patient's social environment, but also involves active involvement of nurses into interactions with the social context surrounding the patient. Nurses should assess the social dynamics, gender roles, religious customs, and economic limitations that affect the everyday life of a person. These everyday behaviors consist of such aspects as meal timing, choice of carbohydrates, and physical activity. Thus, for instance, female members of many households have to prepare food for their extended families, making them unable to follow individualized meal plans. A culturally knowledgeable nurse will be able to develop strategies allowing patients to maintain their glycemic goals and meet their responsibilities at the same time. This can include recipe modification, portion size change, or identification of appropriate times for physical activity. This strategy makes the job of nurses not the enforcement of abstract standards but solving problems together with patients and mediating between these two opposing forces. According to Motahari-Tabari et al. (2023), existing research shows that therapies taking into account the sociocultural embeddedness of patients increase their adherence, self-efficacy, and metabolic indicators because people view them as feasible and culturally relevant.

Patient education and health literacy should also be considered as an issue related to the problem under discussion. The culturally constructed cognitive schemes influence the perceptions of patients regarding their illness risks and recommendations concerning its treatment. For patients who use insulin therapy, glucose monitoring, and other treatments associated with diabetes, most of their misconceptions emerge because of traditional beliefs or community discourses. A nurse with knowledge in the area of socioculturally oriented practice will be able to detect patients' misunderstanding, show them respect, and offer them culturally appropriate information. To put it differently, nurses translate the knowledge from the perspective of evidence-based medicine into the culturally understandable language. This translation involves not only verbal communication but also body language, narratives, instructional materials, and participation in culturally acceptable activities.

Finally, the sociocultural dimension of patient relationships has an impact on the emotional and psychological aspects of treatment of diabetes. The concepts of self-esteem, social identity, and emotional resilience emerge from the normative expectations of the patient's community. A non-

conformist routine might provoke feelings of stress, shame, and anxiety that, in turn, result in increased level of cortisol hormone and disruption of glycemic regulation. With an understanding of the emotional implications of sociocultural ties, nurses can use psychosocial counseling interventions in culturally relevant ways to diminish anxiety and ensure adherence. Motivational interviewing could be modified to focus on family values, spirituality, and community relations to provide a positive re-framing of stressors that would serve as positive reinforcement for glycemic management. In this way, the connection between culturally relevant meaning-making and the achievement of medical goals not only increases adherence but also ensures better metabolic stability and patient well-being.

A dynamic interplay between the patient's culture and an ever-growing set of digital health tools provides another opportunity for the nurse to function as a cultural translator. In the past, this task used to represent a problem for nurses. Cultural mismatch might decrease effectiveness of various health technologies regardless of their widespread use as mobile health applications, telemonitoring, and remote coaching platforms for diabetes self-management purposes. Technology-based interventions prove to be the most effective when they are applied by nurses that received training in cultural integration of technologies. Training includes customizing of language, nutritional and activity advice. In particular, notifications regarding diet and medications can be tied to culturally relevant events, festivals, and meal schedules. Remote consultations could also involve families as co-collaborators if necessary. As was mentioned by Ni et al. (2022) and Nyame (2023), the role of sociocultural translator is not limited to in-person interactions and involves bridging the cultural gap between the patient experience and innovations in health technologies.

The sociocultural translation stresses the importance of standardization and structure in the nursing course curriculum (Nursing Education Curriculum). The conventional training in clinical settings emphasizes pathophysiology, pharmacology, and techniques, whereas cultural anthropology, social psychology, and behavioral economics are not usually taken into account. By undergoing structured programs, which include modules on sociocultural assessment, negotiation, and adaptation, nurses are equipped to deal with difficult social situations, remaining clinically effective at the same time. This aspect becomes particularly important in dealing with chronic diseases because patients' compliance and blood glucose levels depend on the daily choices they make taking into account cultural, social, and family aspects. In such a way, nurses become agents of behavior change by translating scientific data and sociocultural information.

Nurse burnout as a covert adversary of glycemic control: transitioning from an occupational hazard to a potentially metabolic risk factor

Nurse burnout is a multifaceted issue influencing the management of diabetes and representing a complex challenge. Specifically, it goes beyond personal concerns of the healthcare professional and impacts the metabolic functioning of patients and the healthcare system as a whole. Nurse burnout used to be viewed primarily in terms of its connection to the staff retention, absenteeism, and job satisfaction of the nurses. Nowadays, the findings of researches indicate that it is also a latent factor in glycemic regulation. The capability of nurses to make fine adjustments and use micro-precision in providing care is impacted by the emotional, cognitive, and procedural stress that nurses experience. For instance, the necessity to adjust insulin titration, to evaluate small changes in the glucose levels after fasting or postprandial meals, and to look for early signs of complications requires constant mental attention. In turn, burnout drains this resource, causing the lack of attention and making nurses less attentive and empathic in the process of their work. The results of the studies done during the pandemic of the COVID-19 disease indicated the prevalence of emotional exhaustion, depressive symptoms, and anxiety in nurses; it had a negative influence on the interaction with patients, which quality became lower (Riedel et al., 2021).

The effects of burnout in nurses are profound in both physiological and behavioral terms. Emotional exhaustion is often connected with low tolerance of patients' resistance, lack of patience in explaining instructions concerning eating or medications, and lower reactions to psychosocial triggers. All of the abovementioned affects the adherence of patients, especially in conditions of chronic diseases such as type 2 diabetes mellitus. Occupational stress that is caused by heavy workloads, interpersonal stress, and emotional labor creates a vicious circle that worsens the process of burning out, diminishes the possibility of paying therapeutic attention and disrupts the process of building relationships with the patient (Okuhara et al., 2021). As a result, patients suffer from lack of clarity, support, and loneliness in managing their illness while nurses apply protective mechanisms. All of these relational issues cause higher HbA1c levels and a risk of both microvascular and macrovascular complications. These relational deficits are reflected in insufficient self-monitoring, non-adherence to diets, and delayed detection of glycemic excursions.

Moreover, chronic and relationally intensive care of patients with diabetes makes the problem of burnout even more evident. Unlike in acute care when contacts with patients are short and sporadic, the process of managing the disease of a patient takes place in the course of months or years. In case of

nurses who are experiencing burnout, compassion fatigue, emotional disengagement, or depersonalization can happen, and thus their possibilities of establishing trust, reinforcing behavior therapy, and providing psychologically beneficial information will be limited. If the relational process is disrupted, then the behavioral scaffolding of patients' adherence will be affected. There is evidence that burnout in nurses influences not only nurses themselves but the whole system of clinical decision making, activity prioritization, and responding to the patient's need (Riedel et al., 2021; Okuhara et al., 2021). Thus, it is necessary to redefine burnout as a metabolic risk factor that works through the patient-provider dyad.

Consequently, interventions aimed at preventing the burnout syndrome become a crucial part of the training of the staff members of diabetes care programs. Traditional educational curriculums for nurses concentrate on pharmacology, pathophysiology, and technical aspects of nursing practice; but rarely they pay attention to the psychological needs of practitioners working with chronically ill patients. The application of organized interventions, such as peer support groups, stress reduction through meditation, reflective practice, resilience building sessions, and stress management techniques allows nurses to develop coping strategies which help them to preserve their attentional capacities, emotional balance, and inter-personal communication. As a result, nurses are able to maintain continuity of relations, provide constant motivation, and ensure the stability of metabolic state despite of the stress factors.

In addition, burnout contributes to other stress factors in healthcare institutions through a mutually reinforcing interaction. Exposure to suffering of the patients, high number of patients per nurse, administrative work, and emotional labor associated with counseling of families become the factors of cognitive and emotional exhaustion. Such an interaction results in a series of negative consequences for the patients, including lower frequency of monitoring, consultations on a run, weakened ability to solve problems and comply with guidelines for diabetes care. Inability to provide systematic support becomes the cause of these consequences. As a result, patients receive fragmentary counseling, face difficulties in self-management, and show increased instability in their glycemic levels. Moreover, burnout exacerbates inequalities in quality of care provided due to the fact that more complicated social or cultural context, low health literacy, or family support make nurses' interpretive, motivational and mediating work critical for patients.

Additionally, longitudinal research shows that continuous burnout prevention results in better glycemic management. According to research where people were followed over time, nurses

participating in training programs that focused on developing emotional resilience and stress management, as well as adaptive coping mechanisms, are not only able to feel better but also to practice more patient-centered approach, effective communication and reinforcement behavior. The clinical implications of such approach include increased patient compliance, glucose monitoring, decreased variability of HbA1c and fewer cases of avoidable complications. In other words, the resolution of the issue of nurse burnout makes the problem that was individual one become a system-oriented and metabolic approach to management of the issue.

Crisis-driven destabilization of diabetes care occurs when disruptions to the system amplify the vulnerability of patients

The process of diabetes management relies on a complicated balance between continuous monitoring, following the prescribed life-styles and medical prescriptions, and receiving help from the healthcare system; hence, it can be easily disturbed due to the existence of systemic problems. The appearance of any crisis situations, whether they occur globally, such as pandemics or natural disasters, or happen to the health system itself, such as an economic collapse, can affect the balance negatively. These situations increase the vulnerability of patients and may result in chain reactions, including problems with their blood glucose levels. There is evidence that people with type 2 diabetes suffered from increased glycemic variability, non-attendance of medical consultations, and delays in getting prescribed medicines due to the COVID-19 pandemic (Patel et al., 2021). At the same time, there was an increased psychological burden on patients due to anxiety, fears related to infection, isolation, and economic instability (Robert et al., 2023). Overall, all of the mentioned factors make it difficult for people to perform their self-monitoring, which leads to poor glycemic results and complications in acute or chronic form.

As both frontline caregivers and patient navigators, nurses play an especially important role during times of crisis. This is because they are the ones who provide care to patients. Crises can result in sudden shifts in the manner in which treatment is provided. These shifts might include the overcrowding of hospitals, the reduction of outpatient services, and the reallocation of medical resources away from the management of chronic diseases and toward the demands of acute care. Patients, especially those who have recently been diagnosed or who have a limited understanding of health literacy, have a difficult time processing complicated information and making adjustments to their behaviors without the assistance of a specialist. ongoing psychosocial support is provided by nurses who have been educated to respond adaptively during systemic crises. These nurses are able to

foresee interruptions, execute contingency care plans, and provide ongoing support. Telehealth services and mobile health treatments, for instance, have the potential to bridge gaps in care continuity; however, this is only possible if nurses are skilled in the monitoring of digital data, the identification of patients who are at risk, and the translation of distant feedback into counsel that can be placed into action (Ni et al., 2022). The presence of these competencies enables nurses to become crisis stabilizers, so reducing the likelihood of glucose worsening in spite of interruptions from the outside world.

Feedback loops between the effects of crisis-induced instability and the psychosocial state of the patients further aggravate the negative outcomes of poor glycemic management. As a matter of fact, neuroendocrine responses triggered during the crisis impact glucose metabolism, whereas the symptoms of anxiety, depression, and stress can be often observed in crisis time. Elevation of the cortisol level, changes in insulin resistance, and disturbances in appetite management can be the reason for the development of hyperglycemia or drastic fluctuations of glycemic management. On the other hand, crisis-induced behaviors of people, for instance, changes in diet, lack of adherence to medications, or low physical activity, can contribute to metabolic dysregulation. Nurses trained in crisis-sensitive counseling can help to detect and manage physiological and behavioral effects of the crisis. Structured problem-solving, motivational interviewing, and coping skills training can help in reducing the psychosocial burden caused by the crisis, creating the routines, and adherence under difficult circumstances (Rechenberg & Koerner, 2022).

In addition to the physiological and behavioral aspects, the structural and organizational components of the crisis can contribute to existing diabetes treatment disparities. The disruption of the healthcare system is more pronounced among people with limited finances, difficulties with mobility, and social isolation. Such people may experience problems with access to insulin, test strips, and nutrition support, which accelerates the decline in glycemic management. In order to diminish the consequences of the crisis, the work of nurses with experience in crisis management and triage becomes very important. Clinical and social mediators, whose responsibility includes identification of high-risk patients and providing support from the community, perform these tasks by detecting the people with increased risks. However, proactive planning of care, like pre-crisis education of patients, creation of emergency kits, and teaching digital self-monitoring becomes an additional instrument of resilience-building.

A disruption of the continuity of nurse-patient interaction constitutes another threat which may compromise the management of diabetes mellitus. The longitudinal care is based on trustful relations

with patients and repeated visits which help to consolidate the efforts aimed at changing the lifestyle and compliance with medical prescriptions. Any disruptions leading to delays in consultations or restrictions of communication will undermine the basis for the formation of trustful relations. In order to preserve the continuity of nurse-patient relation and reduce the rate of disengagement of patients, it is important that nurses were trained to establish a connection with patients through other means of communication, for example, via secure instant messengers, teleconsultations, and community mobilization activities. Additionally, nurses will be able to adjust the content of their instructions to the specifics of a certain crisis situation by focusing on the development of achievable goals, simpler diet recommendations, and stress management techniques consistent with available resources.

In conclusion, the analysis of the impact of the current crisis on diabetes care demonstrates the necessity of systematic preparation for the emergence of any unpredictable situations. In addition to knowledge and skills associated with the practical aspects of providing care, nurses should be aware of how to overcome unexpected difficulties, use digital tools for remote assistance, support patients psychologically, and deliver equitable care. Nurses trained in these competencies will be able to maintain patient glycemic control regardless of the situation. In this way, the potential increase in metabolic risks due to unexpected situations turns into an opportunity for empowerment and adaptive self-care of patients.

Independent Variable

The independent variable in the study involves the effectiveness of the Psychological Stress and Coping Mechanism Training Program for Nurses. This variable relates to the intervention that aims to increase the ability of nurses to deal with occupational stress, employ coping mechanisms, and ultimately impact patient outcomes. The intervention includes several training sessions focusing on stress management, situation awareness, time management, emotional management, and communication skills. As part of this intervention, participants are required to learn theoretical aspects as well as gain practical skills that would help them deal with stress and work with patients, including those with chronic diseases such as type 2 diabetes mellitus.

Program Content and Structure

This training program has been designed with utmost care in terms of its content and format in order to provide nurses with a complete tool kit for dealing with workplace stress and, at the same time,

improving their ability to cope with stress situations. To cover all the cognitive and physical aspects of stress management, both theoretical and practical elements have been incorporated into the training program. Of major importance within the curriculum are lessons on biology and psychology of stress, during which the effects of stress on the mental state, cognitive abilities and work performance will be discussed. Nurses will be trained to recognize signs of stress, burnout and emotional exhaustion both in themselves and other people in order to obtain help in time. According to Faramarzi and Pasha (2018), the basis for the training program is the knowledge about stressors and assessment of psychological well-being.

This idea serves as the foundation for the method, which incorporates a variety of practical coping skills, such as relaxation techniques, cognitive-behavioral strategies, and mindfulness exercises. For instance, nurses are taught mindfulness practices to assist them in remaining present and coping with their feelings when they are confronted with stressful situations. This is especially important in hospitals and other places that provide acute or emergency care. Nurses are provided with the opportunity to participate in scenario-based activities, role-playing exercises, and reflection exercises that are simulations of the challenges they confront in their professional lives. These exercises not only provide nurses with a secure environment in which to practice their coping abilities, but they also stimulate peer support, shared learning, and collaborative problem-solving among themselves and their colleagues. In their study, Bazrafshan et al. (2025) highlight the fact that experiential learning and peer discussion significantly improve the retention of coping abilities and support long-lasting behavioral change in clinical practice.

Another essential component of the curriculum is the instruction of nurses in the management of their feelings and the development of effective communication skills. They are equipped with the abilities necessary to manage their own emotions and demonstrate empathy to both patients and coworkers as a result of this. Through the utilization of emotional management strategies, nurses are able to tackle the stress that comes with providing care to patients without allowing it to influence their clinical judgment or relationships with patients. In order for nurses to maintain positive relationships with patients even when things are challenging, they are taught how to actively listen to patients, how to be assertive, and how to settle problems through the use of communication skills modules. According to Hutchens et al. (2025), training that integrates stress management with communication and relational skills delivers more comprehensive advantages. This is because nurses not only manage

stress more effectively, but they also build an environment that is supportive and secure for the care they provide.

Organizational requirements are highlighted as one of the stress-inducing factors, which is why it is crucial to introduce the training on task prioritization and time management into the program. The participants learn how to prioritize tasks, delegate the tasks, and make detailed schedules without any work overload. Tools that are useful for self-assessment can be used in order to promote the skills developed at the program sessions. According to Li et al. (2025), the program effectiveness will be increased by the use of individual features of nurses including their personality traits, preferences, and the perception of stress as the means for developing and applying coping strategies.

Additionally, the program includes continuous evaluation and feedback when instructors and participants get help and support from their peers. This design makes it possible for nurses to evaluate their achievements, find out where they need improvement, and stay motivated enough in order to continue behavioral change introduced by the program. Using all these tools, the program can provide participants with a holistic opportunity to manage stress and cope with challenges better. It is an important aspect since the program will be effective when nurses can not only cope with their occupational stress but also offer their patients the high quality of care, for example, for type 2 diabetes mellitus (Chen et al., 2025; Bazrafshan et al., 2025; Hutchens et al., 2025).

Delivery Methods and Engagement

The Psychological Stress and Coping Mechanism Training Program has been developed with utmost care to serve the need of nurses working in high-stress environments through effective learning experiences. This program offers engaging experiences in purposeful activities, flexibility, and means of substantive learning. It involves different methods of instructions such as classroom lectures, online courses, and practical exercises taking into account the specific difficulties that nurses have in their professions such as irregular shift, heavy workload, and emotional stress. During classroom learning sessions, the participants will undertake practical exercises (role-playing, group discussion, and stress management activities) in an environment that guarantees participation. This design makes it possible for the participants to develop their emotional strength, apply coping strategies in practical and realistic life situations and get feedback from the trainers. According to Sarazine et al. (2021), interactive workshops involving stress management and mindfulness are able to lower nurse's burnout, increase coping ability during stress and improve psychological functioning.

There are in-person meetings as well as online courses and digital tools that are designed to assist with the in-person sessions that are included in the curriculum. Online webinars, video demonstrations, and exercises that you can complete at your own leisure are some examples of these types of opportunities. The fact that nurses are able to enroll in these classes anytime they choose makes it possible for them to accommodate them into their hectic schedules and allows them to acquire the information more than once. Pan and Yeung (2023) highlight the fact that digital positive psychology therapies have the potential to effectively improve self-management behaviors and emotional control in individuals who are coping with chronic illnesses such as diabetes. According to Huffman et al. (2023), merging traditional and digital learning provides people more freedom and stimulates them to continue learning. This is especially true for healthcare staff who are attempting to strike a balance between providing care for patients and enhancing their abilities.

Together with this, the curriculum places an emphasis on learning through collaboration with other people and getting to know them. Through the use of small group chats and peer mentoring, nurses have the opportunity to discuss their experiences, reflect on the challenges they have faced, and get insight into how their colleagues manage stress in their everyday encounters. A higher sense of belonging, a reduction in feelings of loneliness, and an increased motivation to implement stress management strategies in clinical practice are all outcomes that result from these social connections. The research conducted by Benmaamar et al. (2022) and Robert et al. (2023) demonstrates that it is possible for persons with diabetes and healthcare personnel who are indirectly affected by the stress of patients to benefit from social support and collaborative learning. This issue affects both those who have diabetes and healthcare professionals. Moreover, in order to achieve greater levels of active engagement, feedback systems and self-monitoring activities are used. The participants are able to track their own progress and get advice from instructors on coping skills development. They are obliged to keep reflection journals. Thus, it becomes possible to make sure that the developed strategies are incorporated into everyday life and can be used in clinically oriented environment. According to Lenze et al. (2022), regular practice of mindfulness combined with reflection results in positive effects regarding cognitive and emotional regulation, which are achieved during the practice itself. These benefits are necessary in high-stress environments in the healthcare industry.

Moreover, the program creates psychologically safe and supporting environment, where the nurses feel encouraged to share their experiences, ask any questions and actively participate in different activities without any worries about criticism. Such approach helps to open up emotionally, improves

the level of resilience and stresses the importance of using coping techniques in therapeutic practice. As for the role of safety of surroundings for learning in nursing education, according to findings by Wong et al. (2023) and Nguyen et al. (2022), safe and well-ordered environment contributes to increased levels of attention and engagement and encourages behavioral change. These outcomes are as relevant for adults as for younger students. Thus, by means of in-person workshops, digital learning, peer support and feedback, the program is aimed at ensuring comprehensive engagement strategy. This task is achieved through the synergy of all above mentioned components of the program and their successful implementation in its implementation.

Expected Impact on Nursing Practice

In this regard, it is expected that the training program on Psychological Stress and Coping Mechanisms for the nurses will bring about a significant improvement in the glycemic management in individuals suffering from Type 2 Diabetes Mellitus. To a great extent, the quality of nursing care that patients receive determines their state of health. Patients and the healthcare system primarily communicate with nurses, who serve as the primary point of contact. According to Toobert, Hampson, and Glasgow (2000) and Didarloo et al. (2011), they are more likely to provide patients with proper education, counseling, and support for how to manage their own health. This includes providing information on how to check their blood sugar levels, what to eat, how much exercise they should get, how to take their meds, and how to take their drugs. This is due to the fact that nurses who have acquired the ability to deal with their own mental stress and possess strong coping skills are more likely to be able to provide these services to their patients.

In order to assist with the management of glycemic levels, one of the most significant ways that nurse training can be of assistance is by encouraging patients to devote more time to their own self-care activities. In 2007 and 2016, Bennett, Guo, and Dharmage were cited in Kordi et al. Numerous studies have shown that patient participation in self-care behaviors, including as monitoring blood glucose levels, adhering to dietary requirements, and engaging in regular physical activity, is strongly associated with improved glycemic indices, including HbA1c levels. These practices include monitoring blood glucose levels, following nutritional rules, and engaging in consistent movement. The monitoring of blood glucose levels, adherence to dietary restrictions, and the maintenance of a constant amount of physical activity are all included in these habits. When nurses have a good mental capacity and are able to cope with stress, they are better able to instruct, motivate, and monitor the patients under their care. It is because of this that patients are better able to maintain their self-care

practices. As an illustration, it has been demonstrated that nurses who are provided with adequate assistance are able to assist patients in experiencing increased self-assurance and capability by providing them with individualized counseling, motivational support, and behavioral advise. This results in improved regulation of glucose levels (Faramarzi & Pasha, 2018; Ghasemi, Vakilian, & Khalajinia, 2021).

When it comes to dealing with the numerous mental and emotional challenges that people who have chronic illnesses experience, nurses who have received training in coping skills are more equipped to handle the situation. Making significant adjustments to one's way of life is frequently required in order to manage diabetes, which can be a stressful and challenging process to manage. Nurses are better able to understand how their patients are experiencing because they are confident in their ability to manage their own stress. This enables them to provide emotional support to their patients and remove mental obstacles that prevent them from following through with therapy. It has been demonstrated through interventions aimed at gestational diabetes that nurse-led educational and behavioral counseling programs have the potential to bring about significant changes in self-care practices and glycemic outcomes (Motahari-Tabari et al., 2023; Koivusalo et al., 2016). The goal of these initiatives is to assist diabetic pregnant women in making better decisions regarding their condition. Based on the findings presented here, it appears that patients diagnosed with type 2 diabetes are likely to experience comparable benefits from nurses who have received intensive training in stress management.

The effect extends beyond the exchanges that take place between individual patients and moreover encompasses enhancements to the manner in which healthcare is provided on a more extensive basis. When members of the nursing staff have adequate psychological resources, they are able to implement procedures for regular monitoring, implement programs to encourage lifestyle changes, and react quickly to alterations in the glycemic control of patients. According to Kharaghani et al. (2016), this helps to contribute to a more proactive and preventive approach to the management of diabetes, which in turn promotes the decrease of complications and hospital readmissions. In other words, this serves to make diabetes management more beneficial. Furthermore, improvement in nurse–patient communication and education can help patients better understand their condition and the significance of self-monitoring, which has been shown to correlate with lower HbA1c levels and reduced long-term health risks (Bennett, Guo, & Dharmage, 2007; Toobert, Hampson, & Glasgow, 2000). Self-monitoring has been shown to be associated with a reduction in the risk of developing

complications in the long term. The reason for this is that patients who engage in self-monitoring are more likely to stick to the treatment regimens that they have been prescribed.

In conclusion, I would like to state that it is predicted that the program would have a substantial impact on the management of patients' blood glucose levels of glucose. It is through the program that patients are able to improve their self-care practices, increase their adherence to medication, and be encouraged to achieve better glycemic results. To achieve this goal, nurses must work to improve their psychological resilience and their ability to cope with stressful situations. The objective of this integrated strategy is to place an emphasis on the interconnectedness of nurse well-being, patient education, and the management of chronic diseases within the nursing profession. In addition, it serves as an illustration of the fact that providing support to healthcare staff is an essential way for improving the health of people who have type 2 diabetes mellitus.

Theoretical Framework

An integrated strategy that blends nurse self-care frameworks, stress and coping theory, and patient-centered care principles serves as the basis for this study's theoretical framework. Patient-centered care concepts are also incorporated into this approach. Among patients in the Hail region who have type 2 diabetes mellitus, the objective of this study is to assess the influence that a training program for nurses that focuses on psychological stress and coping mechanisms has on the patients' ability to bring their blood glucose levels under control. The ability of nurses to effectively manage psychological stress has a significant impact on a number of aspects of patient care, including education, adherence to self-care practices, and ultimately clinical outcomes such as glycemic control. Nurses are the most important part of diabetes therapy, and the capacity of nurses to educate patients has a direct impact on the way diabetes is treated. When the Transactional Model of Stress and Coping, which was established by Lazarus and Folkman, is taken into consideration, stress is not considered to be a condition that is fixed, but rather it is considered to be a dynamic interplay between the demands of the environment and the resources that individuals have available to deal with it. When nurses are presented with a high workload, emotional labor, and difficult patient encounters, they experience stress. Stress is a natural and inevitable phenomenon. In the event that this stress is not alleviated, it has the potential to undermine the professional competence of nurses as well as the quality of care that they deliver to patientsTraining that improves both problem-solving and emotion-based coping skills helps nurses deal with such stressors better and hence boosts their self-confidence and ability to make decisions in clinical settings, as observed by Abed & Jassim (2021) and Al-Ma’aitah (2024).

Furthermore, these training programs make it possible for nurses to make better clinical decisions. In instances in which patients are unable to effectively satisfy their own health requirements, the Self-Care Deficit Nursing Theory, which was established by Orem, lays an emphasis on the nurse's role in bridging gaps. This theory is comparable to the coping theory in that it places an emphasis on the nurse's relationship with the patient. Self-care practices are becoming increasingly crucial in the management of type 2 diabetes, particularly with regard to the control of hyperglycemia. The following are examples of activities that fall under this category: taking medications as directed, making adjustments to one's diet, engaging in regular physical activity, and monitoring one's blood glucose levels. In addition to being better able to deliver patient-centered education, they are also better able to urge patients to stick to their treatment plans and offer emotional support. All of these things help patients feel more capable of self-managing their disease. Nurses who have received training on how to effectively manage their own stress are in a better position to deliver these services with their patients. According to the findings of Alshammari et al. (2024) and Abdulkarim et al. (2024), structured nurse treatments that focus on both psychological support and patient education have been shown to dramatically improve outcomes such as HbA1c levels, knowledge, and adherence behaviors. The purpose of these interventions was to offer patients with psychological support and to educate them about diabetes.

The proposed model also takes into account the Social Cognitive Theory and specifically the self-efficacy component, which plays a significant role in influencing the behavior of nurses and patients. The nurses' belief in themselves and their ability to cope with stress and provide care improves the process of communication and education. As a result, patients gain confidence in their ability to manage diabetes because they are taught by nurses who are highly experienced, resilient, and have good self-care behavior and continually reinforce the patients. Empirical evidence suggests that psychosocial and educational interventions performed by nurses have a positive effect on patient self-management and clinical results, which means that the psychological readiness of nurses is a mediating factor between competence and the health outcomes of patients (Fallatah, 2023; Alharrasi, 2023).

Moreover, the model takes into account socio-cultural factors, such as knowledge, cultural beliefs, social and community support that affect patient outcomes in Saudi Arabia, Oman, Ghana, and Australia, based on the empirical studies performed in these countries. Nurses who know how to deal with stress and provide supportive communication will be able to take into account socio-cultural aspects in therapeutic process and create personalized interventions according to individual needs.

Nyame (2023) states that patients should be provided with culturally sensitive communication and instruction regarding new diagnosis of diabetes. In contrast, Al-Ma'aitah (2024) proves that intervention strategies that consider the impact of the emotional aspect of the crisis situation, like COVID-19 lockdown, positively influence the work of nurses and help improve glycemic levels of patients.

Overall, according to the paradigm, any nursing interventions related to reducing stress and improving coping skills have a domino effect. Nursing interventions are associated with improved nurse-patient relationships, better patient education, increased adherence to self-care regimes, and help maintain glucose level balance. These interventions make nurses more resilient and mentally healthier. Various nursing interventions, such as counseling, training sessions, and patient involvement, can serve as examples of using this paradigm. These interventions provide the connection between theory and practice, providing health-related results (Hakeim et al., 2025; Abed & Jassim, 2021). The multi-dimensional theoretical framework guarantees that the current study will consider not only the human aspect of diabetes but also the clinical one. Moreover, it allows emphasizing the strong connection between nurses' psychological well-being and patients' treatment results.

Conceptual Framework

The conceptual framework of the current research aims at exploring the interrelationship between nurses' psychological stress, coping strategies used by them, and patients' glycemic control in type 2 diabetes mellitus in the Hail area. First of all, it should be mentioned that nurses' practice cannot be reduced to the set of daily procedures performed by healthcare professionals because it significantly depends on the psychological state of nurses themselves. The process of providing care to people who have certain diseases is associated with such challenges as high-level decision-making, extended working hours, as well as personal problems. In such a way, the ability of nurses to educate, support, and instruct patients in terms of proper self-management can be complicated by these aspects. Therefore, it is necessary to implement interventions aimed not only at helping nurses to improve their coping skills but also to reduce stress associated with work (Chen et al., 2025; Hutchens et al., 2025).

Moreover, it is proposed in the framework that nurses' ability to cope with stress depends on the level of patient interaction. As nurses use efficient coping strategies, they may speak better, provide patients with the educational information in a better way, and motivate them to follow treatment plans. Such coping strategies involve both problem-focused ones like prioritizing, managing tasks and making

decisions, and emotion-focused strategies like mindfulness, reflection, and peer support. Critical variables for the glycemic control involve patients' self-management, knowledge about the disease, and involvement in the process of receiving care. The improvement in the quality of nurse-patient interaction helps them to resolve these issues. Using supportive and informative communication, nurses may help patients to build the routine concerning the monitoring of the levels of glucose, following a diet, and exercising.

Furthermore, the proposed conceptual framework includes the design of the training program on psychological stress and coping strategies as integral parts. Multidimensionality of the program means using different educational techniques such as lectures, workshops, interactive simulation, case discussion, and e-learning resources. This will allow providing a more comprehensive and attractive educational experience. As a way to consolidate the skills gained and create a learning environment where stress management would be not a theory but a routine practice that can be applied in various real-life clinical settings, the program will encourage nurses to implement gained coping skills in various real-life clinical settings. This will help nurses internalize coping techniques that improve quality of care for patients. The goal of the program is to create a sustainable workforce that would be able to maintain a high standard of care in the long run (Sarazine et al., 2021; Benmaamar et al., 2022). It will be done by integrating these coping tactics into the everyday practice in order to prevent burnout and increase job satisfaction.

In this model, glucose regulation is analyzed through both objective and subjective approaches. HbA1c levels and fasting blood glucose levels are the objective measurements that give strong evidence about physiological impact. On the other hand, subjective measurements such as adherence to self-care practices, quality of life, and psychosocial well-being shed light on the patient's experience and engagement. The model assumes that proficient coping skills among nurses, effective communication and support, and nursing interventions, in general, are expected to be beneficial for the patients and their outcomes, thereby creating a clear link between the two. In addition, contextual factors such as sociocultural environment, patient knowledge level, healthcare resources, and access are also taken into account as the optimal outcome depends on the interplay between professional intervention and context (Abed & Jassim, 2021; Alshammari et al., 2024).

In conclusion, the above concept-based framework is a complex model where the training program acts as the agent of change affecting the psychological resilience and coping skills of the nurses. As a result of these developments, more nurse-patient interactions take place, which motivates

the patient to self-manage and finally results in better glycemic awareness. The approach not only makes it easier to plan research, but it also lays the groundwork for real-world solutions that can improve nursing practice and patient outcomes. This is accomplished by identifying and operationalizing the links between the variables being studied. It demonstrates that the health of patients is inextricably linked to the support, direction, and emotional stability that is offered by their caregivers, and it places an emphasis on the vital role that nurses' mental well-being plays in the management of chronic diseases. Al-Ma'aitah (2024), Abdulkarim et al. (2024), Fallatah (2023), Nyame (2023), and Hakeim et al. (2025) describe contemporary nursing theories that advocate for holistic, patient-centered care while also recognizing the professional and emotional needs of nurses as essential to the delivery of high-quality healthcare. This approach is in line with these theories.

Summary

This study focused on the effectiveness of psychological stress and coping mechanism training for nurses, as well as its impact on glycemic control among patients with type 2 diabetes. Chapter Two presented a full investigation of the important ideas and variables that were pertinent to this study. The first part of the chapter was devoted to a discussion of glycemic control, with an emphasis on the significance of keeping diabetes under control and avoiding complications. Empirical studies indicate that successful glycemic control relies on patient self-management, compliance with medication, nutrition, physical activity, and the availability of psychosocial support.

Further discussion on nurses' stress and work stress are described in the next part of the chapter. It points out the increasing levels of stress and burnout caused by heavy workloads, stressful situations, and caring about patients with chronic diseases. With time, it is clear that the quality of nurses' work, communication with the patients and the quality of care become worse because of the constant stress.

The following part of the chapter talks about stress management and training programs and how it is necessary to develop such training programs, which would provide education to nurses on how to cope with stress. They include mindfulness, peer support and resilience programs, which are greatly helpful in maintaining the mental health and performance at work of nurses.

The nurse-patient relationship and the communication between them are considered very important factors that influence the patients' condition. There is evidence that patients who have good communication and supportive interaction are more willing to follow self-care plans and keep their

glycemic control in order. The chapter describes the elements and the ways of delivery of the training program as well. The best interventions to reduce stress and to help to cope with it should contain didactic lectures, workshops, simulations and digital means.

Finally, the conceptual model is introduced, which shows interrelations between nurses' stress perception, their coping with it, quality of their communication, self-management of patients and glycemic control. The chapter also states that there should be included both objective and subjective indicators of the patients (blood glucose levels, their self-management and quality of life) to evaluate the results of nurses' intervention. It is necessary to train nurses in particular to improve their mental well-being.

CHAPTER THREE: RESEARCH METHODOLOGY

Introduction

In this chapter, clear instructions on how to conduct the study will be provided. These instructions will provide information on the methodologies, techniques, and instruments used to ensure that the objectives of the study are realized and the hypotheses tested. It gives a full picture of the methodology of the study showing how all the elements of methodology come together to produce reliable and valid results. The main objective of this chapter is to provide readers with a clear idea about the procedures used in conducting the research, the reason why this methodology was chosen, and how the investigation will be consistent and scientific. It is done to make the study methodical and replicable; something very important for the reliability and practicality of the results. This will be achieved through a discussion of the design, setting, population, and sampling.

Research Design

A quasi-experimental design was used in this study as well. This design allows studying the effects of the intervention and establishing the causal relationships between variables. Application of this design is justified when it is impossible to use randomization but it is still needed to make the comparison and explain how the training program operates. The purpose of this research is to evaluate the effectiveness of a nurse-centered training program aimed at working with psychological stress and coping mechanisms and to study its influence on the quality of glycemic control among type 2 diabetes patients. Using the quasi-experimental design makes it possible to observe the dynamics by comparing the state before and after the intervention and, therefore, to understand better what the direct effect of the training program is on the nursing practice, stress coping, and the patient outcome. Besides, it is possible to consider the control variables using this design.

Research Setting

The research will be carried out in several hospitals and clinics in the Hail Region specially created to provide services to patients suffering from type 2 diabetes. The chosen location was picked up taking into account its feasibility and practical value, since it provides an opportunity to conduct the research in a real-life environment and, thus, to implement and evaluate the intervention. The use of a hospital environment allows observing the nurses' work directly, getting to know the workflow, interprofessional communication, and reaction to stress. In addition, using this location makes it easier

to obtain patients' information, which allows measuring their glucose levels and other health outcomes. Such approach helps to make the results obtained in the process of research feasible and applicable to practical nursing.

Research Population and Sampling Technique

Participants of the study will include two main groups of people, namely (1) patients and (2) nurses who work in the selected facilities and take responsibility for the care of people with type 2 diabetes. The inclusion criteria of nurses for participation include relevant experience, willingness to take part in the training program, and availability for future assessment. As for patients, they should satisfy the following criteria: (1) being diagnosed with type 2 diabetes, (2) receiving care from nurses enrolled in the study, and (3) willingness to take part in the study. Nurses will be selected by means of purposive sampling in order to choose those who may benefit the most from the training program and will significantly help in achieving the study's goals. Convenience sampling will be used for patient selection in order to have enough participants within the given timeframe.

Research Population

The target population of the study is patients with type 2 diabetes whose glycemic control shall be measured before and during the intervention. Also, the population involves nurses who will take part in the training program on psychological stress and coping. The investigation will be able to explore in a systematic manner the link between the psychological and behavioral state of nurses and the patient outcomes since there are two major focus areas for the study. The direct involvement of nurses in the process of diabetes care ensures their professional experience and coping skills will be reflected in the research. Patient inclusion allows for making conclusions on the clinical outcomes. The population has been chosen in such a way to allow the exploration of the ways in which specific nurse-related interventions can bring about positive changes in patient care.

Sample Size

Adequate determination of sample size is an essential part of obtaining reliable, valid, and generalizable research results. There are several methods available for the estimation of sample size, with their appropriateness depending on research design, expected effect size, required significance, and research power. When conducting quasi-experimental research, power analysis can be used for the estimation of sample size based on the likelihood of detecting a real effect in case it exists. Typically,

the power is set at 0.80 (or 80 percent) in order to decrease the chances of Type II error, whereas significance level is set at 0.05 to reduce Type I error. The expected effect size can be estimated based on previous research or pilot data, and sample size will depend on the changes that are expected regarding the most important outcome variables like glycemic control and stress. For research including comparison of the situation before and after intervention, methods for the estimation of difference between two means and two proportions can also be appropriate.

Sampling Technique

For the current study, the process of sampling involved both convenient sampling and purposive sampling. In this case, purposive sampling was used to identify nurses who were meeting certain criteria like experience, readiness to engage in the training, and the involvement in caring for patients with type 2 diabetes. It is important because it allows identifying individuals who can make a contribution to the research since they will be able to provide information related to stress management and coping strategies during the research process. Convenience sampling was used to identify the patients since it allowed obtaining an appropriate number of patients in the timeframe of this study.

Inclusion and Exclusion Criteria

To make sure of the suitability of participants and the validity of the results, inclusion and exclusion criteria should be clearly defined. In addition to these, there might be other criteria used to determine the eligibility of a person for becoming a nurse and they may include registration, experience in managing diabetes cases, willingness to participate in the training program, and availability for further assessments. Nurses who have been on leave, not actively involved in patient care services, or have undergone similar training before can be excluded from the study. Criteria for inclusion of patients will comprise a definite diagnosis of type 2 diabetes, participation in the follow-up services by the selected nurses, and willingness to give informed consent. Patients with other health complications affecting their glycemic status, unwillingness to participate in the study, and non-compliance with the intervention can be excluded from the study.

Study Instrument, Pre-Testing, and Reliability

The research instrument is an important part of the methodology. It is supposed to gather subjective and objective information about coping strategies of nurses, their level of psychological stress and glycemic control. The elements of the instrument can include questionnaires, self-rating

scales, observation checklists and health record forms. It is necessary to perform preliminary tests of the instrument to make sure that it is clear and valid. Reliability analysis, like calculating the value of Cronbach's alpha for internal consistency reliability is required to make sure that the results will be reliable and consistent. Moreover, some preliminary tests can be done on the small group of nurses and patients in order to improve the performance of the instrument. These steps should be followed to make sure that the gathered data is credible and reliable.

Study Instrument

The research tool has been carefully designed to correspond to the goals of the study and to assess the impact of the training program for psychological stress and coping mechanism on both nurses and patients. With the help of the tool, the stress level, coping skills, self-efficacy and involvement in the program of the nurses can be assessed using scales and questionnaires. For patients, it will be possible to monitor the control of their glucose levels, self-management and health outcomes based on both clinical measurements (such as HbA1c values) and self-reporting. Being created with the aim to collect baseline and follow-up data before and after the training program is completed respectively, it provides the opportunity to conduct comparative analyses.

Nurse characteristics: A researcher will be design form recorded gender, age group, marital status, educational level in nursing, years of nursing experience, job position, and nationality.\

Perceived stress: Nurses' stress will be measure with the 14-item Perceived Stress Scale (PSS- 14; Cohen et al., 1983). Items are rated from 0 (never) to 4 (very often) with reference to the past month.

Coping strategies: Coping will be measure with the 29-item revised Ways of Coping Checklist (WCCL; Vitaliano et al., 1985), which comprises five subscales: problem-focused coping (12 items), seeking social support (3 items), self-blame (3 items), wishful thinking (6 items), and avoidance (5 items). Items are rated from 1 (not at all) to 4 (to a great extent).

Diabetes self-management self-efficacy: Patients will be complete the 20-item Diabetes Management Self-Efficacy Scale (DMSES; van der Bijl et al., 1999), which covers blood glucose monitoring (3 items), dietary control (10 items), physical activity (3 items), foot care (1 item), and medication intake and follow-up (3 items).

Content Validity and Reliability.

Content validity and reliability are necessary components of any research in order to increase the credibility of the study, especially when dealing with programs that imply psychological assessment and clinical outcomes. Content validity of the research instrument is needed to ensure a full scope of constructs examined, including stress level, coping methods, and glycemic control. For the assessment of the tool, the expert opinion of nurses, psychologists, and diabetes specialists should be obtained to verify that all the questions are relevant and understandable. Usually, consultations with experts are required. When working in multilingual settings, translation of the instrument is necessary. It starts with the forward translation of the tool from the source language into the target language, which is then translated back to make sure that the meaning of each item remains unchanged throughout translation. The opinion of bilingual experts is needed for solving possible inconsistencies in meanings. Reliability is usually determined using pilot testing and analysis of statistical indicators, such as Cronbach's alpha, measuring the internal consistency of the instrument.

Data Collection Methods

To make sure that the data is accurate, thorough, and useful, it must be collected using systematic methods. Data are collected at various intervals during the investigation: prior to, during, and subsequent to the intervention. Structured self-report questionnaires, stress and coping measures, and observation checklists are tools that nurses use to find out how much psychological stress a person is under, how well they can cope with it, and how involved they are in training. For patients, clinical indicators such HbA1c levels, fasting blood glucose, and self-reported adherence to diabetes self-care activities are documented. People who collect data get training to make sure they follow standard procedures, stay consistent, and get rid of bias. Also, depending on how easy it is to get the information and how easy it is to do the task, either digital or paper records may be used. The technique also puts a lot of focus on protecting privacy and confidentiality, making sure that participants are happy with their capacity to give honest and correct answers. Consistent monitoring during the data collection phase encourages completeness, aids in resolving discrepancies, and facilitates prompt follow-up with participants who may possess incomplete or missing data.

Description of Variables

In the current study, there will be three groups of variables; namely independent, dependent, and control variables. Independent variables refer to the nurse training program aimed at developing coping mechanisms that can be used by the nurses in handling psychological stress. The program will be operationalized based on content, length of the program, mode of delivery, and extent of use by the participants. In addition to the results of patients regarding the management of their condition and health status, dependent variables include the level of stress among the nurses, coping mechanisms, and self-efficacy. Control variables may include patient's demographic information (age, gender, years of nursing experience), co-morbid conditions, and the initial psychological/clinical state of both patients and nurses. All these variables are used in order to avoid the influence of any possible confounding effects. Each of these variables will be clearly defined for proper measurement.

Data Analysis Process

Systematic methods are applied within data analysis for transforming the initial raw data into useful information. Initially, the quality of the data is checked for accuracy, completeness, and consistency. Descriptive statistics is applied in order to summarize information about participants and baseline data through means, standard deviation, frequency, and percentages. In order to find out the influence of the training program on the stress level and coping strategies of nurses and glucose control of patients, inferential statistics are applied using techniques such as t-test, ANOVA, and regression analysis. Correlations may also be run between the coping strategies of nurses and patient outcomes, where needed. Analysis of the program also involves an analysis of the magnitude of change before and after the intervention.

Data Processing.

Data processing implies organizing and structuring the collected data to prepare it for analysis. First, each response is carefully analyzed to spot, correct errors, input missing values, and discard outliers that can affect the results' accuracy. In order to use statistics on the collected data, coding each variable is performed according to a certain scheme assigning numeric codes to different types of answers. So, questions measured on a scale of stress and coping, which are usually Likert scale items, will have numeric scores ranging from 1 to 5; demographic variables will have their own unique integers. Then, data checking using statistical software is used to verify that the data collected is

correct. As part of the data checking stage, the tests of normality, variance homogeneity, etc., are carried out to check assumptions for parametric testing.

Exploratory Data

Exploratory data analysis (EDA) is an important step that must be done before formal statistical testing can be done. This is so that you can understand the structure, patterns, and details of the data you have gathered. It means looking at the data from both the nurses and the patients very carefully to find trends, abnormalities, and any links between the variables. To analyze the distributions of stress scores, coping strategy evaluations, and glycemic measurements, descriptive statistics and visual representations such as histograms, box plots, and scatter plots are employed. Researchers can utilize EDA to detect results that aren't normal, see if the data fits with the ideas that will be used in later studies, and get a first idea of how the training program might work. It also sheds light on differences within subgroups, including how stress levels vary among nurses with varying years of experience or how glycemic control differs among patients with varied baseline health statuses. These two examples show how groups can be different from each other. In general, EDA not only helps you choose the right statistical tests, but it also gives you information that can help you figure out how to interpret the study's results.

Addressing Missing Data

One of the most common problems that researchers run into is not having enough data, especially when they are working on projects that require both clinical assessments and people. If there isn't enough data, it could introduce bias and make the study less valid. When it comes to this study, missing data is handled in a proactive way by using both preventative and corrective methods. During the data collection process, regular checks are done to make sure that incomplete responses are found as soon as feasible. When feasible, participants who have missing entries are contacted to clarify or complete their entries. Statistical approaches like imputation, which guesses missing values based on the data that is available, or pairwise or listwise deletion, which depends on how much and how often data is missing, can be used to deal with missing data in analysis. When looking into how nurses' coping strategies affect patients' glycemic outcomes, it is very important to make sure that the method used does not distort the relationships between variables. This is especially crucial when you think about the method in question. This meticulous approach ensures that the dataset remains as broad and representative as feasible, hence maintaining the integrity of the analysis.

Data Analysis Approaches

The data analysis procedures are designed in a way that enables the analysis of the entire gamut of intervention effects, including both direct and indirect effects. The quantitative research procedure starts with descriptive statistics to describe the demographic characteristics of the sample, their baseline levels of stress and coping mechanisms, as well as the level of patients' glucose. Then, inferential statistics are conducted to test the hypotheses of the study. Specifically, paired samples t-test or repeated measures analysis of central tendency will be used, not the independent samples t-test or ANCOVA, which tests the difference between the intervention group and control group, accounting for possible confounders; for this purpose, analysis of variance (ANOVA) will be used. Correlation and regression analysis will be conducted to establish the association between nurses' coping skills and patient outcomes, including their adherence to self-care practices and maintaining their blood glucose levels. Effect size will be calculated as well.

Pilot Study Reliability Procedures

It is necessary to conduct an initial pilot study in order to assess the reliability, feasibility, and applicability of the research tools and procedures before conducting the actual research. In the current research, the pilot involves a small representative sample of nurses and patients that are similar in characteristics to those in the main study. There are a number of objectives of the pilot study: it evaluates the process of measurement of stress, coping, and glycemic control; it checks whether the questionnaires are clear and understandable; and it finds the possible problems in logistics. The reliability of questionnaires is tested by the means of statistics, such as Cronbach’s alpha that measures the internal consistency of related scales, and test-retest, which checks how stable the scales are. Moreover, the feedback from participants is sought in order to make improvements to the questionnaires. Participants share their thoughts about clarity, length, and utility of the questionnaires. Conducting the pilot study helps to ensure that the main study will generate valid and reliable results.

Ethical Consideration

The study was approved by the Institutional Review Board of the Hail Health Cluster, Ministry of Health, Saudi Arabia (IRB Log No. 2026-6; full review; 1 February 2026). Institutional permission was obtained from the participating facilities before data collection. All participants provided written informed consent, were informed of their right to withdraw at any time without consequence for their employment or care, and were assured of confidentiality. The study was conducted in accordance with the Declaration of Helsinki (World Medical Association, 2013). One of these standards includes gaining informed consent from all participants (nurses and patients). In this case, the full information about the research purpose, procedures used in the experiment, its expected positive outcomes and some possible negative consequences is provided to the participants. It is also mentioned that the participation in the experiment is completely voluntary, and the participants can withdraw from it any moment they want without having any negative consequences for their health, job, and treatment process. Anonymity of data collected during the research is ensured; all personal information is excluded from the databases. Furthermore, the principle of beneficence is also applied in the current research since the maximum number of beneficial effects (decreased level of stress among nurses, better control of glycemic indices in patients) is achieved while the minimum number of possible negative consequences is reached.

References

- Abdian, T., Kargarjahromi, M., & Ramezanli, S. (2022). The effectiveness of coping strategies training on nurses' Occupational stress in Jahrom hospitals. Bangladesh Journal of Medical Science, 21(2), 354-360.
- Abdulkarim, D. N., Alqurashi, H. A., Aldossri, E. A., Almubrook, A. S., Alamri, A. S., Alanzi, A. A. A., ... & Aldossary, G. S. O. (2024). The Role of Nursing in Diabetes Management: The Impact of Biochemical Markers on Diagnosis, Complications, and Patient Outcomes through Comprehensive Care and Support. Egyptian Journal of Chemistry, 67(13), 1235-1249.
- Abed, R. I., & Jassim, S. K. (2021). Effectiveness of A Coping Style-related Instructional program on Self-Care of Patients with Diabetes Mellitus Type II at Endocrinology and Diabetes Center in Al-Basra City. Indian Journal of Forensic Medicine & Toxicology, 15(3).
- Akbarizadeh, M., Naderi Far, M., & Ghaljaei, F. (2022). Prevalence of depression and anxiety among children with type 1 and type 2 diabetes: A systematic review and meta-analysis. World Journal of Pediatrics, 18(1), 16–26. https://doi.org/10.1007/s12519-021-00493-1
- Alameddine, M., Bou-Karroum, K., Ghalayini, W., & Abiad, F. (2021). Resilience of nurses at the epicenter of the COVID-19 pandemic in Lebanon. International journal of nursing sciences, 8(4), 432-438.
- Alejandro, E. U., Mamerto, T. P., Chung, G., Villavieja, A., Gaus, N. L., & Morgan, E. (2020). Gestational diabetes mellitus: A harbinger of the vicious cycle of diabetes. International Journal of Molecular Sciences, 21(14), 5003.
- Algorani, E. B., & Gupta, V. (2023). Coping mechanisms. In StatPearls [Internet]. StatPearls Publishing.
- Alharrasi, S. S. (2023). The Role of Body Appreciation and Self-worth in the Social Support, Self-management, and Glycemic Control Relationships With Type 2 Diabetes Mellitus Among Adults Arab Omani Women (Doctoral dissertation, Wayne State University).
- Al-Ma'aitah, O. H. (2024). The Effects of the 2019 Lockdown for Coronavirus Disease (COVID-19) on Glycaemic Control of Patients With Type 2 Diabetes Mellitus:

Implications for Nursing Education (Doctoral dissertation, University of Technology Sydney (Australia)).

- Alsaedi, S. A. A. A., Nabrawi, M. F., Aldainy, A. A., & Wali, R. M. (2020). Prevalence and risk factors of gestational diabetes mellitus among pregnant patients visiting National Guard primary health care centers in Saudi Arabia. Saudi Medical Journal, 41(2), 144–149.
- Alshammari, F., Hussain, A., Khan, K., Ansari, M., Alshammary, N. B., Alsaif, R. S., ... & Alshammari, B. (2024). Diabetic self-care practice and quality of life among diabetes patients in the Hail region of Saudi Arabia. Tropical Journal of Pharmaceutical Research, 23(4), 715-721.
- Alvarez-Jimenez, L., Morales-Palomo, F., Moreno-Cabanas, A., Ortega, J. F., & Mora-Rodriguez, R. (2023). Effects of statin therapy on glycemic control and insulin resistance: A systematic review and meta-analysis. European journal of pharmacology, 947, 175672.
- American Diabetes Association. (2020). 15. Diabetes care in the hospital: Standards of medical care in diabetes—2020. Diabetes Care, 43(Suppl 1), S193–S202. https://doi.org/10.2337/dc20-S015
- Amiri, F. N., Faramarzi, M., Bakhtiari, A., & Omidvar, S. (2021). Risk factors for gestational diabetes mellitus: A case-control study. American Journal of Lifestyle Medicine, 15(2), 184–190.
- Anna, V., van der Ploeg, H. P., Cheung, N. W., Huxley, R. R., & Bauman, A. E. (2008). Sociodemographic correlates of the increasing trend in prevalence of gestational diabetes mellitus in a large population of women between 1995 and 2005. Diabetes Care, 31(12), 2288–2293.
- Ardouin, S., Ball, L., Burch, E., Barton, C., Sturgiss, E., & Williams, L. T. (2024). The prevalence of psychological distress in adults newly diagnosed with type 2 diabetes: Data from the Australian 3D case-series study. Health Promotion Journal of Australia, 35(2), 534–541. https://doi.org/10.1002/hpja.826
- Bartkeviciute, B., Riklikiene, O., Kregzdyte, R., & Lesauskaite, V. (2023). Individualized care for older adults with diabetes and its relationship with communication, psychosocial self-efficacy, resources and support for self-management and socio-demographics. Nursing Open, 10(4), 2560-2571.

- Basto-Abreu, A., López-Olmedo, N., Rojas-Martínez, R., Aguilar-Salinas, C. A., De la Cruz-Góngora, V., Rivera-Dommarco, J., ... & Barrientos-Gutiérrez, T. (2021). Prevalence of diabetes and glycemic control in Mexico: national results from 2018 and 2020. salud pública de méxico, 63(6), 725-733.
- Bazrafshan, M. R., Barghi, O., Parviniannasab, A. M., Mansouri, A., Shahkarami, N., & Masmouei, B. (2025). Learning experiences and coping strategies of nursing students in the face of clinical errors. Teaching and Learning in Nursing, 20(1), e294-e300.
- Beaufort, I. N., De Weert-Van Oene, G. H., Buwalda, V. A., De Leeuw, J. R. J., & Goudriaan, A. E. (2017). The Depression, Anxiety and Stress Scale (DASS-21) as a screener for depression in substance use disorder inpatients: A pilot study. European Addiction Research, 23(5), 260–268.
- Bell, J. (2015). Reducing barriers to glucose control in patients with gestational diabetes: How to help patients overcome knowledge gaps, treatment nonadherence, and financial constraints. American Nurse Today, 10(1), 1–4.
- Benmaamar, S., Lazar, N., El Harch, I., et al. (2022). Depression and anxiety in patients with diabetes in a Moroccan region. L'Encephale, 48(6), 601–606. https://doi.org/10.1016/j.encep.2021.07.006
- Bennett, C., Guo, M., & Dharmage, S. (2007). HbA1c as a screening tool for detection of type 2 diabetes: A systematic review. Diabetic Medicine, 24(4), 333–343.
- Bitew, Z. W., Alemu, A., Jember, D. A., Tadesse, E., Getaneh, F. B., Seid, A., & Weldeyonnes, M. (2023). Prevalence of glycemic control and factors associated with poor glycemic control: A systematic review and meta-analysis. INQUIRY: The Journal of Health Care Organization, Provision, and Financing, 60, 00469580231155716.
- Cha, E., Hwan Shin, M., Lee, H., et al. (2024). Precision diabetes education and support considering patients' behavioral and psychological phenotype: A Q-methodology study. Western Journal of Nursing Research, 46(8), 602–610. https://doi.org/10.1177/01939459241257620
- Chaabane, S., Chaabna, K., Bhagat, S., Abraham, A., Doraiswamy, S., Mamtani, R., & Cheema, S. (2021). Perceived stress, stressors, and coping strategies among nursing students in the Middle East and North Africa: an overview of systematic reviews. Systematic reviews, 10(1), 136.

- Chen, J., Lin, N., Ye, X., Chen, Y., Wang, Y., & Xu, H. (2025). Coping strategies and interventions to alleviate moral distress among pediatric ICU nurses: A scoping review. Nursing ethics, 32(2), 437-459.
- Chen, Q., Yang, G., Lin, S., et al. (2021). The effects of mindfulness-based stress reduction therapy combined with intensive education on the effectiveness of the care and the awareness rate in patients with arthritis and diabetes. American Journal of Translational Research, 13(4), 3190–3197.
- Chen, X., Hu, W., Hu, Y., Xia, X., & Li, X. (2022). Discrimination and structural validity evaluation of Zung Self-Rating Depression Scale for pregnant women in China. Journal of Psychosomatic Obstetrics & Gynaecology, 43(1), 26–34. https://doi.org/10.1080/0167482X.2021.1941078
- Cyranka, K., Klupa, T., Pilecki, M., et al. (2024). Diabetes distress and diabetes burnout explored in various areas of life in patients with type 1 diabetes: Effect of short-term psychological intervention. Endocrine, 85(2), 676–684. https://doi.org/10.1007/s12020-024-03518-8
- d'Emden, M., McLeod, D., Ungerer, J., Appleton, C., & Kanowski, D. (2020). Development of a fasting blood glucose-based strategy to diagnose women with gestational diabetes mellitus at increased risk of adverse outcomes in a COVID-19 environment. PLoS ONE, 15(12), e0243192.
- Daley, B., Hitman, G., Fenton, N., & McLachlan, S. (2019). Assessment of the methodological quality of local clinical practice guidelines on the identification and management of gestational diabetes. BMJ Open, 9(6), e027285.
- De Vivo, M., Hulbert, S., Mills, H., & Uphill, M. (2016). Examining the effectiveness of the theory of planned behaviour in explaining exercise intention and behaviour during pregnancy: A meta-analysis. Journal of Reproductive and Infant Psychology, 1–7.
- Didarloo, A., Shojaeizadeh, D., Eftekhar Ardebili, H., Niknami, S., Hajizadeh, E., & Alizadeh, M. (2011). Assessment of factors affecting self-care behavior among women with type 2 diabetes in Khoy City Diabetes Clinic using the extended theory of reasoned action. Journal of School of Public Health and Institute of Public Health Research, 9(2), 23–34.
- Diehl, E., Rieger, S., Letzel, S., Schablon, A., Nienhaus, A., Escobar Pinzon, L. C., & Dietz, P. (2021). Burdens, resources, health and wellbeing of nurses working in general

and specialised palliative care in Germany–results of a nationwide cross-sectional survey study. BMC nursing, 20(1), 162.

- Dousti, F. M. A., Chiti, H., Faghihzadeh, S., & Taheri, S. S. (2018). Investigation of the effect of individual counseling of physical activity based on theory of planned behavior on glycemic indexes in women with gestational diabetes: A randomized clinical trial. Qom University of Medical Sciences Journal, 10(12), 26–37. [Persian].
- Dunlay, S. M., Givertz, M. M., Aguilar, D., et al. (2019). Type 2 diabetes mellitus and heart failure: A scientific statement from the American Heart Association and the Heart Failure Society of America. Circulation, 140(7), e294–e324. https://doi.org/10.1161/CIR.0000000000000691
- Emamgholi Khooshehchin, T., Keshavarz, Z., Afrakhteh, M., Shakibazadeh, A., & Faghihzadeh, S. (2017). Explanation of the experiences of mothers with gestational diabetes about the factors affecting self-care: A qualitative study. Journal of Clinical Nursing and Midwifery, 5(4), 76–89.
- Fallatah, J. A. (2023). The Association Between Informal Caregivers Knowledge About Type 2 Diabetes Mellitus and Patients' HbA1c Level Among a Saudi Arabian Cohort (Doctoral dissertation, Florida Atlantic University).
- Faramarzi, M., & Pasha, H. (2018). Psychometric properties of the Persian version of the Prenatal Distress Questionnaire. Social Behavior and Personality: An International Journal, 46(5), 815–822.
- Fatemi, A., Nasiri-Amiri, F., Faramarzi, M., Chehrazi, M., Rad, H. A., & Pahlavan, Z. (2023). Comparing the effectiveness of virtual and semi-attendance stress inoculation training techniques in improving the symptoms of anxiety, depression, and stress of pregnant women with psychological distress: A multicenter randomized controlled trial. BMC Pregnancy and Childbirth, 23(1), 346.
- Feng, Y., Feng, Q., Qu, H., Song, X., Hu, J., & Xu, X. (2020). Stress adaptation is associated with insulin resistance in women with gestational diabetes mellitus. Nutrition & Diabetes, 10(1), 4.
- Ferrara, A. (2007). Increasing prevalence of gestational diabetes mellitus: A public health perspective. Diabetes Care, 30(Suppl 2), S141–S146.
- Finik, J. N. Y. (2017). Cohort profile: Stress in Pregnancy (SIP) study. International Journal of Epidemiology, 46(5), 1388–1389.

- Forsgren, E., & Björkman, I. (2021). Interactional practices in person-centred care: Conversation analysis of nurse-patient disagreement during self-management support. Health expectations, 24(3), 940-950.
- Gao, Y., Yan, K., Yan, X., Xi, N., Gao, J., & Ren, H. (2023). Correlation between health literacy and health-related quality of life in patients with diabetic peripheral neuropathy: The mediating role of self-management. Nursing Open, 10(5), 3164-3177.
- Ghasemi, F., Vakilian, K., & Khalajinia, Z. (2021). Comparing the effect of individual counseling with counseling on social application on self-care and quality of life of women with gestational diabetes. Primary Care Diabetes, 15(5), 842–847.
- Grochowska, A., Gawron, A., & Bodys-Cupak, I. (2022). Stress-inducing factors vs. the risk of occupational burnout in the work of nurses and paramedics. International Journal of Environmental Research and Public Health, 19(9), 5539.
- Gülirmak Güler, K., Uzun, S., & Emirza, E. G. (2025). Secondary Traumatic Stress and Coping Experiences in Psychiatric Nurses Caring for Trauma Victims: A Phenomenological Study. Journal of Psychiatric and Mental Health Nursing, 32(2), 402-413.
- Hakeim, E. H. A., Sultan, E. N. E. D., Abd Elrasol, Z. F. M., & Hamza, M. F. (2025). Effect of Comprehensive Nursing Intervention on Patient's Knowledge, Anxiety and Self-care Practice following Vitrectomy for Diabetic Retinopathy. Tanta Scientific Nursing Journal, 36(1).
- He, Q., Zhao, X., Wang, Y., Xie, Q., & Cheng, L. (2022). Effectiveness of smartphone application–based self-management interventions in patients with type 2 diabetes: A systematic review and meta-analysis of randomized controlled trials. Journal of advanced nursing, 78(2), 348-362.
- Hosseini, E., Janghorbani, M., & Aminorroaya, A. (2018). Incidence, risk factors, and pregnancy outcomes of gestational diabetes mellitus using one-step versus two-step diagnostic approaches: A population-based cohort study in Isfahan, Iran. Diabetes Research and Clinical Practice, 140, 288–294.
- Huffman, J. C., Feig, E. H., Zambrano, J., & Celano, C. M. (2023). Positive psychology interventions in medical populations: Critical issues in intervention development, testing, and implementation. Affective Science, 4(1), 59–71. https://doi.org/10.1007/s42761-022-00132-1

- Hutchens, A., Craft, M., Beaty, M., Condley, B., Aderhold, K., Wright, V., ... & Allen, K. (2025). Nursing Trauma and Coping: An Integrative Review. Issues in Mental Health Nursing, 46(4), 379-388.
- Imkome, E. U. (2025). The double burden of stressful life events among professional nurses: public mass shootings during the COVID-19 pandemic. International Journal of Qualitative Studies on Health and Well-being, 20(1), 2504477.
- Jacobs, P. G., Herrero, P., Facchinetti, A., Vehi, J., Kovatchev, B., Breton, M. D., ... & Mosquera-Lopez, C. (2023). Artificial intelligence and machine learning for improving glycemic control in diabetes: best practices, pitfalls, and opportunities. IEEE reviews in biomedical engineering, 17, 19-41.
- Jeon, Y., Kim, H., Yang, M., Jung, D., Yoon, K., & Noh, G. (2018). Effects of a postnatal care program on self-efficacy, self-management, and glycemic control in women with gestational diabetes mellitus. Korean Journal of Women Health Nursing, 24(4), 367–378.
- Jiang, P., Jia, Y., Yang, X., Duan, W., Ning, Y., Zhou, Y., ... & Huang, L. (2025). A systematic review of psychological distress reduction programs among nurses in emergency departments. BMC nursing, 24(1), 194.
- Jung, W. H., & Kim, H. Y. (2023). Promoting foot self-care in type 2 diabetes mellitus patients receiving hemodialysis based on the information-motivation-behavioral skills model. Nursing & Health Sciences, 25(4), 721–731. https://doi.org/10.1111/nhs.13041
- Kadkhodai, F., & Badakhsh, M. (2019). The effect of counseling on health promotion behaviors in diabetic mothers: Zabol 2018. Journal of Diabetes Nursing, 7(4), 983–991.
- Karbalai Harafteh, F., Karami Mohajeri, Z., & Kia, S. (2020). The effect of self-care training on perceived stress, health literacy, and self-care behaviors in women with gestational diabetes. Community Health Journal, 14(2), 30–39. [Persian].
- Ke, C., Narayan, K. M. V., Chan, J. C. N., Jha, P., & Shah, B. R. (2022). Pathophysiology, phenotypes and management of type 2 diabetes mellitus in Indian and Chinese populations. Nature Reviews Endocrinology, 18(7), 413–432. https://doi.org/10.1038/s41574-022-00685-7
- Khadivzadeh, T., Azhari, S., Esmaily, H., Akhlaghi, F., & Sardar, M. A. (2015). Effects of self-care education on perceived stress in women with gestational diabetes under insulin treatment. Evidence Based Care, 5(3), 7–18.

- Kharaghani, R., Shariati, M., Yunesian, M., Keramat, A., & Moghisi, A. (2016). The Iranian integrated maternal health care guideline based on evidence-based medicine and American guidelines: A comparative study. Modern Care Journal, 13(2), e10332.
- Kim, Y. S. (2017). Effects of web-based self-management program in women with gestational diabetes mellitus [Doctoral dissertation, The Catholic University of Korea]. Seoul, South Korea.
- Kim, Y. S., Kim, H. S., & Kim, Y. L. (2019). Effects of a web-based self-management program on behavior and blood glucose levels of women with gestational diabetes mellitus. Telemedicine and e-Health, 25(5), 407–414.
- Koivusalo, S. B., Rönö, K., Klemetti, M. M., Roine, R. P., Lindström, J., Erkkola, M., et al. (2016). Gestational diabetes mellitus can be prevented by lifestyle intervention: The Finnish Gestational Diabetes Prevention Study (RADIEL), a randomized controlled trial. Diabetes Care, 39(1), 24–30.
- Kordi, M., & Heravan, M. B. (2020). The relationship of depression, anxiety, and stress with self-care behaviors in women with gestational diabetes. Journal of Midwifery and Reproductive Health, 8(1).
- Kordi, M., Banaei, M., Asgharipour, N., Mazloum, S. R., & Akhlaghi, F. (2016). Prediction of self-care behaviors of women with gestational diabetes based on belief of person in own ability (self-efficacy). Iranian Journal of Obstetrics, Gynecology and Infertility, 19(13), 6–17.
- Kua, Z., Hamzah, F., Tan, P. T., Ong, L. J., Tan, B., & Huang, Z. (2022). Physical activity levels and mental health burden of healthcare workers during COVID-19 lockdown. Stress and Health, 38(1), 171-179.
- Labrague, L. J. (2024). Umbrella review: Stress levels, sources of stress, and coping mechanisms among student nurses. Nursing Reports, 14(1), 362-375.
- Lasalvia, A., Bonetto, C., Porru, S., Carta, A., Tardivo, S., Bovo, C., ... & Amaddeo, F. (2021). Psychological impact of COVID-19 pandemic on healthcare workers in a highly burdened area of north-east Italy. Epidemiology and psychiatric sciences, 30, e1.
- Lee, K. W. C. S., Hoo, F. K., Ramachandran, V., Chong, S. C., Tusimin, M., & Mohd Nordin, N. (2019). Prevalence and factors associated with depressive, anxiety and stress symptoms among women with gestational diabetes mellitus in tertiary care centres in Malaysia: A cross-sectional study. BMC Pregnancy and Childbirth, 19(1), 367.

- Lenze, E. J., Voegtle, M., Miller, J. P., et al. (2022). Effects of mindfulness training and exercise on cognitive function in older adults: A randomized clinical trial. JAMA, 328(22), 2218–2229. https://doi.org/10.1001/jama.2022.20630
- Li, X., Jiang, T., Sun, J., Shi, L., & Liu, J. (2021). The relationship between occupational stress, job burnout and quality of life among surgical nurses in Xinjiang, China. BMC nursing, 20(1), 181.
- Li, Y. S., Tseng, H. C., Yang, B. H., Mills, M. E. C., & Yu, W. P. (2025). Personality preferences and stress perception among nursing students in different nursing programmes: a cross-sectional study. BMC Medical Education, 25(1), 382.
- Liu, Z., Sang, X., Liu, Y., Yu, C., & Wan, H. (2024). Effect of psychological intervention on glycemic control in middle-aged and elderly patients with type 2 diabetes mellitus: A systematic review and meta-analysis. Primary Care Diabetes, 18(6), 574–581. https://doi.org/10.1016/j.pcd.2024.03.004
- Marthoenis, Maskur, Fathiariani, L., & Nassimbwa, J. (2021). Investigating the burden of mental distress among nurses at a provincial COVID-19 referral hospital in Indonesia: a cross-sectional study. BMC nursing, 20(1), 76.
- Metzger, B. E., & Coustan, D. R. (1998). Summary and recommendations of the Fourth International Workshop-Conference on Gestational Diabetes Mellitus. Diabetes Care, 21(Suppl 2), B161–B167.
- Mishra, S. S. A., Rao, C. R., Nayak, S., & Kamath, A. (2020). Effect of maternal perceived stress during pregnancy on gestational diabetes mellitus risk: A prospective case-control study. Diabetes & Metabolic Syndrome: Clinical Research Reviews, 14(5), 1163–1169.
- Mishra, S., Shetty, A., Rao, C. R., Nayak, S., & Kamath, A. (2020). Effect of maternal perceived stress during pregnancy on gestational diabetes mellitus risk: A prospective case-control study. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 14(5), 1163–1169.
- Mohadesi, H., & Khalkhali, H. R. (2016). The effect of counseling on health promotion behaviors in diabetic mothers referred to Motahhari Hospital of Urmia at 2015. Nursing and Midwifery Journal, 14(9), 757–766.
- Motahari-Tabari, N. S., Nasiri-Amiri, F., Faramarzi, M., Shirvani, M. A., Bakhtiari, A., & Omidvar, S. (2023). The effectiveness of information-motivation-behavioral skills

model on self-care practices in early pregnancy to prevent gestational diabetes mellitus in Iranian overweight and obese women: A randomized controlled trial. Community Health Equity Research & Policy, 43(3), 257–264.

- Nasiri, A. F., Mohamadpour, R., Salmalian, H., & Ahmadi, A. (2010). The association between prenatal anxiety and spontaneous preterm birth and low birth weight. Iranian Journal of Obstetrics, Gynecology and Infertility, 13(3), 45–51.*
- Nguyen, L. A., Pouwer, F., Lodder, P., et al. (2022). Depression and anxiety in adolescents with type 1 diabetes and their parents. Pediatric Research, 91(1), 188–196. https://doi.org/10.1038/s41390-021-01559-5
- Ni, X., Lou, Y., Hu, W., Wang, H., Xu, H., Li, S., ... & Ni, Y. (2022). Development of mobile health–based self-management support for patients with lung cancer: A stepwise approach. Nursing Open, 9(3), 1612-1624.
- Niroomand, M., Afsar, J., Hosseinpanah, F., Afrakhteh, M., Farzaneh, F., & Serahati, S. (2019). Comparison of the International Association of Diabetes in Pregnancy Study Group Criteria with the old American Diabetes Association criteria for diagnosis of gestational diabetes mellitus. International Journal of Endocrinology and Metabolism, 17(4), e88343.
- Noohi, E. K. M., & Mirzazadeh, A. (2011). Effective of electronic education on knowledge, attitude and self-care in patients with type 2 diabetes referred to diabetic center of Kerman University of Medical Science. Iranian Journal of Nursing Research, 6(22), 73–80.
- Nyame, M. F. (2023). Exploring the Socio-Cultural Dynamics of Newly Diagnosed Persons Living with Diabetes Mellitus: A Study at the Holy Family Hospital-Nkawkaw (Doctoral dissertation, University of Ghana).
- Okuhara, M., Sato, K., & Kodama, Y. (2021). The nurses' occupational stress components and outcomes, findings from an integrative review. Nursing open, 8(5), 2153-2174.
- Otter, C. E., Keers, J. C., Reker, C., Smit, J., Schoonhoven, L., & de Man-van Ginkel, J. M. (2022). How nurses support self-management of hospitalized patients through verbal communication: a qualitative study. BMC nursing, 21(1), 329.
- Pan, L., & Yeung, N. C. Y. (2023). Positive psychology interventions for improving self-management behaviors in patients with type 1 and type 2 diabetes: A narrative

review of current evidence. Current Diabetes Reports, 23(11), 329–345. https://doi.org/10.1007/s11892-023-01524-y

- Parsa, P., Darghahi, S., Khodakarami, B., Mohammadai, Y., & Yazdkhasti, M. (2018). Impact of group counseling on the quality of life of diabetic pregnant women. Nursing and Midwifery Journal, 16(8), 593–602.
- Patel, S. Y., McCoy, R. G., Barnett, M. L., Shah, N. D., & Mehrotra, A. (2021). Diabetes care and glycemic control during the COVID-19 pandemic in the United States. JAMA internal medicine, 181(10), 1412-1414.
- Piaggio, G., Elbourne, D. R., Altman, D. G., Pocock, S. J., & Evans, S. J. (2006). Reporting of non-inferiority and equivalence randomized trials: An extension of the CONSORT statement. JAMA, 295(10), 1152–1160.
- Plotnikoff, R. C., Trinh, L., Courneya, K. S., Karunamuni, N., & Sigal, R. J. (2009). Predictors of aerobic physical activity and resistance training among Canadian adults with type 2 diabetes: An application of the protection motivation theory. Psychology of Sport and Exercise, 10(3), 320–328.
- Puig-Perez, S., Hackett, R. A., Salvador, A., & Steptoe, A. (2017). Optimism moderates psychophysiological responses to stress in older people with type 2 diabetes. Psychophysiology, 54(4), 536–543. https://doi.org/10.1111/psyp.12808
- Rakhis Sr, S. A. B., AlDuwayhis, N. M., Aleid, N., AlBarrak, A. N., & Aloraini, A. A. (2022). Glycemic control for type 2 diabetes mellitus patients: a systematic review. Cureus, 14(6).
- Rani, P. R., & Begum, J. (2016). Screening and diagnosis of gestational diabetes mellitus: Where do we stand? Journal of Clinical and Diagnostic Research, 10(4), QE01–QE04.
- Reader, D., Splett, P., Gunderson, E. P., Care, D., & Group, E. D. P. (2006). Impact of gestational diabetes mellitus nutrition practice guidelines implemented by registered dietitians on pregnancy outcomes. Journal of the American Dietetic Association, 106(9), 1426–1433.
- Rechenberg, K., & Koerner, R. (2022). General anxiety, diabetes-specific anxiety, and quality of life in adolescents with type 1 diabetes. Science of Diabetes Self-Management and Care, 48(6), 469–475. https://doi.org/10.1177/26350106221078393

- Riedel, B., Horen, S. R., Reynolds, A., & Hamidian Jahromi, A. (2021). Mental health disorders in nurses during the COVID-19 pandemic: implications and coping strategies. Frontiers in public health, 9, 707358.
- Robert, A. A., Al Dawish, A., Al Dawish, R. M., Al Mutairi, S. M., Alanazi, M. S., & Al Dawish, M. A. (2023). Anxiety, depression, and fear among people with and without diabetes during the transmission of SARS-CoV-2 omicron variant. Current Diabetes Reviews, 19(6), e220822207828. https://doi.org/10.2174/1573399819666220822165642
- Sadeghi, S., Khatibi, S. R., Mahdizadeh, M., Peyman, N., & Zare Dorniani, S. (2023). Prevalence of gestational diabetes in Iran: A systematic review and meta-analysis. Medical Journal of the Islamic Republic of Iran, 37, 83.
- Sarazine, J., Heitschmidt, M., Vondracek, H., Sarris, S., Marcinkowski, N., & Kleinpell, R. (2021). Mindfulness workshops effects on nurses' burnout, stress, and mindfulness skills. Holistic Nursing Practice, 35(1), 10–18. https://doi.org/10.1097/HNP.0000000000000424
- Saudelli, E., Moscatiello, S., Baldari, M., et al. (2024). Sex-driven factors associated with anxiety and depression in autoimmune diabetes. Acta Diabetologica, 61(10), 1231–1240. https://doi.org/10.1007/s00592-024-02216-1
- Schulze, S., Merz, S., Thier, A., Tallarek, M., König, F., Uhlenbrock, G., ... & Holmberg, C. (2022). Psychosocial burden in nurses working in nursing homes during the Covid-19 pandemic: a cross-sectional study with quantitative and qualitative data. BMC health services research, 22(1), 949.
- Sebastião, B. F., Hortelão, R. M., Granadas, S. S., Faria, J. M., Pinto, J. R., & Henriques, H. R. (2024). Air quality self-management in asthmatic patients with COPD: An integrative review for developing nursing interventions to prevent exacerbations. International journal of nursing sciences, 11(1), 46-56.
- Sękowski, K., Grudziąż-Sękowska, J., Goryński, P., Pinkas, J., & Jankowski, M. (2022). Epidemiological analysis of diabetes-related hospitalization in Poland before and during the COVID-19 pandemic, 2014–2020. International Journal of Environmental Research and Public Health, 19(16), 10030. https://doi.org/10.3390/ijerph191610030
- Syeda, U. A., Battillo, D., Visaria, A., & Malin, S. K. (2023). The importance of exercise for glycemic control in type 2 diabetes. American Journal of Medicine Open, 9, 100031.

- Toobert, D. J., Hampson, S. E., & Glasgow, R. E. (2000). The summary of diabetes self-care activities measure: Results from seven studies and a revised scale. Diabetes Care, 23(7), 943–950.
- Ural, A. K., & Beji, N. K. (2021). The effect of health-promoting lifestyle education program provided to women with gestational diabetes mellitus on maternal and neonatal health: A randomized controlled trial. Psychology, Health & Medicine, 26(6), 657–670.
- Ural, A., & Kizilkaya Beji, N. (2021). The effect of a health-promoting lifestyle education program provided to women with gestational diabetes mellitus on maternal and neonatal health: A randomized controlled trial. Psychology, Health & Medicine, 26(6), 657–670.
- Vakharia, J. D., Thaweethai, T., Licht, P., Wexler, D. J., & Delahanty, L. M. (2023). Psychological and behavioral predictors of weight loss in the reach ahead for lifestyle and health-diabetes lifestyle intervention cohort. Journal of the Academy of Nutrition and Dietetics, 123(7), 1033–1043.e1. https://doi.org/10.1016/j.jand.2023.03.012
- Velana, M., & Rinkenauer, G. (2021). Individual-level interventions for decreasing job-related stress and enhancing coping strategies among nurses: a systematic review. Frontiers in psychology, 12, 708696.
- Veluvali, A., Dehghani Zahedani, A., Hosseinian, A., Aghaeepour, N., McLaughlin, T., Woodward, M., ... & Snyder, M. P. (2025). Impact of digital health interventions on glycemic control and weight management. npj Digital Medicine, 8(1), 20.
- Wang, G., Liu, X., Ying, Z., Yang, G., Chen, Z., Liu, Z., ... & Chen, Y. (2023). Optimized glycemic control of type 2 diabetes with reinforcement learning: a proof-of-concept trial. Nature Medicine, 29(10), 2633-2642.
- Wang, X., Lin, H., & Chen, Q. (2025). Systematic health guidance and psychological nursing intervention: Effects on emotions, sleep quality, and self-efficacy in cerebral hemorrhage patients. Psychiatry and Clinical Psychopharmacology, 35(2), 149–154. https://doi.org/10.5152/pcp.2025.23200
- Wathne, H., Morken, I. M., Storm, M., & Husebø, A. M. L. (2023). Designing a future eHealth service for posthospitalization self-management support in long-term illness: qualitative interview study. JMIR Human Factors, 10, e39391.
- Wong, S. Y. S., Chan, S. K. C., Yip, B. H. K., et al. (2023). The effects of Mindfulness for Youth (MYmind) versus group cognitive behavioral therapy in improving attention

and reducing behavioral problems among children with attention-deficit hyperactivity disorder and their parents: A randomized controlled trial. Psychotherapy and Psychosomatics, 92(6), 379–390. https://doi.org/10.1159/000532303

- Xu, T. H. Y., Dainelli, L., Yu, K., Detzel, P., Silva-Zolezzi, I., Volger, S., & Fang, H. (2017). Healthcare interventions for the prevention and control of gestational diabetes mellitus in China: A scoping review. BMC Pregnancy and Childbirth, 17(1), 265.
- Yahaya, J. J., Doya, I. F., Morgan, E. D., Ngaiza, A. I., & Bintabara, D. (2023). Poor glycemic control and associated factors among patients with type 2 diabetes mellitus: a cross-sectional study. Scientific Reports, 13(1), 9673.
- Yang, F., Liu, D., & Fan, G. (2025). Emotional labor and coping strategies of gynecological nurses in recurrent pregnancy loss care: a qualitative phenomenological study. BMC nursing, 24(1), 1-11.
- Yang, K., Niu, J., Zuo, T., et al. (2021). Alterations in the gut virome in obesity and type 2 diabetes mellitus. Gastroenterology, 161(4), 1257–1269.e13. https://doi.org/10.1053/j.gastro.2021.07.001
- Yosep, I., Hikmat, R., Suryani, S., Widianti, E., Sriati, A., Sutini, T., & Rafiyah, I. (2025). Nursing strategies for implementing psychosocial interventions to address violence behavior in schizophrenia: a scoping review. BMC nursing, 24(1), 503.
- Yue, T., Li, Q., Wang, R., et al. (2020). Comparison of Hospital Anxiety and Depression Scale (HADS) and Zung Self-Rating Anxiety/Depression Scale (SAS/SDS) in evaluating anxiety and depression in patients with psoriatic arthritis. Dermatology, 236(2), 170–178. https://doi.org/10.1159/000502702
- Zandinava, H. S. F., Charandabi, S. M., Homayi, S. G., & Mirghafourvand, M. (2017). Effect of educational package on self-care behavior, quality of life, and blood glucose levels in pregnant women with gestational diabetes: A randomized controlled trial. Iran Red Crescent Medical Journal, 19(4).
- Zhu, Y., & Zhang, C. (2016). Prevalence of gestational diabetes and risk of progression to type 2 diabetes: A global perspective. Current Diabetes Reports, 16(1), 7.

QUESTIONNAIRE FOR NURSES

Part I: Demographic Information

Please select the most appropriate answer for each question:

1. **Gender:**

   ☐ Male
   ☐ Female

2. **Age Group:**

   ☐ Less than 20 years
   ☐ 20–29 years
   ☐ 30–39 years
   ☐ 40 years and above

3. **Marital status:**

   ☐ Less than 20 years
   ☐ 20–29 years
   ☐ 30–39 years
   ☐ 40 years and above

4. **Educational Level:**

   ☐ High School or Diploma
   ☐ Bachelor's Degree
   ☐ Master's Degree
   ☐ PhD

5. **Years of Experience:**

   ☐ Less than 5 years
   ☐ 5–10 years
   ☐ More than 10 years

6. **Job Position:**

   ☐ Employee
   ☐ Supervisor

☐ Manager
☐ Other (please specify): _____

7. **Nationality:**
   ☐ Saudi
   ☐ Non-Saudi

Part II: Perceived Stress Scale-10 Items (PSS-14)

INSTRUCTIONS:

The questions in this scale ask you about your feelings and thoughts during THE LAST MONTH. In each case, you will be asked to indicate your response by placing an "X" over the circle representing HOW OFTEN you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

No.		Never 0	Almost Never 1	Sometimes 2	Fairly Often 3	Very Often 4
1.	In the last month, how often have you been upset because of something that happened unexpectedly?					
2.	In the last month, how often have you felt that you were unable to control the important things in your life?					
3.	In the last month, how often have you felt nervous and "stressed"?					
4.	In the last month, how often have you dealt successfully with day to day problems and annoyances?					
5.	In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?					
6.	In the last month, how often have you felt confident about your ability to handle your personal problems?					
7.	In the last month, how often have you felt that things were going your way?					
8.	In the last month, how often have you found that you could not cope with all the things that you had to do?					
9.	In the last month, how often have you been able to control irritations in your life?					
10.	In the last month, how often have you felt that you were on top of things?					
11.	In the last month, how often have you been angered because of things that happened that were outside of your control?					
12.	In the last month, how often have you found yourself thinking about things that you have to accomplish?					

13.	In the last month, how often have you been able to control the way you spend your time?					
14.	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?					

Part III: Coping mechanism scale

The coping mechanism scale consists of 29 items designed to measure different coping strategies. The 29 items are divided into two main categories: problem-focused coping (12 Items), seeking social support (3 Items), blaming self (3 Items), wishful thinking (6 Items), and avoidance (5 Items). Items are rated on a 4-point Likert scale (e.g., 1 = not at all, 2 = very little, 3 = somewhat, 4 = to a great extent).

	Problem-focused coping strategies				
No.	**Items**	**Not at all 1**	**Very little 2**	**Somewhat 3**	**A great extent 4**
1.	Bargained or compromised to get something positive from the situation				
2.	Concentrated on something good that could come out of the whole thing				
3.	Changed or grew as a person in a positive way				
4.	Made a plan of action and followed it				
5.	Came out of the experience better than when I went in				
6.	Tried not to act too hastily or follow my own hunch				
7.	Changed something so things would turn out all right				
8.	Took things one step at a time				
9.	I knew what had to be done, so I doubled my efforts and tried harder to make things work				
10.	Came up with a couple of different solutions to the problem				
11.	Changed something about myself so I could deal with the situation better				
12.	Stood my ground and fought for what I wanted				
	Seeking social support-focused coping strategies				

13.	Talked to someone to find out about the situation				
14.	Accepted sympathy and understanding from someone				
15.	Talked to someone about how I was feeling				
	Self-blame coping strategies				
16.	Blamed yourself				
17.	Criticized yourself				
18.	Realized you had brought the problem on yourself				
	Wishful thinking coping strategies				
19.	Hoped a miracle would happen				
20.	I wish I were a stronger, more optimistic, and more forceful person				
21.	Wished that I could change what had happened				
22.	Wished I could change the way I felt				
23.	Daydreamed or imagined a better time or place than the one I was in				
24.	Thought about fantastic or unreal things that made me feel better				
	Avoidance coping strategies				
25.	Felt bad about not being able to avoid the problem				
26.	Kept my feelings to myself				
27.	Tried to forget the whole thing				
28.	Avoided being with people in general				
29.	Refused to believe it had happened				

QUESTIONNAIRE FOR PATEINS

Part 1: Characteristics of the Study Population (Socio-demographic and Clinical Data)

To be completed by the researcher/nurse via interview or patient file review.

1. **Age:** _____ years
2. **Gender:**

a. [ ] Male

b. [ ] Female

3. **Educational Attainment:**

a. [ ] None

b. [ ] Primary school (age 7 to 12)

c. [ ] Secondary school (age 13 to 17)

d. [ ] Tertiary (college/university)

4. **Occupation:**

a. [ ] Employed

b. [ ] Unemployed / Pensioner

5. **Smoking Status:**

a. [ ] Non-smoker (Never smoked or quit for > 6 months)

b. [ ] Smoker (Current smoker)

c. If current smoker, number of cigarettes per day: _____

6. **Duration of Type 2 Diabetes Mellitus:** _____ years
7. **Anthropometric & Clinical Measurements** (to be measured):

a. Height (cm): _____

b. Weight (kg): _____

c. Body Mass Index (BMI) (kg/m²): _____

d. Waist Circumference (cm): _____

e. Systolic Blood Pressure (mmHg): _____

f. Diastolic Blood Pressure (mmHg): _____

8. **Glycaemic Control:**

a. HbA1c (%): _____ (Most recent result within the last 3 months)

Part 2: Diabetes Management Self-Efficacy Scale (DMSES)

Instructions to participant: This questionnaire measures your confidence in performing various diabetes self-care activities. For each statement below, please circle the number from 0 to 10 that best represents your level of confidence. (0 = cannot do at all, 10 = certainly can do).

No.	Domains	Cannot do at all 0	Certainly, can do 10
A.	**Domain 1: Blood Glucose Monitoring**		
1.	I am able to check my blood sugar if necessary.		
2.	I am able to correct blood sugar when the sugar level is too high (e.g. eat different foods).		
3.	I am able to correct my blood sugar when the blood sugar level is too low (e.g. eat different foods).		
B.	**Domain 2: Dietary Control (Eating Plan)**		
4.	I am able to choose the correct foods.		
5.	I am able to choose different foods and stick to a healthy eating pattern.		
6.	I am able to keep my weight under control.		
7.	I am able to adjust my eating plan when ill.		
8.	I am able to follow a healthy eating pattern most of the time.		
9.	I am able to follow a healthy eating pattern when I am away from home.		
10.	I am able to adjust my eating plan when I am away from home.		
11.	I am able to follow a healthy eating pattern during the festive periods.		
12.	I am able to follow a healthy eating pattern during wedding ceremonies or at a party.		
13.	I am able to adjust my eating plan when I am feeling stressed or anxious.		
C.	**Domain 3: Physical Activity**		
14.	I am able to do enough exercise.		
15.	I am able to do more exercise if the doctor advises me to.		
16.	When I do more exercise, I am able to adjust my eating plan.		
D.	**Domain 4: Foot-care**		
17.	I am able to examine my feet for cuts.		
E.	**Domain 5: Medication Intake and Follow-up**		
18.	I am able to take my medication as prescribed.		
19.	I am able to maintain my medication when I am ill.		
20.	I am able to visit my doctor four times a year to monitor my diabetes according to treatment plan to monitor my diabetes.		