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The Perception of Skills for Maximizing Patient Comfort During Non-Invasive Ventilation Among Respiratory Therapists at KFSH&RC

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ACCEPTANCE

This thesis, THE PERCEPTION OF SKILLS FOR MAXIMIZING PATIENT COMFORT DURING NON-INVASIVE VENTILATION AMONG RESPIRATORY THERAPISTS AT KFSH&RC, by Ahmed Albaqawi, was prepared under the direction of the Master's Thesis Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree of Master of Science in the College of Nursing and Health . Professions, Georgia State University The Master's Thesis Advisory Committee, as representatives of the faculty, certifies that this thesis has met all standards of excellence and scholarship as determined by the faculty.

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Ahmed Albaqawi

Fall 2023

The perception of skills for maximizing patient comfort during non-invasive ventilation

among respiratory therapists at KFSH&RC

By

Ahmed Albaqawi, BsRT

A Thesis

Presented in Partial Fulfillment of Requirements for the

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In

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In

The Department of Respiratory Therapy

Under the supervision of Dr. Douglas S. Gardenhire, EdD, RRT, RRT-NPS,
FAARC

In

The Byrdine F. Lewis College of Nursing and Health Professions

Georgia State University

Atlanta, Georgia

2023

THE PERCEPTION OF SKILLS FOR MAXIMIZING PATIENT COMFORT DURING
NON-INVASIVE VENTILATION AMONG RESPIRATORY THERAPISTS AT
KFSH&RC

By

Ahmed Albaqawi, BSRT

(Under the supervision of Dr. Douglas S. Gardenhire)

Abstract

Background: Noninvasive ventilation (NIV) is a modality that supports patient breathing through different types of face interfaces, such as a full-face mask and nasal mask. Noninvasive Ventilation modalities have proven to improve morbidity and mortality rates for patients suffering from respiratory failure in the hospital setting and Outpatient. It also helped prevent escalating the treatment to more advanced methods such as invasive ventilation. However, several elements are required for optimizing the therapy, including Health care providers' training in operating the different brands of NIV, equipment availability, cost, and appropriate adjustment to the settings according to patient response. **Purpose**: This study aims to assess the level of perception of maximizing patient comfort during non-invasive ventilation devices among respiratory therapists at KFSH&RC by utilizing specific features of NIV. For instance, ramp, Flex, humidification, and auto-adjusting pressure. In addition, how RTs perceive mask selection and other contributing factors that contribute to maximizing patients' comfort. **Methods**: The study used an online, cross-sectional survey with 20 questions were sent to Respiratory therapists at KFSH&RC. In this survey, data collected from targeted population regarding their perceptions of skills for maximizing patient comfort during non-invasive ventilation will be analyzed using the Statistical Package for the Social Sciences (SPSS). **Result**: The findings indicated that respiratory therapists at KFSH&RC generally hold a positive view about utilizing various aspects of NIV, such as auto-adjusting pressure, noise reduction, humidification, and specific NIV settings, to maximize patient comfort. They also recognized the importance of effective communication, patient encouragement, and addressing patient comfort before and after initiating NIV therapy. The study found that demographic factors like gender, country of graduation, years of experience, and age did not significantly impact the therapists' attitudes, except for therapists working in respiratory care community services (RCCS), who placed greater emphasis on maximizing patient comfort during NIV (P=.019). **Conclusion**: This research conducted at King Faisal Specialist Hospital & Research Centre (KFSH&RC) concluded that respiratory therapists demonstrated positive perception about utilizing different elements of NIV to maximize patient comfort during therapy. Majority of therapists believed that features such as auto-adjusting pressure, noise reduction, humidification, and the utilization of certain NIV settings such as the FLEX and RAMP have significance for enhancing patient comfort.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

Introduction

Noninvasive ventilation (NIV) is a modality that supports patient breathing through different types of face interfaces, such as a full face mask and nasal mask. Moreover, many modes are utilized in NIV devices, including but not limited to CPAP, BIPAP, PCV, Auto-CPAP, and more. Over the past years, many NIV devices have been manufactured to be used in-hospital and at home. Several indications of NIV have been identified over the past two decades to improve oxygenation and ventilation problems. Common indications are obstructive sleep apnea (OSA), COPD exacerbation, and cardiogenic pulmonary edema (Scala, 2018).

Non-Invasive Ventilation modalities have proven to improve morbidity and mortality rates for patients suffering from respiratory failure in the hospital setting and Outpatient. It also helped prevent escalating the treatment to more advanced methods such as invasive ventilation (Navarra, 2020). However, several elements are required for optimizing the therapy, including Health care providers' training in operating the different brands of NIV, equipment availability, cost, and appropriate adjustment to the settings according to patient response (Bello, 2013).

Enhancing patient comfort in NIV and considering the factors that could impact the therapy tolerance has been confirmed in previous studies to increase patient tolerance and improve patient outcomes with NIV. Some common factors that impact patient compliance are using humidification, devices noise, patient position, stress, and pain (Camarota, G 2022).

Statement of the Problem

The respiratory therapists at KFSH&RC might lack skills in optimizing patient comfort during noninvasive ventilation, selecting the appropriate interface, and considering other contributing factors resulting in poor patient compliance with NIV. The problem has been observed in the hospital areas where NIV is utilized.

Purpose of the Study

This study aims to assess the level of perception of maximizing patient comfort during non-invasive ventilation devices among respiratory therapists at KFSH&RC by utilizing specific features of NIV. For instance, ramp, Flex, humidification, and auto-adjusting pressure. In addition, how RTs perceive mask selection and other contributing factors that contribute to maximizing patients' comfort.

Research Questions

1. What are the perceptions of RTs working at KFSH&RC towards maximizing patient comfort on NIV?

2. What are RTs attitudes and preferences towards the use of different types of masks during NIV therapy?

3. What are RTs' perspectives on factors that contribute to the patient's comfort during NIV?

4. What are the differences between RTs at KFSHRC in maximizing patients' comfort based on their background and experiences?

Definition of Terms

Noninvasive ventilation (NIV): modality that supports patient breathing through different types of face interfaces.

Obstructive sleep apnea (OSA): a sleep disorder that involves a complete or partial decrease in airflow.

COPD exacerbation: episodes of worsening signs and symptoms leading to notable morbidity and mortality.

Respiratory therapists (RTs): a Health care providers that involved in caring for patients with difficulty of breathing and is responsible for operating different respiratory modalities.

Ramp: comfort setting, when activate, drops the pressure and gradually increases until achieving the set pressure.

Flex: comfort setting, lower the pressure during the exhalation phase.

Humidification: a chamber of water that allows moisture to be added During NIV.

Auto-adjusting pressure: mode of NIV automatically adjusts the pressure based on the level of obstruction.

Mask fitting: best technique and selection of the NIV interface that fits the patient.

high flow nasal cannula (HFNC): A high oxygen therapy modality allows for improving patient oxygenation.

IPAP: Allows the highest pressure to be delivered during inspiration.

CPAP: Allows the lowest pressure to be delivered during expiration.

RCCS: Respiratory care community services.

Limitations

Survey research can be a valuable tool for assessing the knowledge of RTs towards NIV. However, there are several limitations that are expected with this type of research:

1. Survey research is valuable for measuring knowledge, but it cannot examine the actual application of such information in clinical situations.

2. The accuracy of the results may be constrained by the survey's low response rate.

3. The Respiratory therapists at KFSH&RC come from different background and experiences.

Delimitations

1. As this survey only will be shared with one group in one organization, the results of this study will be only applied to Respiratory therapist at KFSH&RC.
2. There is a lack of literature on skills of maximizing patient's comfort during NIV among respiratory therapists worldwide.

Significance of the study

This study may improve our knowledge on the perceptions of how respiratory therapists are able to improve compliance and comfort levels in patients requiring NIV and, therefore, overall outcomes by using the multiple comfort features in NIV. Moreover, the findings of this study will be shared with respiratory therapists at KFSH&RC in order to raise their awareness of the benefits of maximizing patient comfort while using NIV.

Assumptions

1. An examination of RTs' skills towards maximizing patient comfort during noninvasive ventilation by utilizing specific features may provide a better understanding of the issue. Therefore, improve RTs competencies.

2. Since almost all RTs at KFSH&RC are trained to operate NIV devices in their areas, a significant number of RTs will be able to complete the survey.

CHAPTER II

REVIEW OF THE LITERATURE

In order to provide context for the present investigation, a literature review was carried out to investigate how respiratory therapists Perceive various comfort features and settings utilized during non-invasive ventilation. The chapter is organized into four sections. The first section will provide a literature review of non-invasive ventilation (NIV). The second and third sections will have literature focus on the importance of enhancing patient comfort during NIV and the elements for maximizing the comfort settings with NIV, respectively. Finally, the literature will embark on healthcare Providers' Skills in operating NIV.

NIV Overview

Noninvasive ventilation (NIV) has a long history, dating back to the early 20th century. One of the earliest noninvasive ventilation (NIV) devices, the Pulmotor was created by the company Dräger in 1907. Patients with acute respiratory failure of various types were successfully treated with a respirator that delivered CPAP via mask, as reported by Barach in 1935. However, it wasn't until the 1970s that NVPP emerged as a less invasive option, allowing patients to keep their airway intact and allowing them to speak and swallow to avoid the complications associated with endotracheal tubes. NIV was reported to be able to control hypercapnia in patients with acute respiratory failure, so early results seemed promising. Nasal continuous positive airway pressure (nasal CPAP, or n-CPAP) has been used successfully to treat sleep apnea since the 1980s. Nasal intermittent positive pressure ventilation (n-IPPV) was quickly implemented to enhance breathing, particularly during sleep, in patients with chronic respiratory failure (CRF). Subsequently, numerous studies on NVPP were conducted, with increasingly encouraging results, in patients with ARF or CRF, sleep apnea, or respiratory difficulty after extubation (Rey, C 2009).

Noninvasive ventilation (NIV) has evolved alongside invasive mechanical ventilation since the 1940s for the treatment of patients with acute respiratory failure (ARF). Over the past 20 years, there has been an increase in the use of NIV due to a multitude of studies reporting its effectiveness in various patient populations and clinical contexts. Despite potential limitations in accurately reflecting current practice, studies have shown that NIV is now widely available and increasingly used by clinicians in acute-care settings (Pierson 2009).

Non-invasive ventilation (NIV) is a modality of ventilation used to provide patients with breath without using an invasive artificial airway. NIV can be used to treat a range of respiratory disorders, including but not limited to COPD, congestive heart failure, pneumonia, and Obstructive sleep apnea (OSA). (Popat 2016) in this article the Authors provide an overview, advantages, contraindications, and risks of noninvasive ventilation (NIV) and compare it with Invasive ventilation for treating acute respiratory failure. Compared to intubation, which may be traumatic for patients, NIV has the benefit of being less complex and more comfortable for patients. When compared to invasive mechanical ventilation, it has a lower likelihood of complications such as pneumonia.

Close monitoring of respiratory rate (patient effort), oxygen saturation (to regulate FiO2), pH, and PaCO2 is required to guarantee the effectiveness of NIV. additionally, to ongoing observation, comprehensive reevaluations are often conducted every 60 and/or 90–120 minutes. Optimal synchronization between the patient's spontaneous breathing activity and the ventilator's programmed settings is one of the essential criteria determining NIV tolerance, known as "patient–ventilator interaction". The Asynchrony Index is computed as follows: (%) = number of events/ (ineffective breaths+ ventilator cycles) × 100. More than Ten percent is classified severe, and it might increase the patient's effort of breathing and cause discomfort (Masip, J 2014).

Importance of Enhancing Patient Comfort During NIV

It has been demonstrated in earlier studies that improving patient comfort during NIV and considering potential therapeutic tolerance factors can raise patient tolerance and improve patient outcomes. The use of humidification, device noise reduction, patient position, stress, and pain were all listed in this study as prevalent factors that can affect patient compliance during NIV therapy. Additionally, Non-invasive ventilation (NIV) can be uncomfortable for some patients due to various reasons. Discomfort can be caused by the interface, anchor system, ventilatory setting, humidification, noise, position of the patient, psychological distress, anxiety, fear, and pain. Moreover, the patient's tolerance and the effectiveness of NIV are significantly impacted by the NIV interface and ventilatory setting used. As a result, the care of patients who undergo NIV heavily relies on the overall comfort evaluation. Many factors that might decrease a patient's level of comfort while receiving NIV are presented and explored, and a potential interventional technique to address these issues is also proposed (Cammarota, G 2022). The authors suggested

when a patient experiences intolerance to non-invasive ventilation (NIV), it is essential to take a bundle of interventions to address the issue. The following interventions can be considered:

- Establish a relationship of collaboration with the patient and listen to their concerns and preferences.
- Offer the patient to switch to another interface that may be more comfortable or better suited to their needs.
- adjust ventilator settings and progressively increase the inspiratory pressure while giving the patient time to adapt.

- Adopt an interface rotation strategy to prevent pressure sores and to allow the skin to heal.

- Add adequate humidification to prevent dryness and irritation.

- Control disturbing factors such as noise that can cause anxiety and discomfort.

- Consider pharmacological intervention such as sedation and analgesia to reduce anxiety and pain.

- Monitor the patient's vital signs closely.

By implementing these interventions, healthcare providers can help reduce patient intolerance to NIV and improve patient comfort and compliance.

Non-invasive ventilation techniques have shown to lower morbidity and mortality rates for patients with respiratory failure in both in-patient and outpatient care areas. Moreover, it prevented the need for the treatment to escalate to more advanced therapy like intubation (Navarra, 2020).

After the decision has been made to initiate NIV, the first step should consist of demonstrating the equipment to the patient and fitting the NIV interface. The clinician's role is to support and encourage the patient, teach them how to breathe in time with the ventilator, and provide them a safe space to express any worries or concerns they may have. the authors stress that skills of healthcare professionals to operate the various NIV brands, equipment availability, cost, and appropriate setting adjustments in response to patient comfort level are all necessary for maximizing the therapy. Therefore, Prior to initiating noninvasive ventilation (NIV) to patients, several steps should be followed to optimize the patient's care and outcomes. This includes selecting patients who are suitable for NIV based on their clinical condition, ensuring that the

healthcare team involved in NIV has adequate skills and experience, encouraging cooperation among healthcare professionals involved in the care of the patient, obtaining informed consent from the patient or their family, selecting the appropriate interface for NIV, choosing the appropriate ventilation mode and adjusting the ventilator settings to meet the patient's respiratory needs, monitoring the patient's response to NIV therapy, and finally, initiating NIV therapy. By following these steps, healthcare professionals can provide the best outcomes for patients receiving NIV therapy (Bello, 2013).

effectiveness of the NIV relies on several factors, including the clinician's expertise, the selection of the interface, and other considerations (Hess, D. R. 2012). In this study, the author emphasizes that placing patients on NIV is both an art and a science. Initiating NIV necessitates efforts to promote patient compliance with the therapy. For example, the key to success is the selection of a suitable interface, and clinician should be aware of both the advantages and disadvantages of each. As many options as possible for interfaces should be made available, and the patient should be given some input into the selection. Moreover, the author discussed the important roles of some comfort features, such as Ramp, Flex, and humidification.

Elements for Maximizing Patient Comfort uring NIV

While humidifiers aren't usually utilized during NIV, breathing in dry air may cause irritation to the respiratory system, including the nose and mouth, which can cause congestion and an increase in airway resistance. When used with nasal mask, CPAP may cause congestion and dryness in up to 60% of people with sleep apnea syndrome. Thus, humidification is advised as it is believed to help NIV by lowering nasal resistance, helping with secretions, and enhancing compliance and comfort (Masip, J 2014) (Cammarota, G 2022).

For patients receiving CPAP for sleep apnea, ramp settings are typically utilized to incrementally raise pressure by set time. Its utility in NIV, however, is not well studied since they may delay the start of adequate respiratory ventilation. Bi-Flex is another supplement to NIV that gives pressure relief during inhalation and expiration; however, it is only used occasionally. Although ramp and Bi-Flex settings may increase patient comfort, their effect on NIV efficacy is still disputed (Hess, D. R. 2012).

Auto-CPAP machines are created to automatically adjust the treatment pressure to match the specific pressure needs of individuals with obstructive sleep apnea (OSA). This means that the pressure applied during treatment is constantly modified based on the patient's breathing patterns, ensuring that the optimal pressure is delivered at all times (Ficker 1998). A recent study was conducted in Lam Dong Medical College (Dinh-Thi-Dieu 2020) to assess the effectiveness and adherence of auto-CPAP treatment in OSA patients, upon inclusion criteria, 139 OSA patients with significant OSA symptoms (AHI >30/h) were initiated for auto-CPAP therapy and they were assessed for efficacy. Results showed patients with severe OSA who were followed for 6 months showed excellent adherence to auto-CPAP treatment, some of those patients refused to go back to regular CPAP devices due to discomfort.

When talking about NIV (non-invasive ventilation), noise reduction refers to the steps done to minimize the sound of the mechanical ventilation or the air leak that escapes from the mask. This is significant because patient intolerance and noncompliance with NIV may increase if noise levels are too high. In (Cammarota, G 2022), the Author provided some suggestions for element noise during NIV. For example, noise interruption during NIV can be caused by air leaks and clinicians should check for leaks around the mask's edges to ensure a good seal. Other tactics suggested in this article include using earplugs, especially with Hamlet, using the soundproofing

enclosure, and the machine being placed safely away from the patient's bed on a flat floor. The resulting noise from vibrations may be diminished.

To ensure the patient receives the appropriate level of respiratory support and comfort during NIV therapy, it is crucial that the mask be fitted properly.. One of most important factors of mask fitting during NIV is increase patient comfort; A well-fitted mask can increase patient comfort, which is crucial for the patient to tolerate the therapy and adhere to it for the prescribed duration. Moreover, skin irritation and breakdown, especially at the bridge of the nose, caused by a poorly fitted mask can cause pain, discomfort, and non-adherence to therapy. In addition, clinicals should be aware about the various types of NIV interfaces and its advantages and disadvantages, (Table 3) shows the list of each interface (Hess, D. R. 2012) (Hess, D. R. 2006).

There are various interfaces available for non-invasive ventilation, each with its own set of advantages and disadvantages. The nasal interface offers less risk of aspiration, easier secretion clearance, and easier speech, while the oronasal interface provides better oral leak control and is more effective in mouth breathers, but has an increased risk of aspiration and difficulty speaking and eating. The mouthpiece has less interference with speech, very little dead space, and may not require headgear, but it is less effective if the patient cannot maintain mouth seal and usually requires a nasal or oronasal interface at night. The total face mask may be more comfortable for some patients, easier to fit, and has less facial-skin breakdown, but has the potential for orthodontic injury and cannot deliver aerosolized medications. The helmet may be more comfortable for some patients, easier to fit, and has no facial-skin breakdown, but it can lead to rebreathing, poorer patient-ventilator synchrony, less respiratory muscle unloading, and has a risk of asphyxiation if the ventilator malfunctions and cannot deliver aerosolized medications.

Healthcare Providers' Skills in Operating NIV

To ensure a successful outcome in any practical intervention, it is important for the operator to have the necessary skills and knowledge to determine when the intervention is appropriate and when it is not. While training and competency assessment are commonly advised, there is currently no internationally recognized framework for measuring competency. According to a review by NCEPOD, 45.4% of hospitals had staff overseeing patients on NIV without a clear competency level. Providers of NIV need training in the use of NIV in various settings and in troubleshooting when a patient is not improving or not comfortable. Teaching is the best method of learning. Continues assessment of staff's competence are essential (Elliott, 2019).

In (Karim, H 2019) the article highlights the significance of education and training in this field. While NIV is becoming increasingly common, the paper stresses the importance of having the necessary training to use it as a life-sustaining modality. The article conducted a systematic review to determine the importance of NIV education and training. Nevertheless, they were unable to locate any randomized controlled trials that specifically aimed to evaluate the effects of NIV educational and training materials. They located a study that used a training simulation as well as some narrative evaluations. Only a small number of advanced nations currently offer formal NIV training. An international consensus on NIV education and training was developed after collecting the views of 64 experts from 21 nations because to the shortage of high-quality experimental evidence. The authors highlight the potential of education and training to develop knowledge and abilities of clinical workers who give medical care utilizing NIV. The research suggests that developing countries, in particular, have a pressing need for more formalized NIV education and training programs.

In Saudi Arabia, the NIV's effectiveness was minimal. The RTs across the nation indicated a mediocre level of confidence while operating the NIV. The primary causes were a lack of proper formal training, a lack of qualified and experienced workers (RTs), and a staff shortage. Based on a survey that was sent out to RTs among 61 hospitals in Saudi Arabia, 40% of RTs showed a lack of either skills or confidence in operating the NIV. The current results provide significant new information on how NIV is used in the Kingdom of Saudi Arabia and about potential causes of poor NIV effectiveness. To raise the knowledge, confidence, and increase competency of NIV implementation, the authors emphasize the need to improve teaching in RT schools, train staff, and improve policies and guidelines for implementing NIV (AlAhmari 2018).

CHAPTER III

METHODOLOGY

This descriptive study explores the perceptions of skills for maximizing patient comfort during non-invasive ventilation among respiratory therapists at KFSH&RC. The study aims to assess the level of perception of maximizing patient comfort during non-invasive ventilation devices by utilizing specific features of NIV and selecting the appropriate interface among respiratory therapists at KFSH&RC. To collect data, the researcher used a self-administered survey. This particular chapter provides a detailed explanation of the methods used in the study.

Research Questions

1. What are the perceptions of RTs working at KFSH&RC towards maximizing patient comfort on NIV?

2. What are RTs attitudes and preferences towards the use of different types of masks during NIV therapy?

3. What are RTs' perspectives on factors that contribute to the patient's comfort during NIV?

4. What are the differences between RTs at KFSHRC in maximizing patients' comfort based on their background and experiences?

Instrumentation

The researcher conducted a survey consisting of 20 questions. The survey was created by the researcher and validated by the thesis committee. The survey questionnaire consists of two sections. The first section includes demographic questions to collect background and experience information on the respiratory therapist respondents. They inquire about the hospital where they work, their years of experience as a respiratory therapist, their gender, age, highest degree

earned, and the college or university where they earned their degree in respiratory therapy. In addition, the survey inquiries about their primary and secondary work responsibilities. The second section questioners are intended to evaluate the attitudes of respiratory therapists regarding various aspects of non-invasive ventilation (NIV) therapy. The questions use a 4-point Likert scale, where 1 represents "strongly agree," 2 represents "agree," 3 represents "disagree," and 4 represents "strongly disagree." These questions cover topics such as the effects of training and competencies on the ability to operate NIV, the importance of patient comfort and compliance during NIV, the use of specific features of NIV to enhance patient comfort, and the role of communication with other members of the healthcare team in optimizing patient outcomes.

Research Design

This investigation employed a cross-sectional descriptive methodology. Respiratory therapists at King Faisal Specialist Hospital and Research Center in Riyadh, Saudi Arabia were the recipients of this survey, which was sent out electronically. Survey research is a solid research strategy that requires the same requirements as any other research method. Survey research papers are subjected to the same amount of examination as other research reports by journal editors and the broader research community. Although survey research is not always difficult, researchers must be systematic and insightful in the project's design, implementation, and reporting (Nayak, 2019). Moreover, the use of online survey tools facilitates questionnaire creation, data gathering, data storage, data analysis, and teamwork. The time and money required to conduct an online questionnaire are minimal. The researcher has complete control over when the survey begins, when it is paused, and when it resumes (Kelley, K 2003).

Sample

This study utilized a non-probability convenience sample of the intended population. Inclusion criteria were all actively employed Respiratory Therapists at King Faisal Specialized Hospital and Research Center in Riyadh, Saudi Arabia who have obtained training in the use of NIV. Employees who were not RTs in the department, RTs who were not currently working in KFSH&RC, and RT students/interns were excluded from this study.

Data Analysis

Statistical analysis is a method of analyzing and interpreting data using statistical measures. In this survey, data collected from respiratory therapists at KFSH&RC regarding their perceptions of skills for maximizing patient comfort during non-invasive ventilation will be analyzed using the Statistical Package for the Social Sciences (SPSS). Standard deviation, mean and mode will be calculated to provide valuable insights to answer research questions. The standard deviation will indicate the variability of the data, while the mean will provide the average value. mode will determine the common response. The results of the analysis can be used to draw conclusions and inform decisions on research questions. Moreover, to interpret the computed mean, the mean ranges scale from (Alico & Guimba, 2015) was used to see the mean position of each questionnaire.

MEAN RANGES	INTERPRETATION
1.00 – 1.74	Strongly Agree
1.75 – 2.49	Agree
2.50 – 3.24	Disagree
3.25 – 4.00	Strongly disagree

Data collection

The survey was developed using Google Forms and will be distributed directly to the targeted population via participant's emails; participants will get a reminder to finish the survey via email every two weeks for a total of three invites.

CHAPTER IV

Results

This results chapter presents the findings of a study conducted at King Faisal Specialist Hospital & Research Centre (KFSH&RC) to assess the level of perception among respiratory therapists regarding the maximization of patient comfort during non-invasive ventilation (NIV) devices by utilizing specific features of NIV and selecting the appropriate interface. The survey aimed to reach 109 respiratory therapists at KFSH&RC, and it received a total of 41 responses, resulting in a response rate of approximately 38%. The data collected from the survey were analyzed using the Statistical Package for the Social Sciences (SPSS v.28.0) to address the research questions of the study. The chapter provides a comprehensive overview of the study's objectives and methodology, presents the results through tables, graphs, and descriptive statistics.

Research Questions

1. What are the perceptions of RTs working at KFSH&RC towards maximizing patient comfort on NIV?

2. What are RTs attitudes and preferences towards the use of different types of masks during NIV therapy?

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4. What are the differences between RTs at KFSHRC in maximizing patients' comfort based on their different background and experiences?

Demographic Findings

The provided statistics reflect the demographics and characteristics of a group of respondents (N=41) working at KFSHRC as Respiratory therapists. The respondents have a mean M= 7.85 years of experience (±5.786). Divided into four groups as shown in Table 1, figure 1. In terms of gender distribution, the respondents are predominantly male, with (N=31) 75.6% identifying as Male and (N=10) 24.4% as Female. This indicates a higher representation of Male professionals in the surveyed group. The mean age of the respondents is 33.07 years (±6.4) divided into three groups. Regarding the highest degree attained, the vast majority of respondents (85.4%) have a bachelor's degree, while 14.6% have a master's degree. The survey population contains no individuals holding either a Diploma or Doctoral degree.

Figure 1

Pie Chart of Respiratory Therapists' Years of Experience
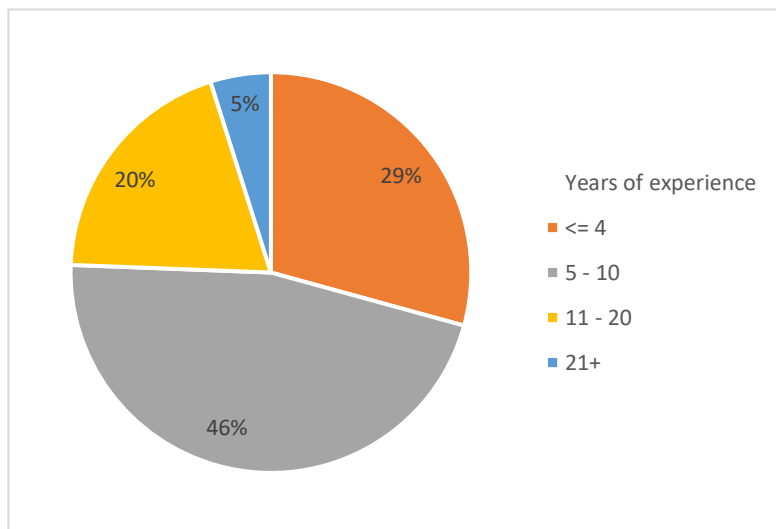
According to the country of graduation, the majority of respondents N=23 (56.1%) graduated from Saudi Arabia, followed by N=16 (39.0%) from the United States and N=2 (4.9%)

from the Philippines as shown in figure 2. Regarding primary areas of responsibility at work, the largest group of respondents (53.7%) is responsible for adult ICUs, followed by 19.5% responsible for pediatrics ICUs, 12.2% responsible for NICU (Neonatal Intensive Care Unit), and smaller percentages responsible for wards (4.9%) and Respiratory care community services (9.8%), presented in figure 2.

Figure 3

Graduation Country Among Participants
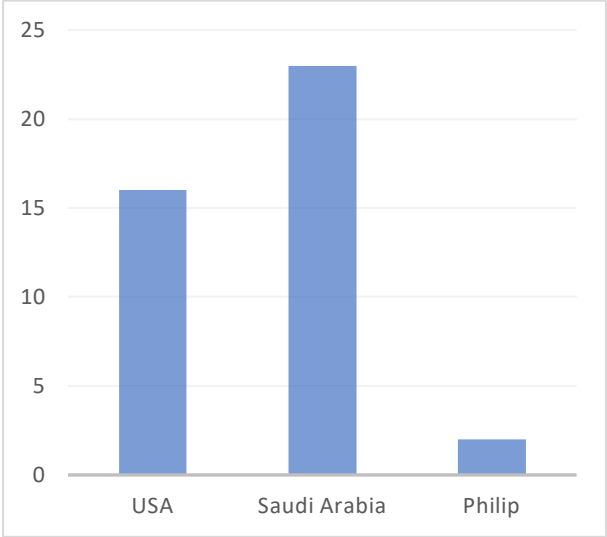
Figure 2

Primary Area of Work Among Participants
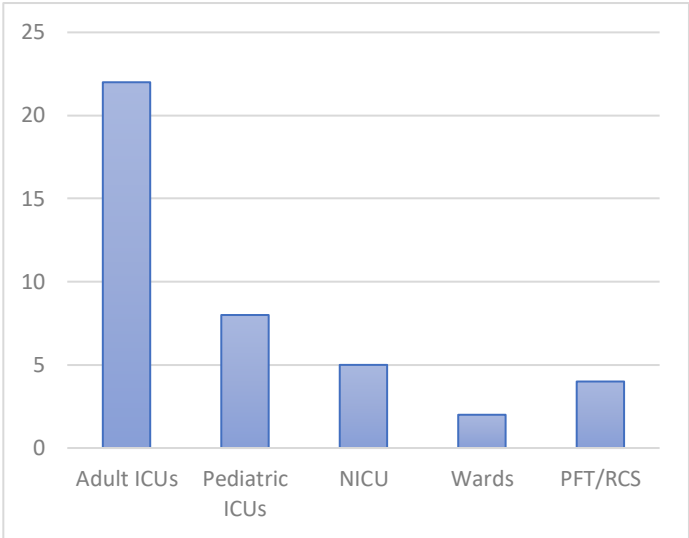
Table 1

Demographic Data among Respiratory Therapists at KFSH&RC.

Demographics	Findings
What hospital do you currently work at? • KFSHRC	41 (38%)
Years of experience.	Total M = 7.85
• <= 4 • 5 - 10 • 11 - 20 • 21+	• 12 (29.3%) • 19 (46.3%) • 8 (19.5%) • 2 (4.9%)
Gender. • MALE • FEMALE	• 31 (75.6%) • 10 (24.4%)
Age.	Total M = 33.07 (±6.4)
• <= 35 • 36 - 45 • 46 - 55	• 30 (73.2%) • 8 (19.5%) • 3 (7.3%)
What is your highest degree?	
• Diploma • Bachelor • Master • Doctoral	• 0 (0%) • 35 (85.4%) • 6 (14.6%) • 0 (0%)
Country of graduation. • Saudi Arabia • USA • PHILIPPINES	• 23 (56.1%) • 16 (39.0%) • 2 (4.9%)
What is your primary area of responsibility at work?	
• Adult ICU • Pediatrics ICU • NICU • Wards • RCCS	• 22 (53.7%) • 8 (19.5%) • 5 (12.2%) • 2 (4.9%) • 4 (9.8%)

Finding Related to Research Question 1

The primary objective of this study was to inquire into how respiratory therapists at KFSH&RC perceived enhancing their patients' levels of comfort while receiving NIV. The purpose of this research was to examine RTs' perspectives on factors that might improve patients' comfort while receiving NIV. The findings are presented along with the mean, mode, and standard deviation (SD) for each survey statement (table 2), which was rated on a four-point Likert scale (1: strongly agree, 2: agree, 3: disagree, 4: strongly disagree) regarding several factors, including humidification, noise reduction features, RAMP/RAMP time feature, FLEX feature, auto-adjusting pressure (Auto-BiPAP), as well as competencies and training in NIV received during their orientation.

Table 2 demonstrates that participants express confidence in the competencies and training received during orientation, with a mean score of 1.78. Furthermore, respiratory therapists stated agreement that employing humidification, M = 1.93 (Item 13), and the RAMP/RAMP time feature in Item 15, M = 1.90, significantly improve patient comfort during NIV. In response to the question, "As a respiratory therapist, I have the ability to maximize my patient's comfort with NIV by adjusting other parameters or features of NIV. 90.2% strongly agree or agree. M=1.95 is the overall mean score. Moving to statement 16, the results suggest that RTs generally believe that using the FLEX feature has a significant effect on patient comfort during NIV (M = 2.10). Similarly, RTs tend to agree that the noise reduction function has a beneficial influence on patient comfort during NIV, with M = 2.20 agreeing on this point. However, nearly 32% either disagree or strongly disagree with the statement with the largest standard deviation (SD 1.100). Moreover, on average, participants have favorable attitudes regarding the perception of using auto-adjusting pressure (Auto-BiPAP) (M = 2.32). However, the SD=.960 demonstrates the diversity of opinion among therapists, as 36% reported disagreement (item 17).

Table 2

The Perceptions of the RTs Working at KFSH&RC Towards Maximizing Patient Comfort on NIV.

Survey Statement	Mean	Mode	SD
9. Do you agree that the competencies and training you received during orientation improved your ability to operate the NIV?	1.78	2	.690
15. I believe using the RAMP/RAMP time feature has a significant effect on patient comfort during NIV.	1.90	2	.625
13. I believe using humidification has a significant effect on patient comfort during NIV.	1.93	2	.787
10. As a respiratory therapist, I have the ability to maximize my patient comfort with NIV by adjusting other parameters or features of NIV.	1.95	2	.669
16. I believe using the FLEX feature has a significant effect on patient comfort during NIV.	2.10	2	.735
14. I believe using the Noise reduction feature has a significant effect on patient comfort during NIV.	2.20	2	1.100
17. I believe using auto-adjusting pressure (Auto-BiPAP) has a significant effect on patient comfort during NIV.	2.32	2	.960

Note. Descriptive statistics are based on a four-point Likert scale (1: strongly agree, 2: agree, 3: disagree, 4: strongly disagree).

Means are based on 4-point Likert-scale for 12 perception statements in Appendix A

Finding Related to Research Question 2

The second research question asked, " What are the respiratory therapists' attitudes and preferences towards the use of different types of masks during NIV therapy?". Table 3 illustrates Mean, median, mode, and stander deviation. Participants were presented with two questions regarding their level of agreement based on four-point Likert scale (as 1 means strongly agree, 2 means agree, 3 means disagree, and 4 means strongly disagree).

The findings in table 3 shows that respiratory therapists at KFSH&RC have varying opinions on the choice of masks for Non-Invasive Ventilation (NIV). For the statement "I believe that a nasal mask should be considered the primary option when using NIV," the mean score is M= 2.46 indicates that, on average, the therapists lean towards disagreement with the statement. The mode of 3 indicates that "Disagree" was the most common response. In contrast, for the statement "I believe mask choice has a significant effect on patient comfort during NIV," the mean score is significantly lower at M = 1.59, reflecting a stronger agreement.

Table 3

Respiratory Therapists' Attitudes and Preferences Towards the Use of Different Types of Masks During NIV Therapy

Survey Statement	Mean	Mode	SD
11. I believe mask choice has a significant effect on patient comfort during NIV.	1.59	1	.894
12. I believe that a nasal mask should be considered the primary option when using NIV.	2.46	3	.745

Note. Descriptive statistics are based on a four-point Likert scale (1: strongly agree, 2: agree, 3: disagree, 4: strongly disagree).

Means are based on 4-point Likert-scale for 12 perception statements in Appendix A

Finding Related to Research Question 3

The Third research question asked, " What are RTs' perspectives on other factors that contribute to the patient's comfort during NIV? ". Table 4 illustrates Mean, stander deviation and percentages. Participants were presented with 3 questions regarding their level of agreement based on four-point Likert scale (as 1 means strongly agree, 2 means agree, 3 means disagree, and 4 means strongly disagree).

The finding shows in table 4 shows the majority responses either strongly agree or agree that patient encouragement prior to initiating NIV has a significant effect on patient compliance toward NIV (Item 18), with mean M = 1.49 and (SD) is .746. The mode of 1 indicates that "Strongly Agree" was the most common response. The relatively low standard deviation of 0.746 indicates that the responses are relatively consistent, and there is little variability among the participants. Similarly, most therapists either strongly agree or agree that addressing a patient's level of comfort after initiating NIV is the standard of practice (Item 19). The mean value M= 1.54 suggests that, on average, the therapists strongly agree with the statement. The mode of 1 indicates that "Strongly Agree" was the most common response. Moreover, in Item (20) is strongly agreed with most participants. A mean value M= 1.66 indicates that the therapists agree with the statement on average. The mode of 1 implies that "Strongly Agree" was the most often selected response. The standard deviation of 0.911 suggests that the responds are more variable than in prior questions, although the majority of therapists still agree.

Table 4

RTs' Perspectives on Other Factors That Contribute to Patient's Comfort during NIV.

Survey Statement	Mean	Mode	SD
18. I believe patient encouragement prior to initiating NIV has a significant effect on patient compliance toward NIV.	1.49	1	.746
19. Before leaving the patient's room, I believe addressing a patient's level of comfort after initiating NIV is the standard of practice.	1.56	1	.776
20. I believe communicating with other members of the healthcare team (e.g., physicians, nurses, respiratory therapists) about the patient's comfort and response to NIV therapy will contribute to patient comfort during NIV.	1.66	1	.911

Note. Descriptive statistics are based on a four-point Likert scale (1: strongly agree, 2: agree, 3: disagree, 4: strongly disagree).

Means are based on 4-point Likert-scale for 12 perception statements in Appendix A

Finding Related to Research Question 4:

The last research question asked, "What are the differences between RTs at KFSHRC in maximizing patients' comfort based on their different backgrounds and experiences?". The investigation explores several demographic and professional factors, including gender, graduation country, years of experience, primary area of work, and age. The purpose is to determine whether the RT's background influences their perspective on maximizing patients' comfort during NIV.

Gender

Based on 12 perception statements that was conducted from the respiratory therapists, The analysis in table 5 examines the relationship between respiratory therapist perceptions towards maximizing patient comfort and their gender, with 31 male and 10 female respondents. The mean perception score for male therapists was 1.8548 (SD=0.44978), while for female therapists, it was 2.0833 (SD=0.70383). and the t-test shows no statistically significant distinction between the groups (P= 0.117).

Table 5

Relationship Between Respiratory Therapist Perceptions Towards Maximizing Patient Comfort and Their Gender.

Gender	N	Mean	SD	Sig.
Male	31	1.8548	.44978	.117
Female	10	2.0833	.70383	

p-value was obtained from Independent Sample t-test.
Means are based on 4-point Likert-scale for 12 perception statements in Appendix A.

Graduation country

The provided statistics in (Table 6) present an examination of respiratory therapists' perceptions concerning maximizing patient comfort during Non-Invasive Ventilation (NIV) based on their country of graduation: the USA, Saudi Arabia, and the Philippines. In the USA, where 16 respondents graduated, the mean score was M = 1.947 (SD=0.40583), Saudi Arabian graduates (N=23) had a mean score of 1.9312 (SD=0.59067), while the small Filipino group (N=2) reported a mean of 1.3750 (SD=0.41248). Overall, among all 41 respondents from these countries, the total mean score was M = 1.9106 (SD=0.52254). The ANOVA test suggests no statistically significant differences (P= .338) scores across the three countries.

Table 6

Relationship Between Respiratory Therapist Perceptions Towards Maximizing Patient Comfort and Their Country of Education.

Graduation country	N	Mean	SD	Sig.
USA	16	1.9479	.40583	.338
Saudi Arabia	23	1.9312	.59067	
Philippine	2	1.3750	.41248	
Total	41	1.9106	.52254	

p-value was obtained from ANOVA test.
Means are based on 4-point Likert-scale for 12 perception statements in Appendix A.

Years of experience as Respiratory therapist

The analysis in (Table 7, Figure 4) involves experience groups of respiratory therapists categorized by years of experience: ≤ 4, 5 - 10, 11 - 20, and 21+. For each group, the mean comfort perception score was calculated. In the ≤ 4 group, the mean was 2.1389 (SD=0.47849), for 5 - 10 years it was 1.8026 (SD=0.39986), for 11 - 20 years it was 1.8854 (SD=0.80664), and for 21+ years it was 1.6667 (SD=0.00000). The overall mean perception score was 1.9106 (SD=0.52254) for 41 respondents. An ANOVA was conducted to examine the differences between these experience groups, resulting in a p-value of 0.322, indicating that there is no statistically significant difference in comfort perception scores among the experience groups.

Table 7

Relationship Between Respiratory Therapist Perceptions Towards Maximizing Patient Comfort and Years of Experience.

Experience Groups	N	Mean	Std. Deviation	Sig.
<= 4	12	2.1389	.47849	.322
5 - 10	19	1.8026	.39986	
11 - 20	8	1.8854	.80664	
21+	2	1.6667	.00000	
Total	41	1.9106	.52254	

p-value was obtained from ANOVA test.
Means are based on 4-point Likert-scale for 12 perception statements in Appendix A.

Figure 4

Years of Experience Among Participants
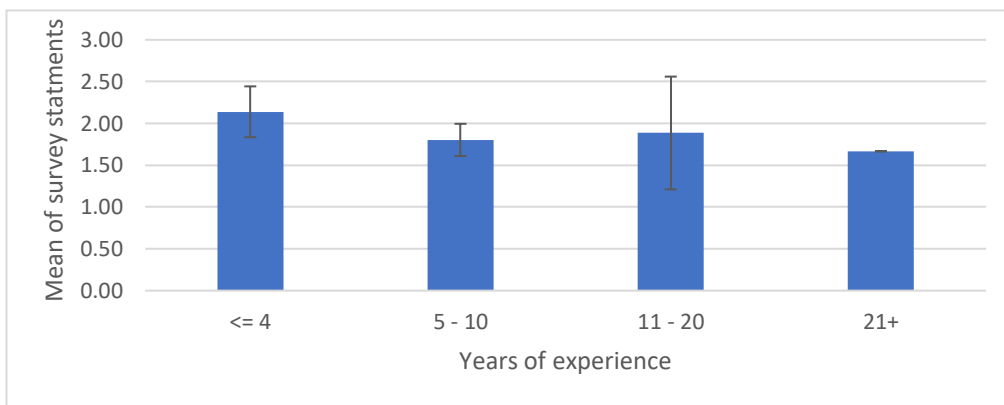
Primary Area of Work

The analysis focuses on the primary areas of work of respiratory therapists, categorized as Adult ICUs, Pediatric ICUs, NICU, and Respiratory care community services (RCCS). For Adult ICUs, the mean score was 2.0833 (SD=0.53514); for Pediatric ICUs, it was 1.7396 (SD=0.15709); for NICU, it was 2.1000 (SD=0.61633); for PFT/RCS, it was 1.3333 (SD=0.15215). The overall mean perception score was 1.9106 (SD=0.52254) for 41 respondents. An ANOVA was conducted to explore differences among these primary areas of work. P-value of 0.019, signifying a statistically significant distinction among the work areas.

Table 8

Relationship Between Respiratory Therapist Perceptions Towards Maximizing Patient Comfort and Primary Area of Work.

Primary Area	N	Mean	Std. Deviation	Sig.
Adult ICUs	22	2.0833	.53514	.019
Pediatric ICUs	8	1.7396	.15709	
NICU	5	2.1000	.61633	
RCCS	4	1.3333	.15215	
Total	41	1.9106	.52254	

p-value was obtained from ANOVA test.
Means are based on 4-point Likert-scale for 12 perception statements in Appendix A.

Figure 5

Primary area of work among participants
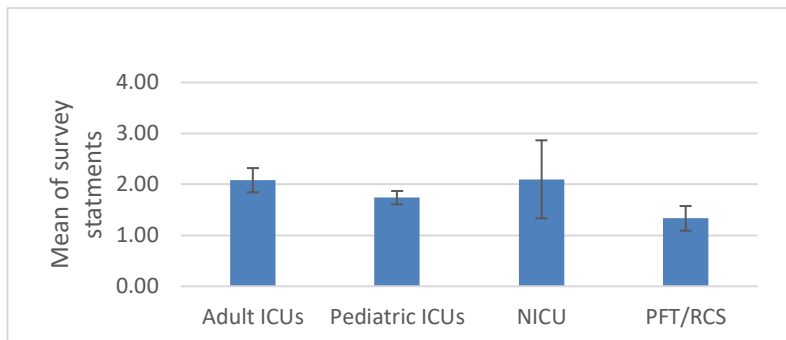
Age

The provided statistics present an evaluation of respiratory therapist perceptions regarding maximizing patient comfort during Non-Invasive Ventilation (NIV) categorized by age groups: <= 35, 36 - 45, and 46 - 55. Among respondents aged <= 35 (N=30), the mean comfort perception score was 1.9861 (SD=0.57239), while the age 36 - 45 group (N=8) reported a mean score of 1.7917 (SD=0.21822), and the age 46 - 55 group (N=3) had a mean of 1.4722 (SD=0.33679). For all 41 respondents, the combined mean comfort perception score was 1.9106 (SD=0.52254). The analysis found a p-value of 0.210, indicating no statistically significant differences across these age groups.

Table 9

Relationship Between Respiratory Therapist Perceptions Towards Maximizing Patient Comfort and Their Age.

Age	N	Mean	SD	Sig.
<= 35	30	1.9861	.57239	.210
36 - 45	8	1.7917	.21822	
46 - 55	3	1.4722	.33679	
Total	41	1.9106	.52254	

p-value was obtained from ANOVA test.
Means are based on 4-point Likert-scale for 12 perception statements in Appendix A.

CHAPTER V

Discussion

This chapter provides an analysis and discussion of the findings reported in the results chapter, with the aim of addressing the research questions outlined below. Additionally, this chapter addresses the implications of this study, future research recommendations, and provides a conclusion.

Research Questions

1. What are the perceptions of RTs working at KFSH&RC towards maximizing patient comfort on NIV?

2. What are RTs attitudes and preferences towards the use of different types of masks during NIV therapy?

3. What are RTs' perspectives on factors that contribute to the patient's comfort during NIV?

4. What are the differences between RTs at KFSHRC in maximizing patients' comfort based on their background and experiences?

Finding Related to Research Question 1

The first question of this study was to inquire into how respiratory therapists at KFSH&RC perceived enhancing their patients' levels of comfort while receiving NIV. In our results, respiratory therapists at KFSH&RC stated agreement that employing humidification M = 1.93 (Item 13) and the RAMP/RAMP time feature in Item 15, M = 1.90, significantly improves patient comfort during NIV. Several studies align with the findings and offer support for the use of humidification in NIV therapy (Masip, J. 2014; Cammarota, G. 2022). These studies emphasize that humidification can be helpful in NIV by lowering nasal resistance, helping with secretions, and enhancing compliance and comfort. On the other hand, the RAMP/RAMP

time feature is well-regarded among the therapists, with a significant (90.3%) agreeing that it has a significant effect on patient comfort during NIV. The low standard deviation of SD± 0.625 indicates overall agreement. This observation is in line with the findings of a study conducted by Hess (2012), which highlighted the potential of the RAMP feature to enhance patient comfort during non-invasive ventilation (NIV). Nevertheless, therapists must use it cautiously, as it delays therapy.

Similarly, on statement 16, the results suggest that RTs are generally knowledgeable about utilizing the FLEX feature, which has a significant effect on patient comfort during NIV. However, while 73.2% agree, 24.4% of the therapists disagree about its impact on patient comfort during NIV. The standard deviation of (SD± 0.735) suggests differing opinions among the therapists. The Flex feature in NIV devices aligns with the findings in Hess (2012), which identified it as one of the elements contributing to maximizing patient comfort during NIV. However, the author stated that its effectiveness is still being debated.

While there haven't been specific studies conducted on the noise reduction function, it's worth noting that previous research has highlighted the significance of noise control as a valuable intervention. Noise, in general, has been recognized as a potential disturbance that can lead to patient anxiety and discomfort (Cammarota, G. 2022). In our study, respiratory therapists (RTs) generally express agreement regarding the positive impact of the noise reduction function on patient comfort during non-invasive ventilation (NIV), with an average score (M) of 2.20. However, it's noted that approximately 32% either disagree with or strongly disagree with this statement. This particular statement exhibits the highest standard deviation (SD 1.100) among all the statements, indicating a significant diversity of opinions among the RTs. Furthermore, the therapists generally hold positive views about utilizing auto-adjusting pressure (Auto-BiPAP) with M = 2.32. However, the relatively high standard deviation (SD=.960) indicates that there is

a range of opinions among therapists, with 36% expressing disagreement. Previous studies have shown that patients who use auto-CPAP or BIPAP have higher levels of compliance with therapy in comparison to their prior experiences with conventional CPAP or BIPAP. In fact, several of those patients refused to go back to traditional CPAP/BIPAP machines because they were so uncomfortable (Dinh-Thi-Dieu 2020).

In summary, generally, respiratory therapists hold a positive perception at KFSH&RC towards maximizing patient comfort on NIV by utilizing various aspects of NIV, including auto-adjusting pressure (Auto-BiPAP), noise reduction function, humidification, Flex, and ramp, which aligns with several previous studies that recommend using these elements. Nevertheless, a notable portion of the results reported a disagreement, which was observed in some elements such as auto-BiPAP therapy and the FLEX feature. The second research question asked, "What are the respiratory therapists' attitudes and preferences towards the use of different types of masks during NIV therapy?".

Finding Related to Research Question 2

The second research question asked, "What are the respiratory therapists' attitudes and preferences towards the use of different types of masks during NIV therapy?". The result reported regarding the statement that a nasal mask should be considered the primary option when using NIV was that about 48.8% of the therapists agreed or strongly agreed that a nasal mask should be considered the primary option, while 51.2% either disagreed or strongly disagreed. The mean value of M = 2.46 indicates that, on average, the therapists lean towards disagreement with the statement. The mode of 3 indicates that "disagree" was the most common response. In contrast, most respiratory therapists (87.8%) either strongly agree or agree that mask choice has a significant effect on patient comfort during NIV. The mean value M= 1.59 suggests that, on

average, the therapists tend to agree with the statement. The mode of 1 indicates that "Strongly Agree" was the most common response.

According (Hess, D. R. 2012) and (Hess, D. R. 2006) one of the most important factors of mask fitting during NIV is increasing patient comfort. A well-fitted mask can increase patient comfort. In addition, clinicians should be aware of the various types of NIV interfaces and their advantages and disadvantages. Although the results indicate that therapists tend to disagree with the statement (12), this may be viewed as a positive perception for enhancing patient compliance, as the clinician should be aware of the most suitable mask for the patient.

Finding Related to Research Question 3

The Third research question asked, " What are RTs' perspectives on other factors that contribute to the patient's comfort during NIV? ". Overall, these survey statements suggest that respiratory therapists at KFSH&RC recognize the importance of effective communication, addressing patient comfort, and providing encouragement to the patients as essential elements in enhancing patient comfort and compliance during NIV therapy. Our findings show the majority responses either strongly agree or agree that patient encouragement prior to initiating NIV has a significant effect on patient compliance toward NIV (Item 18), with mean M = 1.49 and (SD) is .746. The mode of 1 indicates that "Strongly Agree" was the most common response. The relatively low standard deviation of 0.746 indicates that the responses are relatively consistent, and there is little variability among the participants. Similarly, most therapists either strongly agree or agree that addressing a patient's level of comfort after initiating NIV is the standard of practice (Item 19). The mean value M= 1.54 suggests that, on average, the therapists strongly agree with the statement. The mode of 1 indicates that "Strongly Agree" was the most common response.

In addition, in Item (20) most therapists strongly agreed with the statement, with mean value M= 1.66 indicates that the therapists agree with the statement on average. The mode of 1 implies that "Strongly Agree" was the most often selected response. The standard deviation of 0.911 suggests that the responds are more variable than in prior questions, although the majority of therapists still agree. This is consistent with previous research (Bello, 2013) that one of clinicians' role is to support and encourage the patient, teach them how to coordinate their breathing with the ventilator, and provide them a safe space to express any worries or concerns they may have. Also, encouraging cooperation among healthcare professionals involved in the care of the patient. In another article (Cammarota, G 2022). The authors suggest establishing a relationship of collaboration with the patient when on NIV and listen to their concerns and preferences.

Finding Related to Research Question 4

The purpose of this research question was to examine the elements that could affect respiratory therapists' perspectives at KFSHRC on how to maximize patients' comfort while they are receiving NIV. These elements included gender, country of graduation, years of experience, primary area of work, and age. In many cases, these demographic and professional characteristics did not significantly impact therapists' perspectives, according to the findings of the study. However, a significant difference is seen in relation to the primary area of work, P-value of 0.019. Therapists working in RCCS shown a greater perspective on maximizing patient comfort compared to their colleagues working in Pediatric ICUs, Neonatal ICUs, or Adult ICUs. This finding emphasizes the significance of work environment in influencing their attitudes.

Implication of Findings

This study's results have important significance for respiratory therapists at KFSH&RC. First, the study emphasizes the essential contribution of respiratory therapists at KFSH&RC in

improving patient comfort during the utilization of non-invasive ventilation (NIV). Therapists can customize NIV settings to maximize patient comfort by recognizing the importance of features such as auto-adjusting pressure, noise reduction, humidification, the RAMP time feature, and the FLEX feature. This has the potential to increase patient compliance on NIV and contributes to improved outcomes during therapy.

Furthermore, the research highlights the importance of mask selection. While therapists may have diverse opinions on the selection of masks for non-invasive ventilation (NIV), it is important for respiratory therapists at KFSH&RC to have a solid knowledge of the various types of NIV interfaces and their advantages and disadvantages. Their knowledge may help them make an appropriate choice about which mask will be most suitable for each patient, taking into consideration both clinical efficacy and patient comfort.

Moreover, the therapists' primary work area at KFSH&RC has a significant impact on their perspectives. Respiratory care community services therapists were more focused with maximizing patient comfort while on NIV more than therapists in other clinical areas. Therefore, it is important for the department of Respiratory therapy at the hospital to provide specific training programs for all respiratory therapists operating in all clinical areas in order to insure patient comfort while on NIV in all hospital.

Recommendation for Future Study

This study provides important insights into the perspectives believed by respiratory therapists at KFSH&RC, so contributing important information to the department of respiratory therapy in hospital. Additionally, it identifies potential areas for further investigation, highlighting opportunities for future research. Additional research should focus on evaluating patient outcomes and experiences with regard to the elements that have been identified as affecting patient comfort during non-invasive ventilation (NIV).

Moreover, further investigation may be required to carry out an observational study in which researchers directly examine the behavior of respiratory therapists during their interactions with patients. This can provide valuable insights into their actual practices, including their adherence to protocols, the techniques they utilize in operating NIV, and their interactions with patients and other healthcare professionals in order to maximize patient comfort while NIV is used.

Conclusion

This research conducted at King Faisal Specialist Hospital & Research Centre (KFSH&RC) concluded that respiratory therapists had a positive perception of utilizing different elements of NIV to maximize patient comfort during therapy. Majority of therapists believed that features like auto-adjusting pressure, noise reduction, humidification, and the utilization of certain NIV settings such as FLEX and RAMP/RAMP time features have significance for enhancing patient comfort. Additionally, effective communication with other healthcare professions, patient encouragement, and addressing patient comfort both prior to and following the initiation of NIV therapy. Moreover, gender, country of graduation, years of experience, and age did not significantly impact their attitudes, with the exception of therapists working in respiratory care community services (RCCS), who demonstrated a greater focus on maximizing patient comfort during NIV.

Reference

Navarra, S. M., Congedo, M. T., & Pennisi, M. A. (2020). Indications for Non-Invasive

   Ventilation in Respiratory Failure. Reviews on recent clinical trials, 15(4), 251–257.

   https://doi.org/10.2174/15748871156662006031

Cammarota, G., Simonte, R., & De Robertis, E. (2022). Comfort during non-invasive

   ventilation. Frontiers in Medicine, 9, 874250.

   https://doi.org/10.3389/fmed.2022.874250

Bello, G., De Pascale, G., & Antonelli, M. (2013). Noninvasive ventilation: practical

   advice. Current opinion in critical care, 19(1), 1–8.

   https://doi.org/10.1097/MCC.0b013e32835c34a5

Scala, R., & Pisani, L. (2018). Noninvasive ventilation in acute respiratory failure: Which

   recipe for success? European Respiratory Review, 27(149).

   https://doi.org/10.1183/16000617.0029-2018

Rey, C., Pons, M., Mayordomo-Colunga, J., & Los Arcos, M. (2009). History and clinical

   use of non-invasive ventilation. Noninvasive ventilation in Pediatrics. 2nd ed.

   Madrid: Ergon, 1-6.

Pierson, D. J. (2009). History and epidemiology of noninvasive ventilation in the acute-care

   setting. Respiratory Care, 54(1), 40–52. https://rc.rcjournal.com/content/54/1/40

Popat, B., & Jones, A. T. (2016). Invasive and non-invasive mechanical ventilation. *Medicine*

   (Abingdon, England : UK ed.), 44(6), 346–350.

   https://doi.org/10.1016/j.mpmed.2016.03.008

Masip, J., & Mas, A. (2014). Noninvasive ventilation in acute respiratory

   failure. International Journal of Chronic Obstructive Pulmonary Disease, 837.

   https://doi.org/10.2147/COPD.S42664

Hess, D. R. (2012). The growing role of noninvasive ventilation in patients requiring

   prolonged mechanical ventilation. Respiratory Care, 57(6), 900–920.

   https://doi.org/10.4187/respcare.01692

Ficker, J. H., Wiest, G. H., Lehnert, G., Wiest, B., & Hahn, E. G. (1998). Evaluation of an

   auto-CPAP device for treatment of obstructive sleep apnoea. Thorax, 53(8), 643–648.

   https://doi.org/10.1136/thx.53.8.643

Dinh-Thi-Dieu, H., Vo-Thi-Kim, A., Tran-Van, H., & Duong-Quy, S. (2020). Efficacy and

   adherence of auto-CPAP therapy in patients with obstructive sleep apnea: A

   prospective study. Multidisciplinary Respiratory Medicine, 15.

   https://doi.org/10.4081/mrm.2020.468

Elliott, M. W. (2019). Non-invasive ventilation: Essential requirements and clinical skills for

   successful practice. Respirology, 24(12), 1156–1164.

   https://doi.org/10.1111/resp.13445

Karim, H. M. R., Burns, K. E. A., Ciobanu, L. D., El-Khatib, M., Nicolini, A., Vargas, N.,

   Hernández-Gilsoul, T., Skoczyński, S., Falcone, V. A., Arnal, J.-M., Bach, J., Santo, L.

   S. D., Lucchini, A., Steier, J., Purro, A., Petroianni, A., Sassoon, C. S., Bambi, S.,

   Aguiar, M., … Esquinas, A. M. (2019). Noninvasive ventilation: Education and

   training. A narrative analysis and an international consensus document. *Advances in

   Respiratory Medicine*, *87*(1), 36–45. https://doi.org/10.5603/ARM.a2019.0006

AlAhmari, M. D., Al-Otaibi, H., Qutub, H., AlBalawi, I., Alqahtani, A., & Almasoudi, B.

   (2018). Noninvasive ventilation utilization in the Kingdom of Saudi Arabia: Results

   of a national survey. *Annals of thoracic medicine*, *13*(4), 237–242.

   https://doi.org/10.4103/atm.ATM_116_18

Sullivan, G. M., & Artino, A. R., Jr (2013). Analyzing and interpreting data from likert-type

   scales. Journal of graduate medical education, 5(4), 541–542.

https://doi.org/10.4300/JGME-5-4-18

Nayak, Mudavath & K A, Narayan. (2019). Strengths and Weakness of Online Surveys. 24. 31-38. 10.9790/0837-2405053138.

Kelley, K., Clark, B., Brown, V., & Sitzia, J. (2003). Good practice in the conduct and reporting of survey research. *International journal for quality in health care : journal of the International Society for Quality in Health Care*, *15*(3), 261–266. https://doi.org/10.1093/intqhc/mzg031

Alico, Jerryk. (2015). Level And Causes of Pre-University Students' English Test Anxiety: A Case Study On Introduction. 6. 1-10.

APPENDIX A: THE INSTRUMENT OF THE STUDY

* Indicates required question

1. What hospital do you currently work at? *

   _____

2. How long have you been working as a respiratory therapist in years as of today? *

   _____

3. Gender? *

   ◯ Male

   ◯ Female

4. What is your age as of today? *

   _____

5. What is your highest degree? *

   ◯ Diploma

   ◯ Bachelor

   ◯ Master

   ◯ Doctoral

6. What University/College did you complete your respiratory therapy degree at? *

   _____

7. What is your primary area of responsibility at work? *

- ○ Adult ICUs
- ○ Pediatrics ICUs
- ○ NICU
- ○ Wards
- ○ PFT/RCS

8. What is your secondary area of responsibility at work?

- ○ Adult ICUs
- ○ Pediatrics ICUs
- ○ NICU
- ○ Wards
- ○ PFT/RCS

9. Do you agree that the competencies and training you received during orientation *
improved your ability to operate the NIV?

- ○ Strongly disagree
- ○ Disagree
- ○ Agree
- ○ Strongly agree

10. As a respiratory therapist, I have the ability to maximize my patient comfort with NIV by adjusting other parameters or features of NIV.

- ○ Strongly disagree
- ○ Disagree
- ○ Agree
- ○ Strongly agree

11. I believe mask choice has a significant effect on patient comfort during NIV. *

  ⬭ Strongly disagree

  ⬭ Disagree

  ⬭ Agree

  ⬭ Strongly agree

12. I believe that a nasal mask should be considered the primary option when   * using NIV.

  ⬭ Strongly disagree.

  ⬭ Disagree

  ⬭ Agree

  ⬭ Strongly agree.

13. I believe using humidification has a significant effect on patient comfort during NIV.

  ⬭ Strongly disagree

  ⬭ Disagree

  ⬭ Agree

  ⬭ Strongly agree.

14. I believe using the Noise reduction feature has a significant effect on patient   * comfort during NIV.

  ⬭ Strongly disagree

  ⬭ Disagree

  ⬭ Agree

  ⬭ Strongly agree

15. I believe using the RAMP/RAMP time feature has a significant effect on patient * comfort during NIV.

○ Strongly disagree

○ Disagree

○ Agree

○ Strongly agree

16. I believe using the FLEX feature has a significant effect on patient comfort during NIV.

○ Strongly disagree

○ Disagree

○ Agree

○ Strongly agree

17. I believe using auto-adjusting pressure (Auto-BiPAP) has a significant effect on * patient comfort during NIV.

○ Strongly disagree

○ Disagree

○ Agree

○ Strongly agree

18. I believe patient encouragement prior to initiating NIV has a significant effect on * patient compliance toward NIV.

○ Strongly disagree

○ Disagree

○ Agree

○ Strongly agree

19. Before leaving the patient's room, I believe addressing a patient's level of comfort after initiating NIV is the standard of practice.

○ Strongly disagree

○ Disagree

○ Agree

○ Strongly agree

20. I believe communicating with other members of the healthcare team (e.g.,   * physicians, nurses, respiratory therapists) about the patient's comfort and response to NIV therapy will contribute to patient comfort during NIV.

○ Strongly disagree

○ Disagree

○ Agree

○ Strongly agree

APPENDIX B: INFORMED CONSENT

Informed consent

Dear Respiratory Therapist,

We are conducting a research study entitled "The perception of skills for maximizing patient comfort during non-invasive ventilation among respiratory therapists at KFSH&RC." The purpose of this study is to investigate respiratory therapists' perceptions of skills for maximizing patient comfort during non-invasive ventilation and to assess the level of perception of maximizing patient comfort during non-invasive ventilation devices by utilizing some features of NIV and mask fitting among respiratory therapists at KFSH&RC.

We'd appreciate it if you could take part in this research by filling out a short, anonymous survey on your own time. It is estimated that 10 minutes will be expected to complete the survey, which will include 20 questions on your demographics, education, work experience, and perspective on non-invasive ventilation therapy. All data obtained throughout the study will be kept in complete confidentiality and only accessed by the research team. You do not have to be in this study. You may skip questions or stop participating at any time.

To access the survey, follow the link in this email if you accept to take part in the research. Please contact me if you have any queries regarding the study or your participation.

Douglas S. Gardenhire, EdD, RRT, RRT-NPS, FAARC
mailto:dgardenhire@gsu.edu
Office: 404.413.1270

Sincerely,

APPENDIX C: ETHICAL CONSIDERATION

Ethical Consideration

Following IRB (Institutional Review Board) permission. Every participant will be made aware of the study's aims, as well as their right to anonymity and privacy. All volunteers will be free to drop out of the research at any time without consequence. After data collection is complete, the data will remain secret. All information will be kept confidential and accessible only by the study team.

APPENDIX D: IRB Approval

May 23, 2023
Principal Investigator: Douglas Gardenhire
Key Personnel: Albaqawi, Ahmed; Gardenhire, Douglas
Study Department: Georgia State University, Respiratory Therapy
Study Title: The perception of skills for maximizing patient comfort during non-invasive ventilation among respiratory therapists at KFSH&RC
Submission Type: Exempt Protocol Category 2
IRB Number: H23572
Reference Number: 374863

Determination Date: 05/22/2023

Status Check Due By: 05/21/2026.

The above-referenced study has been determined by the Institutional Review Board (IRB) to be exempt from federal regulations as defined in 45 CFR 46 and has evaluated for the following:

1. Determination that it falls within one or more of the eight exempt categories allowed by the institution; and
2. Determination that the research meets the organization's ethical standards

If there is a change to your study, you should notify the IRB through an Amendment Application before the change is implemented. The IRB will determine whether your research continues to qualify for exemption or if a new submission of an expedited or full board application is required.
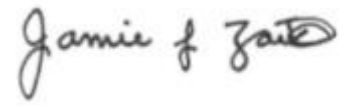
A Status Check must be submitted three years from the determination date indicated above. When the study is complete, a Study Closure Form must be submitted to the IRB.

This determination applies only to research activities engaged in by the personnel listed on this document.

It is the Principal Investigator's responsibility to ensure that the IRB's requirements as detailed in the Institutional Review Board Policies and Procedures For Faculty, Staff, and Student Researchers (available at gsu.edu/irb) are observed, and to ensure that relevant laws and regulations of any jurisdiction where the research takes place are observed in its conduct.

Any unanticipated problems resulting from this study must be reported immediately to the University Institutional Review Board. For more information, please visit our website at www.gsu.edu/irb.

Sincerely,

Jamie Zaikov, IRB Member