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Prevalence, and Attitudes among Respiratory Therapists in Saudi Arabia toward Using Airway Pressure Release Ventilation Mode with Pediatric Acute Respiratory Distress Syndrome Patients

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Prevalence, And Attitudes among Respiratory Therapists in Saudi Arabia Toward Using Airway Pressure Release Ventilation Mode with Pediatric Acute Respiratory Distress Syndrome Patients

By

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ACCEPTANCE

This thesis, PREVALENCE, AND ATTITUDES AMONG RESPIRATORY THERAPISTS IN SAUDI ARABIA TOWARD USING AIRWAY PRESSURE RELEASE VENTILATION MODE WITH PEDIATRIC ACUTE RESPIRATORY DISTRESS SYNDROME PATIENTS, by Fawaz Alamri, 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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Prevalence, And Attitudes among Respiratory Therapists in Saudi Arabia Toward Using Airway Pressure Release Ventilation mode with pediatrics with Acute Respiratory Distress Syndrome in Saudi Arabia

By Fawaz Alamri, BSRT

Under the supervision of Professor Chip Zimmerman

Abstract

Background: Pediatric acute respiratory distress syndrome (PARDS) significantly contributes to morbidity and mortality in young children. Children with PARDS often require intensive care admission and mechanical ventilation. Unfortunately, not much information is available to support management strategies in PARDS beyond lung protective ventilation. Examining proper mechanical ventilation techniques such as Airway Pressure Release Ventilation mode (APRV) that can support and manage these patients. Respiratory therapists' beliefs and practices of using mechanical ventilation are essential to establish guidelines for managing ventilated PARDS cases. **Purpose**: This study aims to evaluate the prevalence and attitude of APRV mode with PARDS patients among respiratory therapists in Saudi Arabia. **Methods**: The study used an online, cross-sectional survey with 22 questions administered to a convenience sample of respiratory therapists in Saudi Arabia. The survey was divided into three sections to obtain information from respondents. These sections are demographic data, the prevalence of utilizing APRV on patients with PARDS, and attitudes regarding APRV with PARDS. **Results**: seventy-seven responses were received from the online survey sent to respiratory therapy departments in different regions across Saudi Arabia. Three participants refused to participate, and n=20 (28,5%) of responders did not complete the survey, and their answers were excluded. Therefore, n=54 (70,1%) respondents completed the survey. The result showed that most participants have a bachelor's degree (n=43, 79,6%), master's degree (n= 8, 14,8%), associate degree (n= 2, 3.7%), and only one participant have a Ph.D. degree (n=1, 1.9). Most participants were males (n= 34, 63%). At the same time, the females were (n=20, 37%). Most of the responses were from the middle region (n=28, 51.9. The majority of respondents worked in a governmental hospital (n=52, 96.3%), while two worked in private hospitals (n=2 ,3.7%). Half of the respondents (n=27, 50%) reported that their hospital uses the APRV mechanical ventilation mode with pediatric ARDS patients. Among those who reported using APRV mode, only (n=9, 33.3%) reported following the current guidelines of the Pediatric Acute Lung Injury Consensus Conference (PALICC). In comparison, (n=6, 22.2%) reported not following the guidelines, and (n=12, 44.4%) were unsure. The findings suggest variation in the respiratory therapists' experience and confidence in using APRV. However, most participants believe it is a safe ventilation mode and can be used as both an initial and rescue mode. **Conclusion**: the study reveals variations in the experience and confidence of respiratory therapists in using APRV, which may influence their willingness to use it in pediatric patients with ARDS. Most participants, however, believe it is a safe ventilation mode that can be used as both an initial and rescue mode. The results of this study could inform the development of training programs and protocols designed to improve respiratory therapists' knowledge and confidence in using APRV and to promote its consistent use in pediatric patients with ARDS.

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Chapter I

Introduction

Pediatric acute respiratory distress syndrome (PARDS) significantly contributes to morbidity and mortality in young children (Orloff et al., 2019;). Children with PARDS often require intensive care admission and mechanical ventilation. Unfortunately, not much information is available to support management strategies in PARDS beyond lung protective ventilation. Acute respiratory distress syndrome (ARDS) is a clinical syndrome caused by disruption of the alveolar epithelial–endothelial permeability barrier unrelated to cardiogenic pulmonary edema. Injury may occur directly to the alveolar epithelium (i.e., pneumonia, inhaled toxins.) or indirectly to the capillary endothelium secondary to systemic inflammation as seen in conditions such as sepsis or pancreatitis (Orloff et al., 2019). A viral respiratory infection is the most common cause of PARDS. However, ARDS can also occur due to a wide range of additional underlying conditions, such as pneumonia, sepsis, trauma, burns, pancreatitis, inhalation, transfusion, and cardiopulmonary bypass. Respiratory failure is the most common cause of death for children admitted to pediatric intensive care units (PICUs) (Burns et al.,2014) and ARDS accounts for 10% of PICU admissions (Quasney et al.,2015). A meta-analysis by Wong et al. found the pooled mortality rate in PARDS to be approximately 24%, with an overall downtrend in mortality over the last three decades.

The ventilation modality known as airway pressure release ventilation (APRV) has gained popularity. APRV is helpful for recruitable lung disease but has also been used effectively in several disease processes, particularly adult forms of respiratory failure. APRV is becoming increasingly popular, as evidenced by the fact that major ventilator manufacturers are incorporating APRV mode into their most recent equipment models. Clinical experience will grow as APRV access does as well. APRV may hold similar promise for pediatrics, given its positive results in adults (Frawley, & Habashi,2004).

APRV is a time-triggered, pressure-limited mode that continuously distends airway pressure with an intermittent pressure phase. The P high and Plow, respectively, are two pressure levels, timed cycled T high and T low. APRV has advantages compared to conventional ventilation, such as reducing sedation and neuromuscular blockade requirements, optimizing alveolar recruitment and ventilation-prefusion matching, allowing spontaneous breathing efforts, and improving cardiac filling (Habashi 2005).

Statement of the problem

Pediatric acute respiratory distress syndrome (PARDS) accounts for approximately 10% of PICU admissions (Orloff et al.,2019). The mortality rate in PARDS has been approximately 24% over the last three decades (Wong et al.,2019). There is limited data to support using APRV with Pediatric acute respiratory distress syndrome (PARDS) beyond lung protective ventilation strategy (Orloff et al.,2019). Therefore, assessing the perception and attitude of respiratory therapists toward using APRV with PARDS is necessary to help establish a fundamental level of care to help improve pediatric outcomes.

Purpose of the study

This study aims to assess the prevalence and attitudes toward using APRV mode with pediatrics who suffer from ARDS among Respiratory Therapists in Saudi Arabia.

1- What is the perception of respiratory therapists in Saudi Arabia regarding the use of APRV with pediatric patients with ARDS?

2- What is the attitude of respiratory therapists in Saudi Arabia toward using APRV with pediatric patients with ARDS?

Significance of the study

Airway pressure release ventilation (APRV) mode has succeeded in adult patients (Frawley, & Habashi,2004). This study will contribute to assessing the level of knowledge and attitude of respiratory care practitioners regarding the use of APRV mode among

pediatric patients with ARDS. The study will also establish a fundamental foundation that helps improve pediatric patients' care who suffer from ARDS. It will help initiate further studies and protocols regarding using APRV with PARDS, which eventually will improve patients' care.

Assumptions

The following assumptions are made regarding this study:

1- There is limited data to support any management strategies in PARDS beyond lung-protective ventilation (Orloff et al.,2019).

2- Respiratory therapists in Saudi Arabia have minimum work experience using APRV with PARDS.

Hypothesis

Few Respiratory therapists in Saudi Arabia have the skills necessary to use the APRV mode in pediatrics with ARDS patients.

Methods

This research will be conducted via a cross-sectional survey using convince sampling. An email link will be sent via the employees' emails, Including RTs who work in pediatric intensive care units. The survey will have three sections: demographic data, prevlance, and attitude of using APRV among PARDS patients.

Limitations

Several factors may limit this study. The first potential limitation of this study is the small sample size which can not yield valid results. The second limitation that may impact the study is recall bias, leading participants to provide inaccurate information. The third limitation that may affect the study is a lower response rate due to emails that might go to junk mail.

Delimitations

This study will include A population of respiratory therapists from various Saudi Arabian provinces. The results of this study can only be generalized to this group of therapists. The research questions will be answered using information from the respiratory therapists. It excludes respiratory therapy students and other healthcare professionals to avoid errors.

Summary

Pediatric acute respiratory distress syndrome (PARDS) significantly contributes to morbidity and mortality in young children. Pediatrics diagnosed with PARDS often require intensive care admission and mechanical ventilation. Unfortunately, there is limited data available to support APRV management in PARDS. Since APRV mode has shown promising results with adult patients (Frawley, & Habashi,2004), further investigation is required. This study will answer the question regarding the perception and attitude of respiratory therapists about implementing APRV mode with pediatric patients with ARDS.

Definition of terms

APRV: Airway pressure release ventilation is a mode of mechanical ventilation that uses two levels of CPAP with inverse ratio timed pressure releases

PARDS: is a life-threatening lung injury that allows fluid to leak into the lungs. Breathing becomes difficult, and oxygen cannot get into the body.

RT: healthcare provider specialized in working therapeutically with people suffering from pulmonary disease

PICU: Pediatric intensive care unit.

Chapter II

LITERATURE REVIEW

The literature review was performed to collect the recent studies regarding perception, and attitudes among respiratory therapists in Saudi Arabia toward using APRV mode with Pediatric Acute Respiratory Distress Syndrome. The database searched for the following literature review include GoogleSscholar and PUBMED. The following key words were used for the searching process: PARDS in Saudi Arabia, APRV perception, APRV attitudes, APRV in Saudi Arabia, PARDS APRV. This chapter covers the following Topics:

- ARDS
- Pediatrics ARDS
- PARDS Strategies
- APRV
- Systematic review of APRV
- APRV in Saudi Arabia

ARDS

Ashbaugh et al (1967). first described a syndrome named "acute respiratory distress syndrome" (ARDS). Twelve patients with a syndrome similar to what was then known as the infant respiratory distress syndrome were identified in a cohort of 272 patients receiving respiratory support. On a chest radiograph, respiratory distress was defined as the presence of tachypnea, hypoxemia, decreased respiratory-system compliance, and bilateral pulmonary infiltrates. Ashbaugh et al. used nasal prongs or a face mask in 5 patients and mechanical ventilation for respiratory support in 7 patients. Pathology found that non-survivors' lungs were heavy and atelectatic with interstitial and alveolar edema, and hyaline membranes.

Ware & Matthay (2000) found that an insult to the alveolar-capillary membrane causes increased lung permeability and edema. Not all insults cause this syndrome. Acute lung injury (ALI) affects both the pulmonary capillary endothelium and alveolar epithelium. ARDS is caused by a direct insult to lung cells and an indirect insult from an acute systemic inflammatory response.

Several definitions of ARDS were proposed over the next quarter-century, but none were widely accepted and utilized. When the American-European Consensus Conference (AECC) published a definition (Bernard et al 1994) in 1994, a broad consensus was reached. This group defined ARDS as acute onset hypoxemia with a PaO2/FiO2 < 200 mmHg and bilateral chest X-ray infiltrates in the absence of left atrial hypertension. They also described ALI using the same variables but a less stringent hypoxemia criterion PaO2/FiO2 <300 mmHg (Phua et al 2008).

The ARDS Definition Task Force, (2012) was established to classify patients according to the severity of their disease, and a revised set of clinical criteria for ARDS, known as the Berlin definition, was developed. According to the Berlin definition, patients had ARDS if:

1. acute respiratory failure not explained by fluid overload or cardiac failure was present.
2. bilateral opacities consistent with pulmonary edema on chest radiograph or CT scan, were present.
3. the onset began within one week after a known clinical insult or new/worsening respiratory symptoms.

ARDS was classified mild if PaO2/FIO2was between 201- and 300-mm Hg, moderate if PaO2/FIO2was between 101- and 200- mm Hg, and severe if less than or equal to 100 mm Hg.

Pediatrics ARDS

Orloff et al., (2019) describe ARDS as a clinical syndrome unrelated to cardiogenic pulmonary edema brought on by disruption of the alveolar epithelial-endothelial permeability barrier. Injuries can affect the capillary endothelium directly through pneumonia, inhaled toxins, or indirectly through systemic inflammation, as in sepsis or pancreatitis. A viral respiratory infection causes the majority of PARDS cases (Orloff et al., 2019). Acute respiratory distress syndrome is described as rapid onset neutrophil-based inflammatory response in the lungs after a clinical trigger (aspiration, trauma, sepsis), which leads to hypoxic respiratory failure and requires invasive or noninvasive mechanical ventilation (Huijsmans et al., 2021). Children with acute respiratory distress syndrome (ARDS) continue to have a high morbidity and mortality rate (25–45%), despite advances in our understanding of lung-protective low-tidal-volume ventilation (Ganesan, 2019). According to the Pediatric Acute Lung Injury Consensus Conference Group 2015, before 2015, children were diagnosed with ARDS by using adult definitions for ARDS. The Pediatric Acute Lung Injury Consensus Conference (PALICC) established a new set of ARDS criteria for children in 2015 after recognizing the need for a pediatric definition. The PALICC criteria are different from the adult criteria in several significant ways as it specifies:

- A sudden acute onset within a week.
- Requiring only unilateral pulmonary infiltrates on chest imaging.
- May manifest as new acute lung disease in the presence of chronic lung disease and/or cardiovascular disease Exclusions.
- Allowing the use of SpO2 in the definition of hypoxia instead of PaO2.
- Incorporating mean airway pressure (Paw) and FIO2 into the assessment of hypoxia by using the oxygenation index ([FIO2 × Paw] / PaO2) or the oxygen saturation index ([FIO2 × Paw] / SpO2) rather than the PaO2 / FIO2 for

children who are invasively ventilated and establishing criteria for ARDS in children who are receiving noninvasive ventilation.

PARDS Strategies

ARDS management aims to treat the underlying cause, provide adequate oxygenation and ventilation, and protect the lungs from ventilator-induced lung injury (VILI) (Dreyfuss & Saumon,1998). Lung-protective ventilation aims to avoid overdistension (volutrauma and barotrauma), prevent atelectrauma by minimizing the cyclic opening and closing of alveoli (Rimensberger et al. 2015), and minimize biotrauma by reducing the injurious effects of biochemical mediators on the lung and distal organs (Curley et al.,2015). In PARDS, there are no randomized controlled trials (RCTs) that specify the ideal ventilator mode or approach. Therefore, pediatric intensivists have referred to the ARDS Network trial analyzing adults with ALI and ARDS, which discovered that mechanical ventilation with a lower tidal volume (6 mL/kg as opposed to 12mL/kg) and limited plateau pressure (30cm H2O) led to decreased mortality and longer ventilator-free days (Brower et al. 2000). The PALICC guidelines suggest tidal volumes of 3-6 mL/kg for patients with poor respiratory compliance and 5-8mL/kg for patients with maintained respiratory compliance, as well as limiting inspiratory plateau pressure to 28 cm H2O. The Standard of care for mechanical ventilation in the PICU is generally consistent with the ARDS Network study. Some pediatric observational studies demonstrate that the mortality rate decreased (Erickson et al. 2007) and patients experienced more ventilator-free days (Khemani et al. 2009) with higher tidal volumes, although these findings' significance is unclear. Further PALICC recommendations include taking permissive hypercapnia for moderate to severe PARDS to reduce VILI, maintaining pH 7.15-7.30 utilizing lung-protective methods, keeping oxygen saturation <92%, and monitoring markers of oxygen transport, such as central venous saturation (Rimensberger et al. 2015).

High-frequency oscillatory ventilation (HFOV) is frequently utilized as a rescue method for refractory hypoxemia when CMV fails (Ferguson et al.). A 1994 RCT suggested that using HFOV early in pediatric respiratory failure may have advantages. Subsequent pediatric studies have revealed no apparent benefit from HFOV (Arnold et al. 1994). A recent retrospective, observational administrative database study of more than 9,000 children with acute respiratory failure discovered a longer duration of mechanical ventilation and higher mortality associated with HFOV compared to CMV (Gupta et al. 2014).

Prone positioning was first used in mechanically ventilated patients in the 1970s to improve lung mechanics and oxygenation (Curley 1999). Improved oxygenation was observed after prone positioning, with rare adverse events, according to a 1999 systematic review of 20 clinical studies involving 297 adult and pediatric patients (Curley 1999). More recent meta-analyses have evaluated the effect of prone positioning on mortality in adults with ARDS, with varying outcomes. RCT evaluating prone positioning in pediatrics demonstrated the practice to be safe but found no difference in duration of mechanical ventilation, mortality, or other health outcomes (Curley et al. 2005). recent meta-analyses in 2008 evaluated 13 studies, totaling >1,500 adult and pediatric patients, and found prone positioning to improve oxygenation without significantly affecting mortality (Sud et al. 2008)

APRV

Mechanical ventilation provides respiratory support for patients incapable of maintaining adequate gas exchange unassisted. The primary aims and objectives of mechanical ventilation are well known, and the clinical challenge is to provide adequate support without causing lung damage or other adverse effects (Myers & MacIntyre, 2007). In the past 85 years, methods for delivering mechanical ventilatory support have advanced from simple imitation of the normal respiratory pattern to the use of sophisticated flow waveforms,

inflation/deflation timing, interactive capabilities, lung-recruitment techniques, and the idea of maintaining alveolar patency with positive end-expiratory pressure while exhaling (PEEP). Even though many of these innovations have positive physiological effects, it is interesting to note that only the idea of decreasing tidal volume (VT) and end-inflation distending pressure has been proven to reduce mortality (Myers & MacIntyre, 2007). Airway pressure-release ventilation (APRV) has been a relatively significant invention in the US since the mid-1990s. Stock et al. first described it in 1987. APRV is a pressure-limited, time-cycled ventilation mode that is either patient- or time-triggered. APRV offers two airway pressure levels (P_{high} and P_{low}) for two predetermined time periods (T_{high} and T_{low}). APRV strategies typically involve a long T_{high} and a short T_{low}. APRV uses a release valve that permits spontaneous breathing during T_{high} and T_{low}, setting it apart from earlier types of pressure-limited long-inflation-time ventilation strategies (such as pressure-controlled inverse-ratio ventilation). Most clinical experience has been with unsupported spontaneous breathing, even though these breaths can be supported by automatic tube compensation, pressure support, or unsupported (Myers & MacIntyre, 2007).

Alternative modes, such as airway pressure release ventilation (APRV), have been linked to several physiological advantages, including increased patient comfort, a decrease in sedative use, better hemodynamics, a decrease in mean airway pressure (MAP), and better oxygenation (Ganesan, 2019).

Systematic review of APRV

Gupta et al. (2013), found that their literature review revealed 13 pediatric studies involving 111 children. In contrast, since 1988, more than 23 prospective adult trials have enrolled more than 1350 patients. Gupta et al. (2013) found that the first report on APRV use in children appeared in 2000, indicating that it is a relatively new practice. APRV is currently

rarely applied to children as a result. Only 1.6% of pediatric critical care units across 12 countries in North America and Europe used APRV regularly, compared to 75.2% who used traditional mechanical ventilation, 16.4% who used HFOV, and 8.5% who used noninvasive mechanical ventilation, according to a cross-sectional study of acute lung injury and ARDS (Santschi et al, 2010). However, APRV is used to ventilate 11.3% of adult ARDS patients, which is higher in Europe than in North America. The current scarcity of data regarding APRV in pediatric populations appears to correlate with these statistical and geographic differences (González et al ,2010).

De Carvalho et al (2000) conducted a case-control study in a cohort of postoperative cardiac children, comparing three ventilation modes (intermittent mandatory ventilation with positive end-expiratory pressure, APRV, and continuous positive airway pressure). With APRV, they noticed a significant rise in mean airway pressure despite no significant differences in oxygenation. Walsh et al (2011) evaluated the outcomes of APRV compared to pressure-controlled ventilation in paralyzed and spontaneously breathing children; Following tetralogy of Fallot repair, cavopulmonary shunt, or Fontan operations, the prospective crossover study found no differences in lung perfusion or measured gas exchange or hemodynamic parameters. In the absence of spontaneous ventilation, however, mean pulmonary blood flow and oxygen delivery with APRV increased significantly during spontaneous ventilation when compared to pressure-controlled ventilation. The authors concluded that during APRV, a spontaneous respiratory effort may direct ventilation toward areas of increased perfusion and that diaphragmatic contraction causes more posterior and dorsal lung segments to expand, which have a more dependent blood supply. Only one prospective randomized controlled trial of APRV in children has been conducted. Schultz et al (2001) measured hemodynamic and respiratory parameters in children with acute lung injury or ARDS. After stabilization on APRV or SIMV researchers, switched the subjects to

the alternate mode and repeated the measurements. Between APRV and SIMV, they discovered similar ventilation, hemodynamic measurements, oxygenation levels, and patient comfort.

Early APRV use may avoid or reduce the need for rescue interventions. Advanced therapies such as HFOV, ECMO, liquid ventilation, and nitric oxide call for specialized equipment that is not always available, specialized clinical skills that require proficiency with a variety of equipment for different disciplines, increased management complexity, and possibly more staff time. In contrast, APRV is easily accessible on modern ventilators, has a simple concept, and does not burden the bedside staff excessively (Frawley & Habashi, 2004). The most common indications for APRV use in children are a rescue mode in ARDS and refractory hypoxemia (Gupta et al., 2013).

APRV in Saudi Arabia

Aljuaid et al (2019) examined how the advanced ventilation mode of APRV is utilized in Saudi Arabia. The authors comprehensively analyzed respiratory therapists' current utilization of advanced ventilation modes in Saudi Arabia. An important finding that emerged from the research was that twenty percent of respiratory therapists worked with APRV mode. Fifty percent of participants in the study lacked knowledge about advanced ventilation approaches. In addition, approximately 23% of the RTs that took part expressed uncertainty regarding these modes (Aljuaid et al,2019). Therefore, it presents evidence that respiratory therapists lack the necessary understanding to implement the new modes and ventilation strategies, which may impede the development of more advanced treatment methods.

Summary

The utilization of APRV mode in the pediatric population is considered a relatively a new practice, and the usage of APRV is often rare. At the same time, it is more

prevalent in the adult population. The early use of APRV is demonstrated to affect patient outcomes positively. Furthermore, APRV showed increased patient comfort, decreased sedative use, better hemodynamics, decreased mean airway pressure, and better oxygenation. Also, the early use of APRV may reduce rescue interventions such as HFOV, ECMO, liquid ventilation, and nitric oxide. The PALICC set new criteria for diagnosing pediatrics with ARDS in 2015; before that, children were diagnosed with adult criteria. The majority of the respiratory therapist in Saudi Arabia have not used APRV before or felt uncomfortable with the mode.

Chapter III

Methods

This research aimed to assess Perceptions, And Attitudes among Respiratory Therapists in Saudi Arabia Toward Using Airway Pressure Release Ventilation mode with pediatrics with Acute Respiratory Distress Syndrome. This chapter will discuss how the design methods were utilized in answering the following questions:

1- What is the prevalence of utilization of APRV mode among respiratory therapists in Saudi Arabia with pediatric patients with ARDS

2- What is the attitude of respiratory therapists in Saudi Arabia regarding the use of APRV with pediatric patients with ARDS?

Instrumentation

A self-administered questionnaire developed by Al Obead (2021) will be used as the survey instrument in this research. The questionnaire used to assess attitudes and perceptions regarding using APRV mode with PARDS was a modified survey based on related articles (Al Obead, 2021). Five respiratory therapy educators from Georgia State University investigated the validity of this survey. The questionnaire includes 22 questions. The survey contained three sections: questions regarding attitudes, perceptions, and demographics.

Sample

This study employed a non-probability convenience sample of the target population. The inclusion criteria included all active RTs in Saudi Arabia who are currently employed in either public or private healthcare facilities at the time of the survey and were eligible. Exclusion criteria included non-RT health care providers, RTs not practicing in Saudi Arabia, and RT students.

Study design

An online questionnaire for the study will be accessible through a link online. The survey will be carried out through the Georgia State University website, and the data will be gathered using Qualtrics. The survey will be sent to known E-mails and will be asked to Participate in an online survey after the IRB's permission is received. The participants will be asked to determine whether or not they are willing to engage in the study on the first page of the survey. The survey will also make it clear that participating in the research project is entirely optional and that participants have the right to leave the study at any time, with no need to give a reason. There are two types of questions on the survey: yes-or-no questions and multiple-choice questions**.**

Data Analysis

Following data collection, statistical analysis will be performed using the Statistical Package for the Social Sciences (SPSS v.28.0). In addition to calculating the standard deviation, mean, frequency, and differences between respondents and hospitals were determined.

Confidentiality

The Institutional Review Board (IRB) at Georgia State University will acquire the study proposal. Measures to protect human subjects must be strictly followed. Participants will be deemed to have granted their consent when they return a survey for this study. Anonymity and confidentiality for the survey will be guaranteed. Additionally, since the survey will be done online, participants will not need to use email to submit their answers, removing any chance of indirect identification. As soon as the data analysis is finished, all surveys will be deleted**.**

Informed consent

Participants consent to the study by clicking "agree." After giving informed consent, participants can answer survey questions. If participants feel unsafe during the study, they can quit anytime.

CHAPTER IV

The purpose of this study was to evaluate the perceptions and attitudes among respiratory therapists in Saudi Arabia toward using airway pressure release ventilation mode with pediatric acute respiratory distress syndrome patients. This chapter provides the results of the data analysis of the survey. Statistical Package for the Social Sciences (SPSS v.28.0) was used for the statistical analyses. The study targeted respiratory therapists who worked at hospitals across Saudi Arabia. An online link was sent to 125 respiratory therapists. Furthermore, a total of 77 answered surveys were received. However, 20 responses were excluded due to failing to complete more than 20% of the survey, and three respiratory therapists refused to participate in the survey. Therefore, the total number of responses used in the data analysis was 54, with a response rate of 43.2%. This chapter illustrates the findings related to the following research questions:

1- What is the prevalence of utilization of APRV mode among respiratory therapists in Saudi Arabia with pediatric patients with ARDS??

2- What is the attitude of respiratory therapists in Saudi Arabia toward using APRV with pediatric patients with ARDS?

Demographic Findings

The demographic data were gathered to provide a description of the population (table 1). The sample included 54 respiratory therapists divided into four levels of education: Associate degree (n= 2, 3.7%), bachelor's degree (n=43, 79,6%), master's degree (n= 8, 14,8%), and Ph.D. degree (n=1, 1.9%). The majority of participants were males (n= 34, 63%). At the same time, the females were (n=20, 37%). Most of the responses were from the middle region (n=28, 51.9%), west region (n= 14, 25.9%), east region (n=8, 14.8%), the north region (n= 2, 3.7%), south region (n= 2, 3.7%). The majority of respondents worked in a governmental hospital (n=52, 96.3%), while two worked in private hospitals (n=2, 3.7%).

Most of the responders graduated from Saudi Arabia (n=35 ,64.8%), although (n=12 ,22%) graduated from the Philippines and (n=7,13%) graduated from The United States. The responders who had 2-5 years of experience were (n=26 ,48.1%), more than ten years (n=13, 24.1%), less than two years (n=10, 18.5%), 5-10 years of experience (n=5, 9.3%).

Demographic data	**N, %**
Gender	
Male	(n=34, 63%)
Female	(n=20, 37%)
Level of education	
Associate's degree	(n= 2, 3.7%)
Bachelor's degree	(n=43, 79, 6%)
Master's degree	(n=8, 14, 8%)
PhD degree	(n=1, 1.9%)
Region	
Middle region	(n=28, 51.9%)
West region	(n=14, 25.9%)
East region	(n=8, 14.8%)
North region	(n=2, 3.7%)
South region	(n=2, 3.7%)
Hospital type	
Government hospital	(n=52, 96.3%)
Private hospital	(n=2, 3.7%)

Graduation country	
Saudi Arabia	(n=35, 64.8%)
United States	(n=7, 13%)
Other (Philippines)	(n=12, 22%)

Years of experience	
2-5 years of experience	(n=26, 48.1%)
More than 10 years	(n=13, 24.1%)
Less than two years	(n=10, 18.5%)
5-10 years of experience	(n=5, 9.3%)

Findings Related to Research Question 1

The first research question asked, "What is the prevalence of utilization of APRV mode among respiratory therapists in Saudi Arabia with pediatric patients with ARDS?" This question aimed to evaluate the current usage of APRV mode with pediatric patients. Participants were asked, "does their hospital use the APRV mode of mechanical ventilation?" Half of the respondents answered yes (n=27, 50%), and the other half answered no (n=27, 50%). The participants who answered yes were asked, "does their hospital follow the current guidelines of the Pediatric Acute Lung Injury Consensus Conference (PALICC)?" nine (n=9, 33.3%) answered yes, while six answered no (n=6, 22.2%), and twelve were unsure (n=12, 44.4%). Also, when the participants asked, "do they have ARDS protocol in their hospital?" Most respondents answered yes (n=24, 88.9%), and only three answered no (n=3, 11.1%). When asked "What protocol does their hospital follow with pediatric ARDS?" Most of the

participants answered with American European Consensus Criteria (AECC) (n=9, 33.3%), then answered "both (n=8, 29.6%) the American European Consensus Criteria and the Berlin definition", then The Berlin definition Criteria (n=7, 25.9%), and only three participants answered no, "we do not have ARDS protocol" (n=3, 11.1%). When asked "does your daily practice follow your hospital protocol?" Most participants answered yes, "I use the same protocol we have" (n=25, 92.6%), and only two answered no; "I use a different protocol" (n=2, 7.4%). When participants asked "is APRV included in their ARDS protocol?" Most respondents answered yes (n=20, 74.1%), and seven answered no (n=7, 25.9%). When asked "Which type/s of ventilator have APRV in your hospital?" Most of the participants answered Maquet Servo i, u (n=23, 42.6%), then Drager Evita (n=22, 40.7%), then Hamilton Galileo (n=6, 11.1%), then Puritan Bennett (n=4, 7.4%) and one participant answered Other (GE ventilator) (n=1, 1.9%). When asked "in your hospital, do you have/use protocol for APRV?" Most of the participants answered yes, "we have a protocol, and we use APRV" (n=20, 74.1%); no, "we do not have a protocol, but we use APRV" (n=6, 22.2%), and "yes, we have a protocol, but we do not use APRV" (n=1, 3.7%). When asked "have you ever used APRV mode on patients?" Most respondents answered yes (n=26, 96.3%), and only one participant answered no (n=1, 1.9%). When asked, "If yes, on which type/s of patients?" Most of the respondents answered ALI/ARDS (n=28, 48.1%), RTA/ traumatic (n=6, 11.1%), cardiac diseases (n=1, 1.9%), and obstructive lung diseases (Asthma and COPD) (n=2, 3.7%)

Table.2 about prevalence of using APRV-PARDS

Questions	N, %
Does your hospital use the APRV mode of mechanical ventilation?	
-Yes	(n=27, 50%)

-No	(n=27, 50%)
If yes, does your hospital follow the current guidelines of the Pediatric Acute Lung Injury Consensus Conference (PALICC)	
-Yes	(n=9, 33.3%)
-No	(n=6, 22.2%)
-Unsure	(n=12, 44.4%)
In your hospital, do you have ARDS protocol?	(n=24, 88.9%)
-Yes	(n=3, 11.1%)
-No	
What protocol does your hospital follow with pediatric ARDS?	
- American European Consensus Criteria (AECC)	(n=9, 33.3%)
- The Berlin definition Criteria	(n=7, 25.9%)
- Both	(n=8, 29.6%)
- No, we do not have ARDS protocol	(n=3, 11.1%)
Does your daily practice follow your hospital protocol?	
- Yes, I use the same protocol we have	(n=25, 92.6%)
- No, I use different protocol	(n=2, 7.4%)
Is APRV included in your ARDS protocol?	
-Yes	(n=20, 74.1%)
-No	(n=7, 25.9%)

Which type/s of ventilator have APRV in your hospital? **(select all that apply)**	
- Maquet Servo i, u	(n=23, 42.6%)
- Puritan Bennett	(n=4, 7.4%)
- Hamilton Galileo	(n=6, 11.1%)
-Drager Evita	(n=22, 40.7%)
- Other	(n=1, 1.9%)
In your hospital, do you have / use protocol for APRV?	
- Yes, we have protocol, and we use APRV	(n=20, 74.1%)
- Yes, we have protocol, but we don't use APRV	(n=1, 3.7%)
- No, we don't have protocol, but we use APRV	(n=6, 22.2%)
Have you ever used APRV mode on patients?	
-Yes	(n=26, 96.3%)
-No	(n=1, 1.9%)
If yes, on which type/s of patients? (Select **all that apply)**	
-ALI/ARDS	(n=28, 48.1%)
- RTA/ Traumatic	(n=6, 11.1%)
-Cardiac diseases	(n=1, 1.9%)
- Obstructive lung diseases (Asthma and COPD)	(n=2, 3.7%)

Findings Related to Research Question 2

The second question asked, “What is the attitude of respiratory therapists in Saudi Arabia toward using APRV with pediatric patients with ARDS?” This question aimed to assess respiratory therapists’ understanding and ability to identify and use APRV in acute respiratory distress syndrome. Participants, when asked “which of the following is correct regarding using APRV?” Most of the participants answered “I use it, with physicians’ full trust” (n=15, 27.8%), (n=10, 18.5%) answered “I use it, and I suggested RTs and physicians use it,” (n=2, 3.7%) answered “I use it, but with some physicians’ resistance” Two (n=2, 3.7%) answered “ I do not use it because I face some physicians’ resistance, ” and one (n=1, 1.9%) answered with “I do not use it because I do not have the knowledge and confidence to do so”.When asked “would you consider using APRV in severe ARDS cases?” Most respondents answered yes “because I believe it is a safe mode of ventilation” (n=14, 51.9%), then they answered “yes, as a last choice” (n=12, 44.4%), and one participant answered “no; I am unfamiliar with the mode” (n=1, 3.7%). When asked “In the majority of times, you have usedAPRV on ARDS patients, which of the following best describes the outcomes?” Most participants answered “Patients revived and outcomes improved (improved means better oxygenation, better hemodynamics, and decreased PIP” (n=19, 70.4%). They answered “Patients do not improve, back to the conventional mode” (n=5, 18.5%); one participant answered “I have not used APRV” (n=1, 3.7%), none of the participants answered “patients died” (n=0, 0%), and two participants answered Other (n=2, 3.7%) and replied that patients had 50% chance to survive. When participants were asked “Do you believe APRV mode can be used as:” the majority of the participants answered both (n=14, 51.9%) “initial and rescue mode”, then they answered “a rescue mode” (n=12, 44.4%), and one participant answered “an initial mode” (n=1, 3.7%). Also, when participants were asked “do you believe that

spontaneous breathing plays a significant role in APRV?" Most respondents answered yes (n=25, 92.6%), and two answered no (n=2, 7.4%).

Table.3 about attitude towards using APRV with PARDS among respiratory therapist in Saudi Arabia	
Questions	N, %
Which of the following is correct in regards to using APRV? (Select all that apply	
- I use it, with physicians' full trust	(n=15, 27.8%)
- I use it, and I suggested RTs and physicians to use it	(n=10, 18.5%)
- I use it, but with some physicians' resistance	(n=2, 3.7%)
- I don't use it, because I face some physicians' resistance	(n=2, 3.7%)
- I don't use it, because I don't have the knowledge and confidence to do so	(n=1, 1.9%)
Would you consider using APRV in severe ARDS cases?	
- Yes, because I believe it is safe mode of ventilation	(n=14, 51.9%)
- Yes, as a last choice	(n=12, 44.4%)
- No, I am unfamiliar with the mode	(n=1, 3.7%)
In the majority of times you have used APRV on ARDS patients, which of the following best describe the outcomes?	
- Patients revived and outcomes improved (improved means better oxygenation, better hemodynamics, and PIP decreased	(n=19, 70.4%)

- Patients don’t improve, back to the conventional mode	(n=5, 18.5%)
- I haven’t used APRV	(n=1, 3.7%)
- Patients died	(n=0, 0%)
-Other	(n=2, 3.7%)
Do you believe, APRV mode can be used as:	
- An initial mode	(n=1, 3.7%)
- A rescue mode	(n=12, 44.4%)
-Both	(n=14, 51.9%)
Do you believe that spontaneous breathing plays a significant role in APRV?	
-Yes	(n=25, 92.6%)
-No	(n=2, 7.4%)

Summary

The study aimed to evaluate the attitudes and prevalence of respiratory therapists in Saudi Arabia towards using airway pressure release ventilation (APRV) mode with pediatric patients with acute respiratory distress syndrome (ARDS). The survey was completed by 54 respiratory therapists, with a response rate of 43.2%. According to the demographic data, most respondents were males with a bachelor's degree who worked in a governmental hospital and graduated from Saudi Arabia. According to the findings, half of the respondents said their hospital used APRV mode with pediatric patients, and the majority of hospitals followed the ARDS protocol. In addition, most respondents said APRV was part of their ARDS protocol and that they had used APRV mode on patients. The research provides insight into the prevalence and attitudes toward APRV mode among Saudi pediatric ARDS patients.

Chapter V

Discussion

This chapter will discuss the findings presented in the previous chapter. The chapter is divided into six major sections: an overview of the study, findings discussion, implications for future research, recommendations for future research, limitations, and conclusions.

Overview of the study

This study aims to assess the perceptions and attitudes among respiratory therapists in Saudi Arabia toward using airway pressure release ventilation mode with pediatric with acute respiratory distress syndrome. This study will also reveal the prevalence rate of using APRV mode with Covid-19 cases in various Saudi Arabian regions. This chapter will cover the study's statistical analysis and the participants' demographic data. This study's statistical analysis was conducted using SPSS 28. The following research questions were examined to help conduct the study:

1- What is the prevalence of utilization of APRV mode among respiratory therapists in Saudi Arabia with pediatric patients with ARDS?

2- What is the attitude of respiratory therapists in Saudi Arabia toward using APRV with pediatric patients with ARDS?

Discussion of Findings

Findings Related to Research Question 1

The first research question asked, "What is the prevalence of utilization of APRV mode among respiratory therapists in Saudi Arabia with pediatric patients with ARDS?" Half of the respondents (n=27, 50%) reported that their hospital uses the APRV mechanical ventilation mode with pediatric ARDS patients. Compared with a study by Gupta et al (2013), the sole

study researchers found on the topic, only 1.6% of pediatric critical care units across 12 countries in North America and Europe used APRV with PARDS. Among those who reported using APRV mode, only (n=9, 33.3%) reported following the current guidelines of the Pediatric Acute Lung Injury Consensus Conference (PALICC). In comparison, (n=6, 22.2%) reported not following the guidelines, and (n=12, 44.4%) were unsure. Most of the participants (n=24, 88.9%) reported that their hospital has an ARDS protocol, and most (n=20, 74.1%) reported that their hospital has a protocol for APRV and uses it. Most respondents (n=25, 92.6%) reported following their hospital's protocol in their daily practice. Among those who reported using APRV mode, the majority (n=20, 74.1%) reported that their hospital has a protocol for APRV, and they use it. Most participants reported using Maquet Servo i, u (n=23, 42.6%) or Drager Evita (n=22, 40.7%) ventilators with APRV mode. Almost all respondents (n=26, 96.3%) reported using APRV mode on patients, mainly with ALI/ARDS (n=28, 48.1%) as the underlying condition.

Overall, the study's findings suggest that APRV mode is used in some hospitals in Saudi Arabia with pediatric patients with ARDS, and most participants reported that their hospital has an ARDS protocol. They follow it in their daily practice. However, there needs to be more consistency in following the guidelines and using APRV mode among hospitals and respiratory therapists.

Findings Related to Research Question 2

The second question asked, "What is the attitude of respiratory therapists in Saudi Arabia toward using APRV with pediatric patients with ARDS?" This question helps to assess respiratory therapists' perceptions of using Airway Pressure Release Ventilation (APRV) in pediatric patients with Acute Respiratory Distress Syndrome (ARDS) in Saudi Arabia. The first part presents the participants' responses to a question asking which of the following statements is correct regarding using APRV. Most participants (n=15, 27.8%)

responded that they use APRV with physicians' full trust, while others reported facing resistance from some physicians or lacking the knowledge and confidence to use it. This suggests that there is variation in the respiratory therapists' experience and confidence in using APRV, which could affect their willingness to use it in pediatric patients with ARDS. These findings are supported by Aljuaid et al (2019), who stated that 23% of the RTs that took part in their research expressed uncertainty regarding APRV mode. The next question asked whether the participants would consider using APRV in severe ARDS cases, and the majority of respondents (n=14, 51.9%) answered yes because they believe it is a safe ventilation mode. This response indicates that most participants have confidence in the safety and efficacy of APRV in severe ARDS cases. The next question then reports the outcomes of using APRV in ARDS patients. Most participants reported that patients revived, and outcomes improved (n=19, 70.4%), while others reported no improvement or returning to the conventional ventilation mode. This suggests that APRV may effectively improve outcomes in pediatric patients with ARDS, but not always. The following asks participants about their beliefs regarding using APRV as an initial or rescue mode and the role of spontaneous breathing in APRV. Most respondents (n=25, 92.6%) believed that APRV could be used as both an initial and rescue mode, and almost all participants believed that spontaneous breathing plays a significant role in APRV.

Overall, the question provides insights into the prevalence and attitude of respiratory therapists in Saudi Arabia towards using APRV in pediatric patients with ARDS. The findings suggest variation in the respiratory therapists' experience and confidence in using APRV. However, most participants believe it is a safe ventilation mode and can be used as both an initial and rescue mode.

Implications for Research

This study's findings will enable respiratory therapy departments to evaluate respiratory therapists' attitudes and prevalence toward using APRV mode with PARDS patients. In addition, it will give a better understanding of detecting weaknesses they may be unaware of, such as the absence of an ARDS or APRV protocol cited by some RTs. Finally, it emphasizes the need for APRV mode training, protocols, and guidelines for treating PARDS patients.

Limitations of the study

This study has some limitations due to various reasons. The main limitation of this study is the small number of respondents who participated in the survey. Also, the findings of this study cannot be generalized to all respiratory therapist's attitudes due to the use of only one cultural background. Furthermore, respondents may have answered the survey according to their work with adult patients, while the research focused only on the pediatric patient population. Finally, there is a lack of literature that discusses the attitudes and prevalence of using APRV among respiratory therapists toward using APRV with PARDS patients. As a result, it was challenging to compare the findings of this research to those of other studies related to respiratory therapy due to the limited amount of research conducted in this particular field.

Recommendation for future study

further studies are recommended duo to limited studies to investigate respiratory therapists' knowledge of APRV and its use with PARDS. In addition, replication of the study with a larger sample size is recommended in a multi-country study to validate the findings presented in this study. Surveying physicians also will give valuable information. Moreover, collecting data on how many PARDS patients respondents cared for each year.

Conclusion

This study provides valuable insights into the prevalence and attuited of APRV in pediatric patients with ARDS among respiratory therapists in Saudi Arabia. The findings suggest that while APRV mode is used in some hospitals, hospitals, and respiratory therapists need to be more consistent in following the guidelines and using APRV mode. In addition, the study reveals variations in the experience and confidence of respiratory therapists in using APRV, which may influence their willingness to use it in pediatric patients with ARDS. Most participants, however, believe it is a safe ventilation mode that can be used as both an initial and rescue mode. The results of this study could inform the development of training programs and protocols designed to improve respiratory therapists' knowledge and confidence in using APRV and to promote its consistent use in pediatric patients with ARDS.

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Appendix A: Survey

I. Prevalence of using APRV on ARDS

1. Does your hospital use the APRV mode of mechanical ventilation? □ Yes □ No
2. If yes, does your hospital follow the current guidelines of the Pediatric Acute Lung Injury Consensus Conference (PALICC) ⊓ Yes ⊓ No ⊓Unsure?
3. In your hospital, do you have ARDS protocol? □ Yes □ No ⊓Unsure?
4. What protocol does your hospital follow with pediatric ARDS?
    a) American European Consensus Criteria (AECC)
    b) The Berlin definition Criteria
    c) Both
    d) No, we do not have ARDS protocol
    e) PALICC

5. Does your daily practice follow your hospital protocol?
    - Yes, I use the same protocol we have
    - No, I use different protocol
6. Is APRV included in your ARDS protocol? □ Yes □ No
7. In your hospital, do you have ventilators that have APRV mode? □ Yes □ No
8. If yes, which type/s of ventilator have APRV? (select all that apply)
    a) Maquet Servo i, u (Getinge)
    b) Puritan Bennett
    c) Hamilton Galileo
    d) Drager Evita
    e) Other _____

9. In your hospital, do you have / use protocol for APRV?
    a) Yes, we have protocol, and we use APRV
    b) Yes, we have protocol, but we don't use APRV
    c) No, we don't have protocol, but we use APRV
    d) No, we don't have protocol, and we don't use APRV

10. Have you ever used APRV mode on patients? □ Yes □ No
11. If yes, on which type/s of patients? (select all that apply)
    a) ALI/ARDS
    b) RTA/ Traumatic
    c) Cardiac diseases
    d) Obstructive lung diseases (Asthma and COPD)
    e) Other _____

II .Attitude towards using APRV with PARDS among

12. Which of the following is correct in regards to using APRV? (select all that apply):
    a) I use it, with physicians' full trust

b) I use it, and I suggested RTs and physicians to use it
c) I use it, but with some physicians' resistance
d) I don't use it, because I face some physicians' resistance
e) I don't use it, because I don't have the knowledge and confidence to do so
f) I don't use it, because I don't believe in APRV as an effective mode of ventilation

13. Would you consider using APRV in severe ARDS cases?
    a) Yes, because I believe it is safe mode of ventilation
    b) Yes, as a last choice
    c) No, because it is harmful
    d) No, I am unfamiliar with the mode
    e) Other _____

14. In the majority of times you have used APRV on ARDS patients, which of the following best describe the outcomes?
    a) Patients revived and outcomes improved (improved means better oxygenation, better hemodynamics, PIP↓)
    b) Patients don't improve, back to the conventional mode
    c) Patients died
    d) I haven't used APRV
    e) Other _____

15 Do you believe, APRV mode can be used as:
    a) An initial mode
    b) A rescue mode
    c) Both
    d) None of the above

16 Do you believe that spontaneous breathing plays a significant role in APRV? □ Yes ϒ No

II. Demographics

- Hospital type: □ Government □ Private
- Region:

a) North region
b) West region
c) East region
d) Middle region
e) South region

- Gender: □ Male □ Female

- Years of experience:

a) Less than 2 years
b) 2-5 years
c) 5-10 years
d) More than 10 years

-

- Qualification: □ Diploma □ Bachelor □ Masters □ PhD

- Graduation country: □ Saudi Arabia □ The United States □ Other:_____

Thanks for agreeing to take part of this survey.
If you have any question or suggestion about this survey, please write it down in the feedback section or through the contact information bellow:

Feedback:

_____
_____
_____
_____

Contact information:
Fawaz Alamri: falamri3@student.gsu.edu Phone: +966536367737.
Research advisor Professor Chip Zimmerman: Chip@gsu.edu

Appendix B: informed consent

Dear Respiratory Therapist, you are invited to a research study because you are taken part in a clinical setting as a registered respiratory therapist. This study aims to evaluate the Perception, And Attitudes among Respiratory Therapists in Saudi Arabia Toward Using Airway Pressure Release Ventilation mode with pediatrics with Acute Respiratory Distress Syndrome.

Fawaz Alamri is conducting this research study as part of the requirements for the master's degree in respiratory therapy from the Department of Respiratory Therapy at Georgia State University, under the guidance of Professor Chip Zimmerman, Chip Zimmerman, PhD, RRT, RRT-NPS, FAARC Clinical Associate Professor and Coordinator of Interprofessional Education Governor's Teaching Fellow.

Although there will be no direct benefit to you from participating in this study, the information gathered will improve healthcare quality for respiratory care services. If you choose to participate, you will be required to complete the following survey, which should take no more than 10 minutes.

Your participation is entirely voluntary, and you may refuse or discontinue taking the survey at any time without penalty or loss of benefits to which you are otherwise entitled. Please note that your responses are used exclusively and entirely confidential for research purposes. To protect your privacy, no names or codes will be used to identify you or your survey. Your completion and submission of the survey constitute your agreement to take part in the study.

We look forward to the completion of your survey. However, you may withhold at any time by not completing or sending a blank survey if you decide not to participate in this study. The information from this study may be published in journals and presented at professional meetings. This study does not cost the participant in any way, except for the time spent completing the survey.

If you have any questions about this research, now or in the future, don't hesitate to contact Fawaz Alamri at Falamri3@student.gsu.edu or Professor Chip Zimmerman at Chip@gsu.edu. The department's mailing address can be found at the bottom of this page. You may also contact the Georgia State University IRB at https://gsu.imedris.net/. Please note: Completion and submission of this survey imply that you have read this information and consent to participate in the research.

Your completion and submission of the survey imply that you agree to participate in this research. Please note that you may withdraw at any time by not completing or by clicking the disagree button.

Please note: If you agree to participate in this research, please continue with the survey.

o I Agree o I Disagree

Sincerely,

Fawaz Alamri

Dept. of Respiratory Therapy

Georgia State University

Appendix c: IRB approval

INSTITUTIONAL REVIEW BOARD

Mail: P.O. Box 3999
Atlanta, Georgia 30302-3999
Phone: 404/413-3500

In Person: 3rd Floor
58 Edgewood
FWA: 00000129

December 13, 2022

Principal Investigator: Ralph Zimmerman

Key Personnel: Alamri, Fawaz A; Zimmerman, Ralph

Study Department: Georgia State University, Respiratory Therapy

Study Title: Perception, And Attitudes among Respiratory Therapists in Saudi Arabia Toward Using Airway Pressure Release Ventilation mode with pediatrics with Acute Respiratory Distress Syndrome

Submission Type: Exempt Protocol Category 2

IRB Number: H23309

Reference Number: 372910

Determination Date: 12/13/2022

Status Check Due By: 12/12/2025

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.

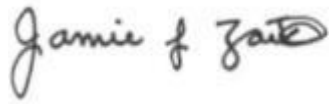
This determination applies only to research activities engaged in by the personnel listed on this document.

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