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doi: https://doi.org/10.57709/11994369

THE PERCEPTION OF ADHERENCE TO CYSTIC FIBROSIS GUIDELINES BY

RESPIRATORY THERAPIST IN SAUDI ARABIA

by

JAMEEL Zaid HAKEEM

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Health Sciences

College of Byrdine F. Lewis College of Nursing and Health Professions

Georgia State University

2018

## ACCEPTANCE

This thesis, The Perception of Adherence to Cystic Fibrosis Guidelines by Respiratory

Therapists in Saudi Arabia by Jameel Hakeem, was prepared under the direction of the Master's

Thesis Advisory Committee of the Department of Respiratory Therapy at Georgia State

University. It is accepted by the committee in partial fulfillment of requirements for the Master

of Science degree in Respiratory Therapy at the Byrdine F. Lewis 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.


_____ Date <u>April 5, 2018</u>
Douglas S. Gardenhire, Ed.D, RRT, RRT-NPS, FAARC
Committee Chair


_____ Date <u>April 5, 2018</u>
Ralph D. Zimmerman, PhD, RRT, RRT-NPS
Committee Member


_____ Date <u>April 5, 2018</u>
Robert B. Murray, MS, RRT
Committee Member

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Jeddah, Saudi Arabia 23425

The director of this thesis is:

Douglas S. Gardenhire, Ed.D, RRT-NPS, FAARC

Governor's Teaching Fellow

Chair and Clinical Associate Professor

Byrdine F. Lewis College of Nursing and Health Professions

Department of Respiratory Therapy

Georgia State University

P.O. Box 4019

Atlanta, GA 30302-4019

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## Dedication

First and above all, I thank, Allah (God) for the grace, wisdom, strength, patience, and perseverance to complete my graduate research as well throughout my life. Second, I want to thank the two greatest people in my life, Mom and Dad, there are not enough words to describe how thankful I am to the both of you. Words cannot express how grateful I for all the sacrifices that you have made on my behalf. Your prayer for me was what sustained me thus far. My brothers and sisters, thanks for the motivation and support that you give me while I was out of the country. Thanks for taking care of our parent during my absence.

I would like to thank my lovely wife Raghad Albar for standing beside me throughout my studying in the United States. I have been successful in my life because you have been so much a part of it. Thanks for everything.

# ACKNOWLEDGMENTS

The Perception of Adherence to Cystic Fibrosis Guidelines by Respiratory Therapists in Saudi

Arabia


By

Jameel Z. Hakeem, BSRT

A RESEARCH PROPOSAL

Presented in Partial Fulfillment of Requirements for the

Degree of

Master of sciences

In

Health Science

In

the Department of Respiratory Therapy

Under the supervision of Dr. Douglas S. Gardenhire

In

Byrdine F. Lewis College of Nursing and Health Professions

Georgia State University

Atlanta, Georgia

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

## ABSTRACT

**BACKGROUND:** Adherence to cystic fibrosis (CF) clinical guidelines play a crucial element in the management of respiratory complication associated with CF disease. Despite the importance of adherence to CF clinical guidelines, there is a lack of literature in this area of research specifically relating to Respiratory Therapists (RTs). Therefore, it is essential to assess the perception and adherence level to CF clinical guidelines among RTs in Saudi Arabia. **PURPOSE:** The aim of this study was to assess the adherence level of RTs to CF clinical guidelines in Saudi Arabia. **METHODS:** Data were collected through a descriptive survey using questions based on CF clinical guidelines. The survey was emailed to all members of the Saudi Society for Respiratory Care (SSRC). Two main dimensions were assessed Knowledge and Management of CF disease. Excluded from the study were other healthcare providers and students. **RESULTS:** The total adjusted number of participants was one hundred-sixty-six (n=166) out of (N=351) responses. The study response rate was 46.8%. Most participants hold an undergraduate degree (BS and AS) 80.1% while 19.9% were graduate. Females accounted for 30.1% of all participants while males accounted for 69.9%. The study showed 35% of RTs in Saudi Arabia adhered to CF clinical guidelines. The study showed knowledge domain needs improvement compared to management domain ($Mdn = 2$), $Z = -10.45$, $p < .001$, $r_s = 0.49$. The study findings showed the level of RT education did not have a significant effect on the level of adherence to CF clinical guidelines $H(2) = 2.7$, $p = .255$. Moreover, the study findings indicated that senior RTs (with > 5 years of experience) demonstrated a higher adherence level to the guidelines than RTs with less than 5 years of experience ($Mdn = 8.7$), $U = 2056$, $p < .001$, $r_s = 0.314$. Additionally, the study revealed no significant difference in adherence of the guidelines between regions of practice in Saudi Arabia, $H(4) = 2.5$, $p = .645$ **Conclusion**: The average overall level of adherence to CF clinical guidelines is low among RTs Saudi Arabia. Education materials need to be implemented to enhance the level of awareness, knowledge, and management of CF disease.

# List of Tables

**Table of Contents**

**CHAPTER I**

**Introduction**

Cystic Fibrosis (CF) is a multisystem autosomal recessive disorder induced by mutations in the gene for the cystic fibrosis transmembrane conductance regulator (CFTR). CFTR encodes an ion channel protein, with more than 2000 mutations classified to date (Farrell et al., 2017). Two regular copies of the CFTR gene is present in people without CF. A mutation causes CF to develop when one of the copies is not working correctly, or both copies not present. CFTR functions as a chloride channel regulator, bicarbonate regulator, and chloride and sodium transporter through body organs like the lung, pancreas, salivary glands, and kidney. A mutation in the gene will lead to a significant effect in both the lung and the gastrointestinal tract. The inactivation of CFTR in the lung will disable sodium absorption and chloride transportation over airway epithelial cells. This impaired mechanism of transport causes an increase in water absorption and a reduction in the total fluid in the airway surface, which leads to a thick, viscous sputum in the airway. As the result of the dry airway and sticky mucus, the cilia in CF patient is impaired, which can produce a desirable environment for bacterial growth (Boucher, 2007).

According to the Cystic Fibrosis Foundation yearly reports, about 60,000 to 70,000 individuals Worldwide suffer from cystic fibrosis (Banjar & Angyalosi, 2015). The worldwide incidence varies from country to another. In European countries, the mean prevalence of CF disease is 0.737 per 10,000 (Farrell, 2008). In the United States, cystic fibrosis occurs at a rate of 1 in 4,000 births (Farrell et al., 2017) and 1 in every 5,800 births in Middle East region (Banjar & Angyalosi, 2015).

In Saudi Arabia, the ratio of CF incidence increased from 1 every 2000 to 18 per 1000 births (Banjar & Angyalosi, 2015). The mean survival rate of cystic fibrosis increased to 20

years in Saudi Arabia (Banjar & Angyalosi, 2015). Early diagnosis and management of diseases accompanied by effective therapeutic options delivered by multidisciplinary teams has been showed to increase the survival rate among CF patients (Spoonhower & Davis, 2016).

Management of respiratory complication plays an influential role in CF disorder. It includes the administration of antibiotics, chest physiotherapy, and airway clearance medication such as bronchodilators, Pulmozyme, and hypertonic saline. Therefore, Respiratory Therapists must adhere to the updated CF guidelines and stay up to date on treatment options to provide the best care to the patient. (Newton, 2009).

Respiratory therapists (RTs) interact with CF patients in the outpatient clinic and during hospitalization. By following the CF pulmonary guidelines, RTs administer aerosol therapy and airway clearance to CF patients. They educate patients and families about airway clearance techniques and how to prepare and deliver the required treatment. The RTs needs to have the enough experience to help them decide when to switch the patient from simple oxygen therapy as lung function declines to chronic oxygen, noninvasive ventilation, or to invasive ventilation where the end-stage patient waits for a lung transplant. Furthermore, RTs may perform a pulmonary function testing to assess patient's lung function baseline (Newton, 2009).

Several studies have previously investigated the lack of adherence and implementation of clinical guidelines among health care providers in health care facilities (Francke, Smit, de Veer, & Mistiaen, 2008). Additionally, there is limited research regarding cystic fibrosis clinical guideline adherence globally. In Saudi Arabia, the mean survival rate improved from ten years to twenty years (Banjar, 2003), (Banjar & Angyalosi, 2015). To maintain this increase, the health care provider should follow and apply the new guidelines. Therefore, this study aims to investigate adherence level of RTs to the clinical care guidelines for the management of

respiratory complications in cystic fibrosis patients in Saudi Arabia.

## Statement of Problem

The majority of cystic fibrosis mortality cases and hospital admission are due to pulmonary exacerbation (Agrawal, Lalani, Alagusundaramoorthy, & Du, 2016). In Saudi Arabia, which has the highest rate of CF cases among Arab countries (Banjar, 2003), the mean survival rate of cystic fibrosis patients is lower than other countries like United States. Between 1998 and 2013, the rate of hospital admission due to pulmonary exacerbation and cost of care in CF patients increased by 75%. Since RTs play a significant role in the managements of pulmonary complications in cystic fibrosis (CF), they are expected to have adequate information about the disease and its management.

## Purpose of the Study

This descriptive quantitative study aims to assess the adherence level of Respiratory Therapists (RTs) to cystic fibrosis (CF) guidelines and determine if the RTs in Saudi Arabia are following the CF Foundation's guidelines for the management of respiratory complication in CF disease. The research will also show the weak point that needs to be improved in CF awareness and management. Moreover, the research will show if the adherence is one of the reasons for increasing the survival rate in the Saudi Arabia. The research questions are going to be addressed in this study are:

1. What is the level of adherence among Respiratory Therapists (RTs) in Saudi Arabia to cystic fibrosis (CF) clinical guidelines?

2. Which section (awareness or management) needs most improvement in terms of level of adherence to CF clinical guidelines?

3

3. What is the effect of the level of RT's education on the level of adherence to CF clinical guidelines?

4. What is the level of adherence to CF clinical guidelines in senior RTs compared to junior RTs?

5. What is the level of adherence among RTs between the different regions of Saudi Arabia?

## Significance of the Study

The study will contribute to improving knowledge and adherence of respiratory staff to the cystic fibrosis clinical guidelines. The study will also establish a solid foundation that helps to improve the adherence of Respiratory Therapists with international CF guidelines and make visible areas of practice that may require more training and education in future. Moreover, the study will show the level of adherence to the published guideline among RTs. This information will improve the quality of CF patient care and survival rate.

## Assumptions

The following assumptions are made regarding this descriptive study:

1. Respiratory therapists who follow published guidelines demonstrate more skill when caring for CF patients (Newton, 2009).

2. Adherence to the CF clinical guidelines minimizes the length and cost of hospital admission (Agrawal, Lalani, Alagusundaramoorthy, & Du, 2016).

3. The rate of pulmonary exacerbation for CF patients decreases if the respiratory therapist adheres to CF guidelines.

4. Senior RTs have less adherence to CF guidelines compare to junior RTs.

5. RTs have the same adherence to CF guidelines in all the regions of Saudi Arabia.

## Definition of Terms

Cystic Fibrosis (CF): An inherited progressive disease that affects the lungs and digestive system.

Cystic fibrosis transmembrane conductance regulator (CFTR): Gene controls the transportation of anions, regulate chloride concentration in epithelial cells.

Respiratory therapists (RTs): healthcare provider specialized in working therapeutically with people suffering from pulmonary disease.

## Limitations

The study uses different conclusions drawn from various participants' educational degree, the duration of their experience, and educational programs, which may add to the significance of the study findings. However, the findings of this study cannot be generalized to all RT due to the use of only one destination of experience, and one cultural background, Saudi Arabia.

## Delimitations

This study included a population of Respiratory Therapists from different regions in Saudi Arabia. The results of this study can only be generalized to this group of therapists. Data from the respiratory therapists will be utilized to satisfy the research questions. To prevent errors, it excludes respiratory therapy students and other healthcare providers.

## Summary

One of the respiratory therapy care goals is to provide outstanding care to CF patients. The professional knowledge, compliance, and adherence to cystic fibrosis patient care guidelines is essential to CF management. The rate of pulmonary complications, hospital admissions and mortality rate among CF patients is a good indicator of the quality of care that has been provided

by the therapist. Therefore, the knowledge of and adherence to published clinical practice guidelines for care of the CF patient need to be both identified and evaluated.

# CHAPTER II

## Review of the Literature

The following literature reviews illustrates a detailed analysis of the works that have been accomplished by other researchers and which are related to the importance of knowledge and adherence of the health care provider to clinical guidelines in the management of respiratory complication in cystic fibrosis disease (CF). The primary purpose of this literature review is to help the researcher expose the research gap present in this area of research and hence provide a possible solution to bridge it. The chapter is divided into sections namely: background of cystic fibrosis, prevalence and diagnosis of CF, CF in Saudi Arabia and the role of respiratory therapy in CF management. Other areas that will be reviewed are the importance of adherence and compliance among health professionals to the clinical guidelines and the impact of high knowledge and adherence of the health care provider in disease management and cost relation. Finally, it will take a look at the Management of Respiratory Complication in CF.

Databases used for this review include; PubMed, EBSCOhost, Google Scholar, and CINHALL. The following keywords used mutually; "cystic fibrosis," "cystic fibrosis management," "cystic fibrosis respiratory complication," "cystic fibrosis epidemiology', "the importance of adherence to published guidelines" "cystic fibrosis survival range," "cystic fibrosis management cost." The research finding showed a variety of publication that shows cystic fibrosis management and epidemiology. However, there is insufficient research in the area of measuring the adherence level of the Respiratory Therapists to published guidelines.

**Background Information on Cystic Fibrosis**

Cystic Fibrosis (CF) has been a cause of concern to medical practitioners from all parts of the world. In 1938, Dorothy Andersen identified CF as a separate disease after her autopsy studies of malnourished infants (Dean et al., 1990), (Davis, 2006). Henceforth, it has caused a lot of havoc to the human especially in Europe and North America (Farrell, 2008). CF is described as an autosomal genetic disorder that causes severe impact on the pulmonary tract, digestive system and other body organs (Salinas et al., 2016). The leading cause of CF is the mutation of a gene that alters the functionality of chloride-conducting transmembrane dubbed the cystic fibrosis transmembrane conductance regulator (CFTR**)** which controls the transportation of anions, regulate chloride concentration in epithelial cells and enhances clearance of mucus in the respiratory tract (Berwick, Nolan, & Whittington, 2008). CFTR failure cause a retention of thick, tenacious secretion in the pulmonary system, and this can lead to airway inflammation caused by the growth of the bacteria in the retained secretion (Salinas et al., 2016). CF also affects other body organs like pancreas causing malabsorption, liver resulting in biliary cirrhosis, vas deferens causing infertility and sweat glands leading to heat loss (Oliver, Cantón, Campo, Baquero, & Blázquez, 2000). However, most of the morbidity and mortality occurs due to bronchiectasis, obstruction of small airways, and progressive impairment of the respiratory system (Stephenson et al., 2017).

**Prevalence and Diagnosis of Cystic Fibrosis**

Studies indicate that CF is one the most common diseases in the United States of America with over 1,000 cases reported annually. It approximated that over 30,000 people in the United States are affected and 70,000 globally (Earley et al., 2011). However, the CF prevalence varies among the ethnic groups of the population. In the USA, the Caucasian Americans are most

prevalent with 3 per 10,000 followed by African Americans at 7 per 100,000 and finally the

Asian Americans with 3 per 100,000 (Earley et al., 2011). This information also varies due to the

discrepancies in reporting systems and the presence of the unreported cases in the country

(Berwick, Nolan, & Whittington, 2008). The diagnosis of the CF comprises some laboratory and

clinical tests which include evaluation of the presence and amount of chloride channel

dysfunction (Earley et al., 2011).

Sweat test is considered the gold stander to diagnose CF (Tümmler, 2017). A chloride

concentration of 60 mmol/L or more in the sweat led to a positive diagnosis of CF (Raina et al.,

2016). For the test to be reliable, it must be conducted by experienced technicians in facilities

where the national standards are applied (LeGrys, Yankaskas, Quittell, Marshall, & Mogayzel,

2007). Because some CF patients have  normal chloride concentrations, sweat chloride tests

needs to be ≥ 60 mmol/l on two occasions to confirm the diagnosis of the disease (Raina et al.,

2016). Other assessment strategies that may be helpful when diagnosing CF includes the

assessment of gallbladder function, evaluation of liver, signs of intestinal obstruction, nasal

potential difference measurement, or pansinusitis identification and a close inquiry into the

family history (Kacmarek et al., 2009).

Genotyping is usually conducted to facilitate identification of the pancreatic malfunction

of the gene on chromosome seven responsible for encoding of CFTCR (Earley et al., 2011).

Despite symptoms analysis being the most common diagnosis approach to this disease, infant

screening took precedence in the United States to provide an early intervention (Parker-McGill et

al., 2015). According to the Cystic Fibrosis Foundation Patient Registry in the United States,

children are screened for CF at birth and majority of the cases are diagnosed before the age of

two. However, some of the CF cases are diagnosed at adult age where a doctor orders a genetic and a sweat test to confirm the diagnosis whenever there is suspicion of the condition.

**Cystic Fibrosis in Saudi Arabia**

CF has existed in the Middle East for approximately half century and has caused concerns to the health practitioners in the region (Banjar, Moghrabi, Alotaibi, Alotaibi, & Gamalmaz, 2017). The incidence rate of CF among the natives Arab is markedly high as compared to the non-natives. In Jordan, the incidence of CF is 1 in 2500 of all the live births. This is followed by Bahrain which has an incidence of 1 in 5000 live births (Banjar, Kambouris, Meyer, al-Mehaidib, & Mogarri, 1999). The first CF case in the Middle East was reported in 1958 in Lebanon, where the first CF case in gulf courtiers was report in 1977 in Kuwait (Banjar, Moghrabi, Alotaibi, Alotaibi, & Gamalmaz, 2017). In Saudi Arabia, the first CF case was identified in 1986 and the condition continues to be a significant threat to the lives of Saudi citizens (Banjar, Moghrabi, Alotaibi, Alotaibi, & Gamalmaz, 2017).

Despite the challenge of determining the prevalence of CF in the Middle East. The prevalence of CF in Saudi Arabia CF has been projected to range between 1 in 30,000 to 1 in 50,000 (Banjar & Angyalosi, 2015). Similarly, determination of the magnitude of incidence of CF among Saudi Arabia (SA) population has become elusive. The figures provided are mere approximations, and these indicate that it lies between 1 in 2000 and 1 in 5800 live births per year (Banjar & Angyalosi, 2015). The determination problems are associated with the overlooked of CF disease with other conditions, such as tuberculosis, diarrheal diseases and malnutrition (Banjar, Moghrabi, Alotaibi, Alotaibi, & Gamalmaz, 2017), According to Banjar, et al. (2017) the mean survival rate of CF patients in Saudi Arabia is estimated to be 20 years. Studies attribute this low survival rate to the delay in the diagnosis and lack of sufficient

awareness of the disease in the region (Farrell et al., 2017). This situation has resulted in late intervention which increases the risks of the early patient deaths (Kacmarek et al., 2009).

Saudi Arabia has a variant distribution of CF among its population by sex, geographical location and ethnic alienation (Nazer et al., 1989). In a study to determine the geographical distribution of CF in the country, 70 patients were identified, and 37% of this sample was found to come from the eastern parts of SA (Banjar, Kambouris, Meyer, Al-Mehaidib, & Mogarri, 1999). The central region contributed 28%, western region 22%, northern 5% and the southern 8% of the patients (Nazer et al., 1989). CFTR mutations were found in 33 families of which 67% were originally from Saudi Arabia while 13% were nonnatives (Banjar, Kambouris, Meyer, Al-Mehaidib, & Mogarri, 1999). Moreover, a study aimed at characterizing CFTR a gene mutation that led to CF in Saudi Arabia. The study found that 1234V and 1548deIG are the most common types of mutations in Saudi Arabia (Banjar, Kambouris, Meyer, al-Mehaidib, & Mogarri, 1999).

### Role of Respiratory Therapy in Management of CF

A 1988 study showed that respiratory therapy is one of the critical interventions in the management of CF and the associated comorbidities (Abman, Ogle, Butler-Simon, Rumack, & Accurso, 1988). Different scholars have suggested various treatment methods of managing CF disease. Among the most commonly used therapies in controlling CF are gene replacement therapy, airway clearance to mobilize the sputum from the respiratory airway and the use of aerosol drugs help to expectorate sputum and prevent the chance of infections (Abman, Ogle, Butler-Simon, Rumack, & Accurso, 1988). However, no particular method has been touted to be the best in managing CF. The main question is what is the role of Respiratory Therapist (RT) in controlling this disorder (Volsko, 2009). Geller and Rubin (2009) argue that RT has played a central role in CF management for a very long time and is vital in the management of CF among

patients (Volsko, 2009). The main goals of respiratory therapy is clearing the airway and improve oxygen intake by patients (Volsko, 2009). Respiratory therapists have significant roles in taking care of inpatient and outpatient CF patients (Volsko, 2009). RTs are responsible for offering education to CF patients on airway clearance techniques such as; cough & huff technique, chest physiotherapy (CPT), oscillating positive expiratory pressure (Oscillating PEP), positive expiratory pressure (PEP) therapy, active cycle of breathing technique and autogenic drainage (AD) (Wilson, Agnew, Morrison, Akinyede, & Robinson, 2014). They also administer aerosols therapy to patients. RTs conduct research to identify new devices and techniques for controlling CF symptoms (Volsko, 2009) However, despite studies highlighting the role of the RTs, very few have addressed the impact of CF to them. It is observed that RTs takes a lot of pride in successfully guiding a patient out of CF, and therefore they take their work as a motivating factor (Volsko, 2009).

## The Importance of the Adherence and Compliance among Health Professionals to the Clinical Guidance

The primary significance of compliance and adherence to the set clinical guidelines among health professionals is bridging the gaps between the management of disease and improve the disease outcomes. All professions have their underlying operation standards and principles that regulate their actions and behaviors. The healthcare profession is one such sector where the staffs are expected to strictly adhere to the set guidelines when dealing with patients considering that life is a sensitive matter (Brusamento et al., 2012). Compliance and adherence to the clinical guidelines by these professions are crucial in determining the outcome of the treatment process (Singh, Rebordosa, Bernholz, & Sharma, 2015). Based on bioethics principles, the healthcare professional should ensure that the patient has autonomy in deciding whether to take the

12

prescribed medication or not (Geller & Rubin, 2009). Moreover, any decision taken by the healthcare professional should the most beneficial to the client and at the same time maintains the confidentiality of the patients' medical information (Wahl et al., 2005). Adherence to these guidelines is not only important to the healthcare professional but also to the wellbeing of the patient (Brusamento et al., 2012). If the prescription is not appropriately done, the patient may end up failing to follow it, and this may result in increased cases of disease exacerbation and hospital admission (Morgan et al., 1999). On the side of the healthcare professional, failure to adhere to the prescribed guidelines when offering services to clients may lead to prosecution especially if the outcome is death or deterioration of the patient after treatment (Geller & Rubin, 2009). Moreover, lack of compliance with the medical procedures and guidelines may result in health hazards to both the healthcare professional and the client (Singh, Rebordosa, Bernholz, & Sharma, 2015). For communicable diseases, the reliant on personal protective equipment (PPEs) and ignoring clinical guidelines may expose health care practitioners to the risk of contracting the disease (Brusamento et al., 2012). It is therefore vital for all healthcare professionals to strictly follow the provided clinical guidelines in ensuring that they are safe, and the patients obtain the most suitable outcome of the treatment process (Strausbaugh & Davis, 2007).

In conditions such as CF where the management keeps improving due to the various advancements and breakthroughs in management, it is crucial for all healthcare professionals to be up to date with the current protocols of treatment to provide high quality care (VanDevanter, Kahle, O'Sullivan, Sikirica, & Hodgkins, 2016). High-quality care for such conditions can be provided if the healthcare professionals are using up to date techniques per the most recent guidelines. It is essential to establish methods and strategies like guideline dissemination, education, audit and feedback, and academic detailing to help the health professionals who have

been in the field for many years to adapt and adhere to the newly published guidelines (Jeffery et al., 2015).

**The Relationship Between Knowledge and Adherence to Disease Management and Cost**

Healthcare professionals have become more effective in the health service delivery with increasing period of practice (Geller & Rubin, 2009). It is believed that the longer the duration of service and individual has, the more experience and knowledge they gather on the treatment procedures and hence they become better practitioners (Strausbaugh & Davis, 2007). However, as much as this statement may hold some basis, it may not always be the case (Choudhry, Fletcher, & Soumerai, 2005). Choudhry et al, (2005), in a systematic review of 32 studies, stated 67% of them demonstrated a negative association between the age of the physicians and their performance (Choudhry, Fletcher, & Soumerai, 2005). The result of the study shows experience and knowledge to the clinical guidelines is not the only factor that determines the quality of care delivered by healthcare professionals (Choudhry, Fletcher, & Soumerai, 2005). Refreshing knowledge can provide additional methods and treatment of various disease conditions (Earley et al., 2011). It supports the redesigning of primary care, population health management and other systems that improve health care results (Brusamento et al., 2012). The development of knowledge in the treatment of cystic fibrosis has dramatically increased the evolution of disease management.

Adherence to the recent published guidelines and set regulations in the medical sector is crucial in cost reduction since it minimizes the probability of repeat therapy for patients (Choudhry, Fletcher, & Soumerai, 2005). It improves knowledge and experience of disease management which can reduce the cost of disease management and make healthcare affordable to all individuals in the society (Karbach et al., 2011). Additionally, strictly following the clinical

procedure when operating medical equipment and machines reduces the chances of misuse and malfunctions of the equipment's which is an essential portion in cost cutting and decrease the repair expenses in the healthcare facilities (Modi et al., 2006). Several Studies indicate that proper mastery of the clinical requirement is essential in improving disease management and cost relative (Spruit et al., 2013). With the right knowledge of the treatment procedure, healthcare professionals will offer proper intervention to the patient irrespective of the experience in the field (Modi et al., 2006). Adequate skills also cut down the cost of training health care providers (VanDevanter, Kahle, O'Sullivan, Sikirica, & Hodgkins, 2016). However, experience cannot be totally written off regarding the performance of clinicians as it provides familiarity with the symptoms of a specific disorder thereby and speeding up the process of diagnosis (Richards, Lester, Chin, & Marshall, 2013). Therefore, it is essential to consider methods that can measure the adherence and knowledge of healthcare provider to published guidelines.

**Management of Respiratory Complications in Cystic Fibrosis**

Various intervention and techniques have been put forward to manage CF, on among them is the CF airway clearance therapy (ACT) (Mogayzel et al., 2013). This method applied because, despite CF affecting many organs in the body, almost 85% of the total mortalities are caused by lung infections (Gibson, Burns, & Ramsey, 2003). It has been suggested that cleaning the airway of the mucus secretion along the respiratory tract is necessary for reducing the obstruction of the air path and at the same time minimize lung infections and inflammations (Gibson, Burns, & Ramsey, 2003). Despite being one of the most basic intervention plans, ACT is not sufficient as single intervention with CF management, and therefore there is a need to consider other methods of controlling CF (Schluchter, Konstan, Drumm, Yankaskas, & Knowles,

2006). However, ACT has been found to reduce exacerbations among patients and improve lung functions (Gibson, Burns, & Ramsey, 2003).

Pulmonary exacerbations refer to worsening of lung functioning and respiratory tract blockage as a result of acute CF (Mogayzel et al., 2013). This situation is usually characterized by increased sputum production, persistent coughs, chest pains, and shortness of breath and lung dysfunction among other symptoms (Flume et al., 2009). A study by pulmonary disorder specialists has suggested various treatments for managing pulmonary exacerbations among patients (VanDevanter, Kahle, O'Sullivan, Sikirica, & Hodgkins, 2016). One of these techniques is the prescription of appropriate antibiotics (Flume et al., 2009). However, the committee recommends the use of inhaled tobramycin antibiotics for *Pseudomonas aeruginosa* bacteria since it is the primary cause of respiratory infections (Oliver, Cantón, Campo, Baquero, & Blázquez, 2000). There should be a lot of caution to ensure that the right dosage is prescribed and this treatment is best suited for inpatient intervention (Flume et al., 2009). Apart from antibiotics, ACT is another alternative to dealing with pulmonary exacerbations. Chest physiotherapy is another crucial treatment for CF (Richards, Lester, Chin, & Marshall, 2013). This method is suitable for reducing the level of secretion in the lungs and the rest of the respiratory tract (Flume et al., 2009). The intervention involves postural drainage, deep breathing exercise, chest percussion, and vibration and coughing (Waters & Smyth, 2015).

For acute cases of CF, chronic medications are recommended, however under strict guidelines. First of all, the prescription has to be done by highly knowledgeable and experienced physicians (Elborn et al., 2016).In some circumstances, it is typical for people suffering from constant CF to experience significant lung injury; this condition is referred to as pneumothorax (Elborn et al., 2016). Moreover, some patients may end up coughing blood from the lungs a

situation called hemoptysis (Razvi et al., 2009). The CF Foundation provides a guideline for

managing these two pulmonary complications which include hospital admission (Flume et al.,

2010). In addition to the hospitalization, the patients should be offered ACT, inhaled

medications, and antibodies prescribed (Flume et al., 2010). Furthermore, a patient experiencing

large or tension pneumothorax should be undertaken through chest tube replacement, or

pleurodesis for patients who have experienced pneumothorax a couple of times (Elborn et al.,

2016). The affected individual should also be given a chance to relax to restrict physical

activities which may increase the oxygen consumption rate, thus promoting chances of

suffocation (Schluchter, Konstan, Drumm, Yankaskas, & Knowles, 2006).

**Summary**

Cystic Fibrosis is a deadly disease and is a concern for all health care providers all over

the world. The prevalence of CF varies from one country to another, even though it is highest

among the Non–Hispanic White Americans. If diagnosed early enough, CF can be managed.

However, delayed reporting reduces the survival rate significantly. Various treatments are used

to manage CF and related disorders. The literature review proves that the most effective

intervention is the ACT and use of antibiotics even though chest physiotherapy has also has

worked for some patients. CF management strategies in Saudi Arabia have improve the survival

rate and management of the disease.

## CHAPTER III

## Methodology

In this study, the researcher investigated the adherence level of Respiratory Therapist (RTs) to the cystic fibrosis (CF) clinical care guidelines for the management of respiratory complications in cystic fibrosis patient in Saudi Arabia.

The committee members met and discussed every element of the instrument and finalized a survey of thirty questions (see appendix A). To gather data for this study, an online survey is distributed through the Saudi Society for Respiratory Care (SSRC) to all its registered members. Participants' responses are going to be filtered based on the study inclusion and exclusion criteria. This chapter explains the methods and procedures that are going to be used to conduct this study.

## Research Questions

The study set out to answer the following questions:

1. What is the level of adherence among Respiratory Therapists (RTs) in Saudi Arabia to cystic fibrosis (CF) clinical guidelines?

2. Which section (awareness or management) needs most improvement in terms of level of adherence to CF clinical guidelines?

3. What is the effect of the level of RT's education on the level of adherence to CF clinical guidelines?

4. What is the level of adherence to CF clinical guidelines in senior RTs compared to junior RTs?

5. What is the level of adherence among RTs between the different regions of Saudi Arabia?

18

**Instrumentation**

The instrument developed in this study is based on the Cystic Fibrosis Foundation's published guidelines. All the multiple-choice questions were taken based on the suggestion and recommendation of the CF clinical guidelines. A committee of respiratory therapy education experts consisting of The Director of Respiratory Therapy Program, The Director of Clinical Education, and an assistant clinical professor implemented a modified Q-sort method. A Q-sort method has each member on the panel "sort" each question into piles for categorization (Block, 1961).

Validity and reliability refer to the consistency and precision of the used instrument. Reliability expresses to the researchers if they achieve consistent scores from the tools, where validity will tell them if the score has any meaning. Validity describes the extent to which a tool measures what it is supposed to measure (Burns & Grove, 2005). A panel of respiratory therapy education experts discussed the instrument thoroughly and apply content validity. From this meeting, the committee agreed on the elimination of seven unclear items. The rest of thirty-three items were carefully reviewed, reworded and formatted for better clarity.

The finalized instrument for this study consists of two parts, demographic data, and the survey. The demographic section consisted of fill in the blank and multiple-choice questions regarding gender, age, country and region of residence, the highest level of education, age upon start working as respiratory therapist, years of experience in the field of respiratory care, highest completed overall level of education, clinical experience with CF patient and guidelines, current position and National Board for Respiratory Care (NBRC) accreditation. Part II, emphasizes on measuring and assessing the amount adherence of the respiratory therapist to the Cystic Fibrosis foundation published guidelines. These dimensions are: RTs perception and knowledge of CF

disease (6 questions) and RTs Perception of CF disease management (14 questions). The instrument can be found in appendix A.

## Research Design

A study of descriptive exploratory research design with a self-reporting survey is going to be used in this study. A survey is a technique of research that comprehends answering questions or interviews (Brown, 2009). The aim of a survey is using questionnaire interviews to gather data from a sample to describe the population in research. The survey design used in this study intended to collect data from the respiratory therapist members of SSRC. The ability to collect a large amount of data from many participants by using a single instrument is one of the advantages of using survey research. Also, survey research includes lower cost with the use of online technologies and reaching a large number of participants (Portney & Watkins, 2008).

## Sample

A convenience sample will be used in study and the subjects chose criteria will depend on the basis of their availability. The study group will be the members of Saudi Society for Respiratory Care (SSRC). The SSRC is a scientific non-profit association that aims to promote and advances the profession of respiratory therapy in Saudi Arabia through sponsoring of scientific activities throughout all regions of the kingdom (SSRC, 2015). Permission from SSRC is required to survey all members in its database utilizing an electronic approach. The participants will be provided with 33 questions with a cover letter explaining the purpose of the study and assuring them of confidentiality.

To be precise in answering the research questions, respiratory therapists (RTs) who deal with cystic fibrosis disease (CF) in Saudi Arabia will be included in the study. RTs from other countries, RTs who have not treated CF patients in the past, or RTs who are not familiar with CF

disease will be included in the study. RTs students and other healthcare providers will be excluded from the study.

## Data Analysis

Data was transferred to the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics including mean and standard deviation were obtained for age, years of experience and starting age while frequency, percentage and mode were obtained for gender, country of practice years of experience (less than five years or five years or more), region of practice in Saudi Arabia, highest level of respiratory therapy education, highest completed overall level of education, current position, familiarity with CF treatment and guidelines and credentialed from NBRC. Spearman's rank correlation analysis was used to identify the relationship between current age and number of correct responses for awareness section, current age and number of correct responses for management section, and current age and number of correct responses for both sections overall. Mann-Whitney U-Test was used to compare the differences in number of correct responses for awareness section, management, and both sections overall between gender, current practice, years of experience (less than five years or five years or more), year of practice, familiarity with CF treatment & guidelines, and credentialed from NBRC.  Kruskal-Wallis Test was used to compare the difference in the number of correct responses for awareness, management, and both sections overall between, region of practice in Saudi Arabia, highest level of respiratory therapy education, highest completed overall education, and current position. The magnitude of correlations between variables in Spearman's rank correlation analysis will be interpreted using Davis conventions (Davis, 1970).

| Coefficient | Description |
|---|---|
| .70 or higher | Very strong association |
| .50 to .69 | Substantial association |
| .30 to .49 | Moderate association |
| .10 to .29 | Low association |

## Protection of Human Subjects

The study proposal will be submitted to Georgia State University Institutional Review Board (IRB) for expedited approval. Procedures for protection of human subjects will be strictly implemented. Study participation will be voluntary with consent assumed on the return of a completed survey. Confidentiality will also be protected and surveys were anonymous. In addition, using an online survey approach meant that participation did not have to use email to submit the participants' responses, thus avoiding indirect identification. After all data are analyzed, all surveys will be deleted.

## Development of a Cover Letter

The researcher formed a cover letter after examining formerly published survey examples (Portny & Watkins, 2008). The cover letter was sent to the thesis chair for further review and examination. The final cover letter and follow-up emails can be seen in appendixes B, C, and D sequentially.

# CHAPTER IV

## FINDINGS

This study aimed to assess the adherence level of Respiratory Therapists (RTs) to the cystic fibrosis (CF) clinical guidelines and determine if the RTs in Saudi Arabia are following the CF Foundation's clinical guidelines for the management of respiratory complication in CF disease. Moreover, this study showed the weak point that needs more improvement in CF management. This chapter presents the results of the statistical analysis as well as the demographic information of the samples. Statistical Package for the Social Sciences 25 (SPSS 25) was used to conduct the statistical analysis for this study. The findings will be presented separately in relation to the following research questions.

### Research Questions

1. What is the level of adherence among Respiratory Therapists (RTs) in Saudi Arabia to cystic fibrosis (CF) clinical guidelines?

2. Which section needs most improvement in terms of level of adherence to CF clinical guidelines?

3. What is the effect of the level of RT's education on the level of adherence to CF clinical guidelines?

4. What is the level of adherence to CF clinical guidelines in senior RTs compared to junior RTs?

5. What is the level of adherence among RTs between the different regions of Saudi Arabia?

### Demographic Findings

The study included a convenient sample of registered members of the Saudi Society for Respiratory Care (SSRC). The sample covers respiratory therapists who are currently working or

have worked in Saudi Arabia. Three hundred-fifty-one responses were obtained out of 750 emailed surveys, resulting in a response rate of 46.8%. Out of 351 responses, one hundred-sixty-six responses were completed, ending up with a completion rate of 47.1%. Student participants and other health profession providers were excluded from the study. Moreover, undergraduate degree (BS and AS) accounted for 80.1% (*n*=133) of the participant, while 19.9% (*n*=33) were graduate degree therapist (MS). Meantime, the respiratory therapists' highest overall levels of education in Saudi Arabia, which may or may not include RT education, were as follows: AS 5.4% (n=9), BS 69.3% (*n*=115), MS 20.5% (*n*=34), Doctorate 3.6 % (*n*=6), and MD 1.2% (*n*=2). The majority 94% (*n*=156) of the participants were from Saudi citizen while 6% (*n*=10) were from other countries. Also, the male 69.9% (*n*=116) participants were constituting most of the sample, where female participant constitutes 30.1% (*n*=50) of the sample. 79.5% (*n*=132) of the RTs are currently practicing respiratory care profession in Saudi Arabia(SA), whereas 20.5% (*n*=34) RTs were practicing in SA. Furthermore, 51.8% (*n*=86) responses were from central region, 24.1% (n=40) were from east region, 18.1% (*n*=30) were from west region and 6% (*n*=10) were from other regions.

RTs Specialist constituted (n=100) 60.2 % of the responses, were 8.4% (n=14) of the responses were from RTs Technicians.  RTs Supervisor responses were (n=14) 8.4% of the sample were RTs Director or Manager were 4.8% (n=8) of total responses. RTs Faculty member composed 10.8% of responses (n=18) were 4.2% (n=7) of responses were from RTs Clinical Educator. Responses from Unemployed were 3% (n=5) of the total response. From the total sample, 63.9% (*n*=106) of therapists have treated CF patient while 36.1% (*n*=60) haven't treated CF in the past. Also, 53.6% (*n*=89) of the participants were familiar with CF clinical guidelines while 46.4% (*n*=77) were not familiar with CF clinical guidelines. 33.1% (*n*=55) of the therapists

were credentialed register Respiratory Therapist (RRT) by National Board of Respiratory Care (NBRC) from the United States of America where 66.9% (*n*=55) were not credentialed. Mean current age score in years and standard deviation (*SD*) for the participants were (*M*=29.2, *SD* ± 5.5), while mean age score and SD for RTs when they started RT care profession international were (*M*=24.2, *SD*= ±2.6). Also, mean score and SD for years of experience in RT field were

Table 1 – Demographic Characteristics of Respiratory Therapists in Saudi Arabia. N=166

| Characteristic | N | % |
|---|---|---|
| **Country of Citizenship** | | |
| Canada | 3 | 1.8 |
| Philippines | 4 | 2.4 |
| Saudi Arabia | 156 | 94.0 |
| United States of America. | 2 | 1.2 |
| Yemen | 1 | 0.6 |
| **Gender** | | |
| Male | 116 | 69.9 |
| Female | 50 | 30.1 |

(*M*=4.93, *SD*= ± 4.9).

Table 2 – Demographic Characteristics of Respiratory Therapists in Saudi Arabia. N=166

| Characteristic | M | SD | Minimum | Maximum |
|---|---|---|---|---|
| **Current age** | 29.2 | ±5.5 | 23 | 51 |
| **Age when started respiratory care profession (yrs.)** | 24.2 | ±2.6 | 20 | 39 |
| **Years of experience** | 4.93 | ±4.9 | 0 | 22 |

**Table 3** – Educational and Professional Characteristics of Respiratory Therapists in Saudi Arabia. N=166

| Characteristic | N | % |
|---|---|---|
| **Practicing respiratory care in Saudi Arabia** | | |
| Yes | 132 | 79.5 |
| No | 34 | 20.5 |
| **Region of Practice** | | |
| Center | 86 | 51.8 |
| East | 40 | 24.1 |
| North | 2 | 1.2 |
| South | 8 | 4.8 |
| West | 30 | 18.1 |
| **Level of Respiratory Therapy Education** | | |
| Associate degree | 11 | 6.6 |
| Bachelor's degree | 122 | 73.5 |
| Master's degree | 33 | 19.9 |
| **Overall level of Education** | | |
| Associate degree | 9 | 5.4 |
| Bachelor's degree | 115 | 69.3 |
| Master's degree | 34 | 20.5 |
| Doctorate (PhD, EdD, ScD, etc.) | 6 | 3.6 |
| Doctor of Medicine | 2 | 1.2 |
| **Position** | | |
| Technician | 14 | 8.4 |
| Specialist | 100 | 60.2 |
| Supervisor | 14 | 8.4 |
| Director or Manger | 8 | 4.8 |
| Clinical Educator | 7 | 4.2 |
| **Participant treated a cystic fibrosis (CF) patient in the past** | | |
| Yes | 106 | 63.9 |
| No | 60 | 36.1 |
| **Familiarity with CF foundation clinical guidelines** | | |
| Yes | 89 | 53.6 |
| No | 77 | 46.4 |
| **Credentialed RRT from NBRC** | | |
| Yes | 55 | 33.1 |
| No | 111 | 66.9 |

**Missing Data**

All the incomplete responses were not use in the study. Out of 254, (*N*=166) responses were used in this study. Also, 7 participants were excluded because they disagreed to participate.

**Findings Related to Research Question 1**

The first research question asked, "What is the level of adherence among Respiratory Therapists (RTs) in Saudi Arabia to cystic fibrosis (CF) clinical guidelines?". Median, Mode, and percentages were calculated and tabulated for each research question in the survey (see tables 4-1 and 4-2). Also, Median, Mode, and percentages were calculated for number of correct responses overall (see table 4-3). Out of 20 questions measuring knowledge and management, most number of people (mode=6, n=25) answered 30% of questions correctly. On average, respondents answered 35% of questions correctly (median=7, n=16). So, the average level of adherence among RTs in Saudi Arabia to CF clinical guidelines is 35%.

**Findings Related to Research Question 2**

The second research question asked, "Which section needs most improvement in terms of level of adherence to CF clinical guidelines?" A Wilcoxon Signed-ranks test indicated that significantly more questions were answered correctly for the management section (*Mdn* = 5) than awareness & knowledge section (*Mdn* = 2), $Z = -10.45$, $p < .001$, $r_s = .49$ (see table 5 Comparison of level). Respondents performed worse in the knowledge section than the management section.

**Table 4-1** – Descriptive statistics for knowledge section. N=166

| Question | Correct % (n) | Wrong % (n) | I don't know % (n) | Mode | *Median* |
|---|---|---|---|---|---|
| **Awareness and knowledge of CF** | | | | | |
| From my experience as a Respiratory Therapist, sweat chloride of …….... mmol/l or more can indicate the presence of CF. | 42.8 (71) | 17.5 (29) | 39.8 (66) | 1 | 1 |
| From my experience as a Respiratory Therapist, performing direct spirometry test for an adult patient with CF disease, the predicted value for forced exhaled volume in 1 second (FEV1) will be ……… | 10.8 (18) | 71.1 (118) | 18.1 (30) | 0 | 0 |
| From my experience as a Respiratory Therapist, most CF chest x-ray demonstrate ………. ….. lungs. | 28.3 (47) | 59.6 (99) | 12.0 (12) | 0 | 0 |
| From my experience as a Respiratory Therapist, CF inflammatory response is ……......relative to the burden of infection. | 67.5 (112) | 12.0 (20) | 20.5 (34) | 2 | 1 |
| From my experience as a Respiratory Therapist, …………….... is the most common destructive airway pathogen present in CF patients. | 36.1 (60) | 22.9 (38) | 41.0 (68) | 2 | 1 |
| According to my answer to previous question, in my experience as a Respiratory Therapist the use of ……………. antibiotic is prescribed for the pathogen selected in question nine-tee. | 36.7 (61) | 16.9 (28) | 46.4 (77) | 2 | 1 |

0= Wrong answer, 1= Right answer, 2 = I don't know

**Table 4-2** – Descriptive statistics for management section. N=166

| Question | Correct % (n) | Wrong % (n) | I don't know % (n) | Mode | *Median* |
|---|---|---|---|---|---|
| **Management of CF** | | | | | |
| From my experience as a Respiratory Therapist, the gold standard for airway clearance therapy in a CF patient is: | 56.6 (94) | 39.2 (65) | 4.2 (7) | 1 | *1* |
| From my experience as a Respiratory Therapist, the Mucoactive agent used most often with a CF patient is: | 35.5 (59) | 46.4 (77) | 18.1 (30) | 0 | *1* |
| From my experience as a Respiratory Therapist, .......... reduces the viscosity of airway secretion in general. | 26.5 (44) | 51.2 (85) | 22.3 (37) | 0 | *0* |
| From my experience as a Respiratory Therapist, the administration of Mucoactive agent should occur: | 62.7 (104) | 25.3 (42) | 12.0 (20) | 1 | *1* |
| From my experience as a Respiratory Therapist, airway clearance therapy should be performed for: | 22.9 (38) | 77.1 (128) | -- | 0 | *0* |
| From my experience as a Respiratory Therapist, airway clearance therapy in a CF patient with a small pneumothorax (≤3 cm) should be: | 25.3 (42) | 38.6 (64) | 36.1 (60) | 0 | *1* |
| From my experience as a Respiratory Therapist, airway clearance therapy in a CF patient with scant hemoptysis should be: | 14.5 (24) | 57.8 (96) | 27.7 (46) | 0 | *0* |
| From my experience as a Respiratory Therapist, aerosol therapy that induces a cough (hypertonic saline >0.9%) a with CF patient who has a pneumothorax should be: | 20.5 (34) | 41.6 (69) | 38.0 63) | 0 | *1* |
| From my experience as a Respiratory Therapist, BiPAP in a CF patient with scant hemoptysis should be: | 18.7 (31) | 45.8 (76) | 35.5 (59) | 0 | *1* |
| From my experience as a Respiratory Therapist, the use of hypertonic saline (>.9%) twice a day to reduce the chance of lung infection in a CF patient is: | 39.8 (66) | 26.5 (44) | 33.7 (56) | 1 | *1* |
| From my experience as a Respiratory Therapist, PEP therapy in a CF patient with an ear infection is: | 42.2 (70) | 19.3 (32) | 38.6 (64) | 1 | *1* |
| From my experience as a Respiratory Therapist, the airway clearance regiment AFTER lung transplant in a CF patient is: | 24.1 (40) | 24.1 (40) | 51.8 (86) | 2 | *2* |
| From my experience as a Respiratory Therapist, the long-term use of Dornase Alpha demonstrates better outcome compared to short-term use in a CF patient. | 69.9 (116) | 30.1 (50) | -- | 1 | *1* |
| From my experience as a Respiratory Therapist, the long-term use of an anti-inflammatory like inhaled corticosteroids to increase forced exhaled volume in 1 second (FEV1) in a CF patient is: | 45.2 (75) | 15.7 (26) | 39.2 (65) | 1 | *1* |

0= Wrong answer, 1= Right answer, 2 = I don't know

**Table 4-3** – Number and percentage of the correct responses for the survey questions. N=166

| Characteristic | N | % |
|---|---|---|
| Zero correct response | 3 | 1.8 |
| One correct response | 5 | 3 |
| Two correct responses | 6 | 3.6 |
| Three correct responses | 8 | 4.8 |
| Four correct response | 12 | 7.2 |
| Five correct response | 11 | 6.6 |
| Six correct response | 25 | 15.1 |
| Seven correct response | 16 | 9.6 |
| Eight correct response | 21 | 12.7 |
| Nine correct response | 12 | 7.2 |
| Ten correct response | 21 | 12.7 |
| Eleven correct response | 10 | 6.0 |
| Twelve correct response | 8 | 4.8 |
| Thirteen correct response | 5 | 3.0 |
| Fourteen correct response | 2 | 1.2 |
| Fifteen correct response | 1 | .6 |
| Total | 166 | 100 |

| Mode | 6 | Median | 7 | Minimum | 00 | Maximum | 15 |
|---|---|---|---|---|---|---|---|

**Table 5** – Comparison of level of adherence to cystic fibrosis clinical guidelines between awareness. knowledge and management among Respiratory Therapists in Saudi Arabia. N=166

| | Negative ranks | | | Positive ranks | | | Test statistic | | |
|---|---|---|---|---|---|---|---|---|---|
| | n | Mean rank | Sum of ranks | n | Mean rank | Sum of ranks | Ties | Z | P |
| Total correct responses for management - Total correct responses for awareness & knowledge | $7^a$ | 19.86 | 139 | $144^b$ | 78.73 | 11337 | $15^c$ | $-10.45^*$ | .00 |

a. Total Correct Responses Management section < Total Correct Responses Awareness and knowledge section
b. Total Correct Responses Management section > Total Correct Responses Awareness and knowledge section
c. Total Correct Responses Management section = Total Correct Responses Awareness and knowledge section
* Based on negative ranks.

**Findings Related to Research Question 3**

The Third research question asked What is the effect of the level of RT's education on the level of adherence to CF clinical guidelines?" A Kruskal-Wallis Test didn't reveal a significant difference in the overall number of correct responses between the levels of RT education, $H(2) = 2.7$, $p = .255$. So, the level of RT education did not have a significant effect on the level of adherence to CF clinical guidelines (see table 8).

**Findings Related to Research Question 4**

The fourth research question asked" What is the level of adherence to CF clinical guidelines in senior RTs compared to junior RTs. Experience was measured in term of years of experience and skill level as indicated by the RT's current position. Results of the Spearman correlation indicated that there was a significant positive association between years of experience and number of overall correct responses, $r_s$ (166) = .26, $p < .01$; There was a significant association between years of experience and number of overall wrong responses, $r_s$ (166) = .16, $p < .05$; There was a significant association between years of experience and number of overall I don't know responses, $r_s$ (166) = -.30, $p < .01$ (see table6-7). Thus, overall, respondents with more years of experience tent to have higher adherence level.

A Mann-Whitney test indicated that overall, the respondents who had more than five years of experience answered significantly more questions correctly (*Mdn* = 8.5) then those who had less than five years of experience (*Mdn* = 7.0), $U = 2056$, $p < .001$, $r_s$ (166) = .314. So, overall, those with seniority in terms of years of experience had significantly higher adherence level than those without seniority (See table7).

Kruskal-Wallis Test revealed a significant difference between the levels of current position in terms of the overall number of correct responses, $H(6) = 12.1$, $p = .05$. Within

different levels of current position, overall, supervisors (mean rank = 112.04, n = 14), those who

were un-employed (mean rank = 111.5, n = 5) and clinical educators (mean rank =100, n = 7)

answered greatest number of questions correctly. So, overall, there were significant differences

in the adherence level between current positions. Specifically, those at supervisory and clinical

educator levels and those who were un-employed had higher level of adherence (see table 8).

Table – 6 Spearman's rank-order correlation between years of experience and participant responses.
N=166

| | How many years of experience do you have in the field of RT? | Overall correct responses | Overall Wrong responses | Overall, I don't know responses |
|---|---|---|---|---|
| How many years of experience do you have in the field of RT? | 1.000 | | | |
| Overall correct responses | .264** | .264** | .163* | -.303** |
| Overall Wrong responses | .163* | | | |
| Overall, I don't know responses | -.303** | | | |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table – 7 Comparison of overall correct responses between Respiratory Therapists who have > 5 years
of experience and those who have < 5 years of experience. N=166

| Factor | Overall |
|---|---|
| Mann-Whitney U | 2056 |
| Z-score | -4.028 |
| Significance P-value | .000 |

Table – 8 Comparison of the overall number of correct responses between highest levels of respiratory therapists education, between the regions and current position. N=166

| Questions | Overall n | H(df) | P |
|---|---|---|---|
| **Region of Practice** | | 2.5(4) | .645 |
| Center region | 86 | | |
| East region | 40 | | |
| North region | 2 | | |
| South region | 8 | | |
| West region | 30 | | |
| **Highest level of respiratory therapy education** | | 2.7(2) | .255 |
| Associate degree | 11 | | |
| Bachelor degree | 122 | | |
| Master degree | 33 | | |
| **Highest completed overall level of education** | | 9.1(4) | .053 |
| Associate degree | 9 | | |
| Bachelor degree | 115 | | |
| Master degree | 34 | | |
| Doctorate (PhD, EdD, ScD, etc.) | 6 | | |
| Doctor of Medicine | 2 | | |
| **Current position** | | 12.1(6) | .050 |
| Respiratory Therapist - Technician | 14 | | |
| Respiratory Therapist - Specialist | 100 | | |
| Respiratory Therapist - Supervisor | 14 | | |
| Respiratory Therapist - Director or Manger | 8 | | |
| Respiratory Therapist – Clinical Educator | 7 | | |
| Respiratory Therapist – Faculty member | 18 | | |
| Un employed | 5 | | |

## Findings Related to Research Question 5

The fifth research question asked" What is the level of adherence among RTs between the different regions of Saudi Arabia?"_A Kruskal-Wallis Test revealed no significant difference in overall number of correct responses between the region of practice in Saudi Arabia, $H(4) = 2.5$, $p = .645$ ( see table 8). So, the region which RT practice did not have significant effect on overall number of correct responses.

# CHAPTER V

## Interpretation of Findings

This chapter will present a discussion of the findings presented in Chapter IV. The chapter is divided into six major sections: an overview of the study, discussion of findings, implications for research, future research recommendations, limitations of the study, and conclusion.

## Overview of the Study

This study aimed to assess the adherence level of Respiratory Therapists (RTs) to the cystic fibrosis (CF) clinical guidelines and determine if the RTs in Saudi Arabia are following the CF Foundation's clinical guidelines for the management of respiratory complication in CF disease. The following research questions were addressed in order to help guide the study:

6. What is the level of adherence among Respiratory Therapists (RTs) in Saudi Arabia to cystic fibrosis (CF) clinical guidelines?

7. Which section needs the most improvement concerning the level of adherence to CF clinical guidelines?

8. What is the effect of the level of RT's education on the level of adherence to CF clinical guidelines?

9. What is the level of adherence to CF clinical guidelines in senior RTs compared to junior RTs?

10. What is the level of adherence among RTs between the different regions of Saudi Arabia?

**Discussion**

**Findings Related to Research Question 1**

The first research question asked, "What is the level of adherence among Respiratory Therapists (RTs) in Saudi Arabia to cystic fibrosis (CF) clinical guidelines?" The finding showed that overall adherence of RTs to treat CF respiratory complication was found to be 35% on average, which indicates that most of RTs in Saudi Arabia do not depend on guidelines in CF management. The reason for low adherence level may arise due to the lack of familiarity with clinical guidelines or department protocols contradictory with a specific recommendation in guidelines (Perez et al., 2012). To improve the adherence level among healthcare provider, Lugtenberg et al. (2009) found that clinical guidelines should be more precise concerning the applicability and recommend discussing the clinical guidelines in the education curriculum as an innovative education strategy.

**Other Findings Related to Research Question 1**

The study finding showed that there was a significant correlation between RTs who were familiar with CF clinical guideline and adherence level $r_s =.80$. Also, there was a significant correlation between an accredited registered Respiratory Therapist (RRT) from the national board of respiratory care (NBRC) and I don't know responses $r_s = -.65$. Overington et al. (2014) found healthcare providers who follow clinical guidelines, will deliver the best available care during their clinical practice. Parthasarathy, Subramanian, & Quan (2014), observed that physicians with the accreditation-certification status were associated with high clinical guidelines adherence, better patient education, high-grade patient satisfaction, and better timeliness.

**Findings Related to Research Question 2**

The second research question asked, "which section needs the most improvement concerning the level of adherence to CF clinical guidelines?" The study showed that respondents have inadequate knowledge about CF disease. Respondents significantly answered more questions correctly in the management section (P<.001) compared to knowledge section which suggests a gap exists between knowledge and practice. A similar study conducted in Nigeria to measure the gap between knowledge and practice of providers treating uncomplicated malaria found that there was a gap between providers' knowledge and their practice (Mangham-Jefferies, Hanson, Mbacham, Onwujekwe, & Wiseman, 2015). Majumdar, McAlister, & Furberg (2004) found lack of motivation, lack of awareness, disagreement with the guidelines, lack of self-efficacy and overemphasis on potential side effects can cause the gap between knowledge and the way of practice and management of the disease.

**Findings Related to Research Question 3**

The third research question asked, "What is the effect of the level of RT's education on the level of adherence to CF clinical guidelines?" The study result showed the level of RT education (associate degree, bachelor's degree, and master's degree) did not have a significant effect on the level of adherence to CF clinical guidelines (p = .255). This finding may be due to the same educational background. Most of the respiratory therapy schools in Saudi Arabia are following the same teaching strategies and have the same curriculum (Alotaibi, 2015). There is no similar research support that the level of education will not alter the adherence level in the healthcare provider. However, Aiken, (2003) found in her study "Educational Levels of Hospital Nurses and Surgical Patient Mortality" that nurses with a bachelor's degree or higher, have less

37

mortality rate compared to the nurse who has associated degree. That indicates that as the level of education increase, the management of disease increase, and the mortality decreased.

## Findings Related to Research Question 4

The fourth research question asked, "What is the level of adherence to CF clinical guidelines in senior RTs compared to junior RTs?" Experience was measured in years and skill level as indicated by the RT's current position. The study showed that there was a significant positive association between years of experience and number of overall correct responses, $r_s$ (164) = .26, $p < .01$ and a significant negative association between years of experience and number of overall, I don't know responses, $r_s$ (164) = -.30, $p < .01$. That means as years of experience increase the adherence level and awareness level increase. (Blegen, Vaughn, & Goode, 2001) found units with more experienced nurses had lower medication errors and lower patient fall rates. However, McKinlay et al., (2007) found that there were no significant differences in the use of guidelines depending on physician level of experience ($p = 1.0$).

Also, the study found that respondents with more than five years of experience had significantly more questions correctly (*Mdn* = 9.5) than those who had less than five years of experience (*Mdn* = 7.0), $U = 2056$, $p < .001$, $r_s$ (164) = .314. Meaning therapist with more than five years of experience has higher adherence level and higher management level. In a study conducted in the nursing field, McHugh & Lake (2010) mentioned that a higher proportion of nurses with ≥ five years of experience was associated with fewer medication errors and lower patient fall rates.

Additionally, the study showed that there were significant differences in the number of correct responses between current positions. Specifically, those at supervisory and clinical educator levels and those who were un-employed answered most number of questions correctly.

Leading positions in Saudi Arabia hospital require spending a certain number of hours at the bedside before obtaining a supervisory position, which may explain why supervisors have more correct answers and better management (Slipicevic & Masic, 2012). Clinical educator job description required to be up to date with the new clinical guidelines, which also explains the high correct response with clinical educator compared to other positions (CAPCSD, 2013). Also, the reasons behind the high correct responses among unemployed to survey questions are; they are fresh graduates, they just finished internship and knowledge still fresh in their minds (Dogra, Mahajan, Jad, & Mahajan, 2015).

### Findings Related to Research Question 5

The fifth research question asked, "What is the level of adherence among RTs between the different regions of Saudi Arabia?" The study revealed that the region which RT practice did not have a significant effect on the overall number of correct responses. Meaning that the region does not affect the overall adherence level of RTs in Saudi Arabia. Moreover, the Saudi Commission for Health Specialties (SCFHS) require students to complete their externship in accredited hospitals (SCFHS, 2014). This requirement attempts to ensure RTs knowledge is equivalent in all Saudi Arabia regions. Also, most of the schools that students graduate from in Saudi Arabia are following same teaching strategies and may help explain the lack of differences between the regions (Alotaibi, 2015). (Cantrell, Browne, & Lupinacci, 2005) found in her study that nurses who had externship requirements were more professionalism and role socialization compared to the nurses who had not has externship requirements.

### Implications for Research

The finding of this study will promote the importance of adherence to CF clinical guidelines. This finding indicates that adherence level to clinical guidelines needs to be improved

among RTs in Saudi Arabia. Further education session and class are required to improve the overall level of adherence to clinical guidelines which can improve and enhance the management of CF disease and increase the average survival rate in Saudi Arabia. Moreover, the Saudi Respiratory schools need to consider teaching the disease management based on the updated published guidelines.

## Recommendation for Future Study

Future research is recommended due to lack of research on the subject of the perception of adherence to cystic fibrosis guidelines by respiratory therapists in Saudi Arabia. To validate the results of this study, replication with larger number of participants recommended and use of multi-organization that has lager date base of the Respiratory Therapist like Saudi Commission for Health Specialties (SCFHS).

## Limitations

The present study is limited by different factors. The findings of this study cannot be generalized to all RTs adherence level due to the use of only one database that has RTs information, and one cultural background. Moreover, the study is limited by its relatively small sample size drawn from a large population of RTs. Finally, there is a lack of research in the perception of adherence to cystic fibrosis guidelines by respiratory therapists in Saudi Arabia.

## Conclusion

RTs adherence to clinical guidelines plays a significant role in the management of respiratory complications associated with cystic fibrosis. Years of experience in the clinical field, RTs job position, familiarity with clinical guidelines and accreditation from NBRC were correlated with adherence level and quality of care. The study findings indicate that average adherence level of the Respiratory Therapists in Saudi Arabia is low and need to be improved.

Educational classes need to be conducted to improve the CF disease knowledge level in RTs. Also, to enhance the management level, RT departments required to keep their staff updated with new clinical published guidelines.

**Appendix A: The Perception of Adherence to Cystic Fibrosis Guidelines by Respiratory Therapists in Saudi Arabia Survey**

I.      Demographic data.

1. Country of citizenship:

    o   (1)Canada.

    o   (2)Philippines.

    o   (3)Saudi Arabia.

    o   (4)United States of America.

    o   Other ……………...

2. What is your gender? (1) Male/(2)Female

3. Current age: ………… years old.

4. Are you currently practicing respiratory care in Saudi Arabia? Yes/No

5. At what age did you start respiratory therapy profession?.........

6. How many years of experience do you have in the field of respiratory care? ………

7. In which region of Saudi Arabia do currently practicing Respiratory therapy profession?

    o     (1)Center region

    o     (4)East region

    o     (2)North region

    o     (5)South region

    o     (3)West region

8. What is your highest level of respiratory therapy education?

    o     (1)Associate degree

    o     (2)Bachelor degree

    o     (3)Master degree

9.   What is your highest completed overall level of education?

- o   (1)Associate degree

- o   (2)Bachelor degree

- o   (3)Master degree

- o   (4)Doctorate (PhD, EdD, ScD, etc.)

- o   (5)Doctor of Medicine

10. What is your current position?

- o   (1)Respiratory Therapist - Technician.

- o   (2)Respiratory Therapy - Specialist

- o   (3)Respiratory Therapist- Supervisor

- o   (4)Respiratory Therapist- Director or Manger

- o   (5)Respiratory Therapist- Clinical Educator

- o   (6)Respiratory Therapist- Faculty member

- o   Other (please specify) …………………

11. Have you treated a cystic fibrosis (CF) patient in the past? (1)Yes/(2)No.

12. Are you familiar with CF foundation clinical guidelines? (1)Yes/(2)No.

13. Are you a credentialed registered respiratory therapist (RRT) by National Board for
Respiratory Care (NBRC) form United States of America? (1)Yes/(2)No.

II.     Survey

A. Respiratory Therapists perception and awareness of CF disease.

1. From my experience as a Respiratory Therapist, sweat chloride of …….... mmol/l or more can indicate the presence of CF.

    o (1)40

    o **(2)60**

    o (3)100

    o (4)I don't know

2. From my experience as a Respiratory Therapist, performing direct spirometry test for an adult patient with CF disease, the predicted value for forced exhaled volume in one second (FEV1) will be ………

    o **(1)more than 60%**

    o (2)less than 60%.

    o (3)I don't know

3. From my experience as a Respiratory Therapist, most CF chest x-ray demonstrate………….. lungs.

    o (1)wet

    o (2)collapsed

    o **(3)hyperinflated**

    o (4)I don't know

4. From my experience as a Respiratory Therapist, CF inflammatory response is …….
   relative to the burden of infection.

   o **(1)excessive**

   o (2)minimum

   o (3)I don't know

5. From my experience as a Respiratory Therapist, ……………... is the most common
   destructive airway pathogen present in CF patients.

   o (1)staphylococcus aureus

   o (2)hemophilus Influenza

   o **(3)pseudomonas aeruginosa**

   o (4)escherichia coli

   o (5)I don't know

6. According to my answer to question five, in my experience as a Respiratory Therapist the
   use of ……………. antibiotic is prescribed for the pathogen selected in question five
   pathogen.

   o (1)inhaled Cephalexin

   o **(3)inhaled Tobramycin**

   o (2)inhaled Moxifloxacin.

   o (4)I don't know

B. RTs Perception of CF disease management.

1. From my experience as a Respiratory Therapist, the Mucoactive agent that used most often with cystic fibrosis patients is:

   o **(1)Dornase Alpha.**

   o (2)N-acytlecystine

   o (3)Hypertonic saline.

   o (4)I don't know

2. From my experience as a Respiratory Therapist, the gold standard for airway clearance therapy in CF patients is:

   o **(1)High-frequency chest wall oscillation (chest vest).**

   o (2)Autogenic drainage.

   o 93)Chest physiotherapy (manual CPT)

   o (4)I don't know

3. From my experience as a Respiratory Therapist, ........... reduces the viscosity of airway secretion in general……………...
   o (1)Albuterol Sulfate

   o (3)N-Acetylcysteine

   o **(2)Dornase Alpha**

   o (4)Normal saline.

4. From my experience as a Respiratory Therapist, the administration of Mucoactive agent should occur:

  o **(1)Before physiotherapy**

  o (2)During physiotherapy

  o (3)After physiotherapy

  o (4)I don't know

5. **From my experience as a Respiratory Therapist, airway clearance therapy should be performed for:**

  o (1)10 - 19 minutes

  o **(2) 20 - 40 minutes**

  o (3) 41 - 60 minutes

6. From my experience as a Respiratory Therapist, airway clearance therapy in CF patients with a small pneumothorax (≤3 cm) should be:

  o (1)Stopped.

  o **(2)Not stopped**

  o (3)I don't know

7. From my experience as a Respiratory Therapist, the airway clearance therapies in CF patients with scant hemoptysis should be:

  o (1)Stopped.

  o **(2)Not stopped**

  o (3)I don't know

8. From my experience as a Respiratory Therapist, aerosol therapy that induces a cough (hypertonic saline >0.9%) with CF patients who has a pneumothorax should be:

- ○ (1)Stopped

- ○ **(2)Not stopped**

- ○ (3)I don't know

9. From my experience as a Respiratory Therapist, BiPAP in CF patients with scant hemoptysis should be:

- ○ (1)Stopped

- ○ **(2)Not stopped**

- ○ (3)I don't know

10. From my experience as a Respiratory Therapist, the use of hypertonic saline (>.9%) twice a day to reduce the chance of lung infection in CF patients is:

- ○ **(1)Indicated**

- ○ (2)Not Indicated

- ○ (3)I don't know

11. From my experience as a Respiratory Therapist, PEP therapy in CF patients with an ear infection is:

- ○ (1)Indicated

- ○ **(2)Not indicated**

- ○ (3)I don't know

12. From my experience as a Respiratory Therapist, the airway clearance regiment **AFTER** lung transplant in CF patients is:

   ○ (1)Indicated

   ○ **(2)Not indicated**

   ○ (3)I don't know


13. From my experience as a Respiratory Therapist, the long-term use of anti-inflammatory like inhaled corticosteroids to increase forced exhaled volume in one second (FEV1) in CF patients is:

   ○ **(1)Indicated**

   ○ (2)Not indicated

   ○ (3)I don't know

14. From my experience as a Respiratory Therapist, the long-term use of Dornase Alpha demonstrated better outcome compared to short-term use in CF patients.

   ○ **(1)Yes**

   ○ (2)No

*Appendix B: First Cover Letter*

Dear SSRC member,

You are invited to participate in a research study titled " The Perception of Adherence to Cystic Fibrosis Guidelines by Respiratory Therapists in Saudi Arabia." The research study will explore Respiratory Therapist perception of management of respiratory complications associate Cystic Fibrosis disease. The research is being conducted by Jameel Hakeem, a Master student at Georgia State University, under the direction of Dr. Doug Gardenhire, Chair of the Department of Respiratory Therapy. Your involvement in this research study is voluntary, and if you refuse to take the survey you can submit a blank survey by select the disagree option. All responses are confidential. No names or codes will be used to identify responses. All results will be deleted after they have been collected.

Findings will be published based on groups, not individuals. If you would like a summary of the work or if you have any questions about this research, please contact Jameel Hakeem at jhakeem1@student.gsu.edu or Dr. Doug Gardenhire at dgardenhire@gsu.edu. The department's contact information can be found at the bottom of this page.

Best regard,

**Jameel Hakeem**

Department of Respiratory Therapy

Georgia State University

P.O. Box 4019

Atlanta, GA 30302

(619) 430-7021

**Appendix C: Second Cover Letter**

Dear SSRC member,

      We understand you are very busy. So, we wanted to remind you that we still kindly need your assistance. Last week we sent you an online survey to complete. The purpose of the research study is to explore Respiratory Therapist perception of management of respiratory complications associate Cystic Fibrosis disease. If you have responded to the survey thank you so much for your time. If you have not, I am writing you again because I still need your help to successfully complete this research study. The survey should not take more than 10 minutes of your time. We would like to ask you please to complete the survey today by clicking on the link below: If you have any questions about this research, now or in the future, please contact Jameel Hakeem at jhakeem1@student.gsu.edu or Dr. Doug Gardenhire at dgardenhire@gsu.edu The department's contact information can be found at the bottom of this page.

Best Regards,

**Jameel Hakeem**

Department of Respiratory Therapy

Georgia State University

P.O. Box 4019

Atlanta, GA 30302

(619) 430-7021

**Appendix D: Final Follow-Up Letter**

Dear SSRC member,

   We understand you are very busy. So, we wanted to remind you that we still kindly need your assistance. About two weeks ago, we sent you an online survey to complete. The purpose of the research study is to explore Respiratory Therapist perception of management of respiratory complications associate Cystic Fibrosis disease. If you have responded to the survey thank you so much for your time. If you have not, I am writing you again because I still need your help to successfully complete this research study. The survey should not take more than 10 minutes of your time. We would like to ask you please to complete the survey today by clicking on the link below: If you have any questions about this research, now or in the future, please contact Jameel Hakeem jhakeem1@student.gsu.edu or Dr. Doug Gardenhire at dgardenhire@gsu.edu The department's contact information can be found at the bottom of this page.

Best Regards,

**Jameel Hakeem**

Department of Respiratory Therapy

Georgia State University

P.O. Box 4019

Atlanta, GA 30302

(619) 430-7021

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