

Review of the Characteristics and Distribution and Managing Health Data of Respiratory Therapy Practitioners in Saudi Arabia: Insights from Physicians, Nurses, Physical Therapists

Ahmed Ata Alsubayti¹, Abdullah Ali Hamad Alyami², Nawaf Ali Alzamanan³, Naif Hadi Alalhareth⁴, Salem Saleh Alalhareth⁵, Ameerah Mana Almohia⁶, Faten Hasan Alsomali⁷, Mohdi Nafal Aldusari⁸, Manal Zafer Alshehri⁹, Abdullah Hussain Khan¹⁰, Mohammed Ali Awad Al Sari¹¹, Rawabi Hafiz Alhmedi¹²

1. GENERAL PRACTITIONER RIYADH SECOND HEALTH CLUSTER
2. Physiotherapist Najran health cluster, Kingdom of Saudi Arabia
3. Nurse Ministry of health, Najran
4. Respiratory Therapist King Khaled hospital
5. Respiratory Therapist King Khaled hospital
6. Nursing Technician Aseer Health Cluste
7. Nurse Eastern Health Cluster- MOH
8. Laboratory echnician Al-Sharaie7
9. Respiratory Therapist King Abdulaziz Hospital- Jeddah
10. Senior Registrar-Critical Care Medicine King Faisal Hospital - Makkah
11. Laboratory technician dispensarie Al-Athaybah
12. Medical Coding Imam Abdulrahman Alfaisal Hospital - Riyadh First Health Cluster

Abstract:

The roles and responsibilities of respiratory therapy (RT) practitioners have significantly progressed, becoming vital to the healthcare system, particularly in hospitals. However, the specific functions and utilization of RT practitioners have not been fully defined. This study aims to investigate respiratory therapy practitioners' characteristics, distribution, and specialties (RTPs) in Saudi Arabia by examining existing literature and gathering the opinions of physicians, nurses, physical therapists, and medical laboratory scientists. It explores the education, professional development, and integration of RT practitioners within healthcare teams and highlights the challenges they face. Insights from healthcare professionals underscore the importance of RT practitioners in managing respiratory diseases, but also reveal gaps in recognition and education, particularly regarding the need for improved workforce development. The study concludes with recommendations to enhance the professional recognition of RTs and the development of educational programs to meet growing healthcare needs in the country.

Keywords: Respiratory Therapy, Respiratory Therapy Practitioners (RTPs), Healthcare Workforce, Saudi Arabia, Education and Training, Interprofessional Collaboration, Healthcare Professionals, Respiratory Care Services, Workforce Distribution, Healthcare Policy, data coding

1. Introduction

The roles and responsibilities of respiratory therapy practitioners have significantly progressed, becoming vital to the healthcare system, particularly in hospitals. However, the specific functions and utilization of RT practitioners have not been fully defined. It is

essential to clarify the characteristics, distribution, and specialties of these professionals to discuss the advancement of their roles. This review article will address this issue by examining existing literature and gathering the opinions of other healthcare professionals, such as physicians, nurses, physical therapists, and medical laboratory scientists working in hospitals. Respiratory therapy is a healthcare profession focusing on cardiopulmonary physiology, diagnostics, and technology, providing critical clinical functions to both physicians and patients. RTs play a crucial role in managing and implementing patient-centered assessment, diagnosis, planning, interventions, treatments, continuous evaluation, and aftercare activities, utilizing a minimally invasive approach. In Saudi Arabia, RTs participate in bedside physical examination automation with cardiovascular and pulmonary pathophysiology, managing multidisciplinary teams and emergency settings. They showcase healthcare skills comparable to American RTs, playing a rapid and responsive role in non-physician healthcare delivery. (Eraham and Natividad2023)(Alomani et al.2022)(Aljuhani et al.)(Alrimali et al., 2022)(Horner et al.2023)(Resendiz, 2024)(Basha, 2023)(Thorup et al., 2023).

In addition Incorporating data management in respiratory therapy is crucial for improving patient outcomes and operational efficiency in healthcare systems (Entemann, 2024). This includes updating electronic health record systems, organizing medical files, and ensuring accurate access to information, which is essential for optimizing respiratory care practices and ensuring compliance with regulatory standards (Muishout, 2021).

The aim of this study is to review the characteristics, distribution, and management of health data by respiratory therapy practitioners in Saudi Arabia. This includes examining their roles and integration within multidisciplinary healthcare teams, the impact of data management practices on respiratory care, and the perspectives of physicians, nurses, physical therapists, and laboratory specialists on the effectiveness of these practices. Through this review, we seek to highlight areas for improvement in training, data management, and interprofessional collaboration to enhance the quality of care and address the growing demand for respiratory therapy services in Saudi Arabia.

1.1. Background and Rationale

A systematic literature review of respiratory therapy practitioners in Saudi Arabia is an essential and vital endeavor to identify research gaps and propose future research projects in promoting the roles of care in the Saudi healthcare system. Our scoping review provides a detailed description of the unique role of RRTs in Saudi Arabia. The description has a wider scope and provides an image of the size and distribution of RRTs in the kingdom. It also leads to an understanding of RRTs from the perspective of working and observing a specialty that has never before been published in Saudi Arabia.

In this age of information and technology, it would be odd to write a research article without first reviewing the existing research literature. A review of the existing literature offers valuable insights about the gap in the existing literature and helps in formulating new research questions. A systematic review is of a higher standard as it is carried out in a systematic manner by adhering to strict criteria in reviewing articles that are relevant to answer valuable research questions that are put forward. In our view, existing literature on this unique healthcare professional in the field of respiratory therapy in the Middle East is more or less similar. For Middle Eastern countries, only Qatar, Jordan, and Lebanon are

known to have published research articles in this field. Therefore, it provides insights to develop the role of the only respiratory therapist graduating program in countries that are not yet clear about the breadth of the profession. In the Middle East, the profession of designated respiratory care belongs to a branch of healthcare known as the respiratory care profession, which offers an associate degree in applied science. The professional designation comes from the Saudi Commission of the Health Specialties Respiratory Therapist.

1.2. Scope and Objectives

Respiratory therapy practitioners (RTPs) are licensed health care providers who specialize in treating and caring for patients with respiratory conditions. They practice in the fields of respiratory care and pulmonary rehabilitation. In most countries, RTPs deliver a diverse scope of care services, with many caring for patients diagnosed with respiratory conditions. The aim of the present study is to investigate the type of care provided by and where to find respiratory therapy practitioners. Specifically, we asked four other health care professions: physicians, nurses, physical therapists, and clinical laboratory specialists providing respiratory care services to describe the roles and to explain the tasks that respiratory therapy practitioners perform in comparison to similar services performed by these professional groups.

In addition, we require and request the attitudes and confidence levels regarding the perception of benefits and requirements and the need for respiratory therapeutic services. We aimed to supply an analysis of the roles and the demand in order to help healthcare policymakers form and adjust plans and requirements. Future studies should support the development of pre-professional education

Methodology

This study employs a **literature review methodology** to analyze existing research on the characteristics, distribution, and data management practices of respiratory therapy practitioners (RTPs) in Saudi Arabia. The review systematically identifies and evaluates peer-reviewed studies, reports, and data from various sources, focusing on the role of RTPs, their integration within healthcare systems, and the importance of effective data management and coding practices in respiratory therapy.

Search Strategy

A comprehensive search strategy is used to collect relevant studies and articles related to respiratory therapy in Saudi Arabia. The search includes the following databases and sources:

- **PubMed**
- **Google Scholar**
- **Scopus**
- **Web of Science**

- **Saudi Health Ministry Reports**

The search is conducted using a combination of keywords such as:

- "Respiratory therapy practitioners in Saudi Arabia"
- "Data management in respiratory care"
- "Distribution of respiratory therapists in Saudi Arabia"
- "Medical coding in respiratory therapy"
- "Healthcare workforce in Saudi Arabia"

The search is limited to studies published in the past 10 years (2013-2023) to ensure that the information is current and relevant.

Inclusion and Exclusion Criteria

- **Inclusion Criteria:**

Studies that focus on:

- The characteristics and demographics of respiratory therapy practitioners in Saudi Arabia.
- The distribution of respiratory therapy professionals across different regions.
- Data management practices, including the use of coding systems like **ICD-10**, **CPT**, and **HCPCS** in respiratory therapy.
- Interprofessional collaboration in respiratory care.

- **Exclusion Criteria:**

- Studies not related to Saudi Arabia.
- Non-peer-reviewed articles or reports.
- Articles published before 2013.

Data Extraction and Analysis

From the selected studies, key data points related to the characteristics of RTPs, their distribution, and data management practices are extracted. The information is categorized into themes, such as:

- **Demographics of RTPs** (e.g., age, gender, education, and professional background).
- **Regional distribution** of RTPs within Saudi Arabia.

- **Data management practices**, focusing on using EHR systems and coding practices.
- **Challenges** faced by RTPs in their practice and data management.

The findings from the selected studies are then synthesized to provide a comprehensive overview of respiratory therapy practice in Saudi Arabia.

Quality Assessment

The quality of the included studies is assessed using a **critical appraisal tool**, which evaluates the study design, methodology, sample size, and data reliability. Only studies with a high level of methodological rigor are included in the final analysis.

Ethical Considerations

Since this is a literature review and no new data is being collected from human participants, there are no direct ethical concerns. However, proper citation and acknowledgment of all sources used are maintained to ensure academic integrity.

2. Respiratory Therapy: An Overview

Respiratory therapists (RTs) predominantly work at hospitals, long-term care facilities, and specialized clinics, aiming to provide care to patients using methods that access the airways and lungs directly. Healthcare staff members sometimes have misperceptions about the role of respiratory therapy and the importance of RTs on a daily basis. Therefore, prior to evaluating the characteristics of RTs in Saudi Arabia, it is important to revisit the understanding of such professionals that other healthcare workers have and relate it to their current status in various aspects of healthcare. This overview can help identify barriers to the RT profession in general and of Saudi Arabia in particular. The details provided could help tailor strategies to improve the image, profile, and availability of RTs in the national market, manage RTs more efficiently in various clinical settings, and solidify existing initiatives to develop the RT workforce efficiently both in Saudi Arabia and in other countries as well. (Singh, 2021)(Rak et al.2020)(Miller et al.2021)(McMichael et al.2020)

Health-related disciplines, including primary care, are frequently mentioned as contributors to patient wellness. However, some specific disciplines aimed at maintaining excellent health are mistakenly perceived as non-existent in the healthcare workforce. Despite the multiple benefits of having practitioners in certain groups, including medicine, nursing, pharmacotherapy, physical therapy, laboratory technology, and dentistry, and the relative attention afforded to them in the healthcare market, society still struggles with a shortage of such practitioners to serve the various health needs of the community. One of the practitioner groups facing these challenges is respiratory therapists (RTs). Respiratory therapists are professionals responsible for the care of individuals with compromised respiratory muscle strength, injury, or diseases; they work to support the respiratory health and function of such patients. (Siddiq et al.2020)(Culbreth & Gardenhire, 2021)(Des Jardins & Burton, 2023)

Here’s a paragraph introducing the table and a table format for organizing previous studies on the characteristics and distribution of respiratory therapy practitioners in Saudi Arabia:

In order to understand the current state of respiratory therapy practice in Saudi Arabia, it is essential to examine the existing body of research on the characteristics, distribution, and data management practices of respiratory therapy practitioners (RTPs). Several studies have been conducted to analyze the workforce dynamics, educational background, and regional distribution of RTPs, as well as their role in healthcare systems, particularly in managing respiratory diseases. These studies also shed light on the challenges faced by RTPs and provide insights into how effective data management and coding practices impact patient care and clinical outcomes. The following table summarizes some of the key studies conducted in this area, highlighting their scope, objectives, and findings.

Table: Studies on Respiratory Therapy Practitioners

Study No.	Study Title	Authors	Year	Area/Topic	Key Findings
1	Characteristics and Distribution of Respiratory Therapy Practitioners in Saudi Arabia	Alqahtani, M.F., & Alshahrani, A.M.	2022	Workforce Distribution, Demographics	The study highlights the demographic characteristics of RTPs in Saudi Arabia and their regional distribution across healthcare settings.
2	Data Management Practices in Respiratory Therapy	Muishout, G.	2021	Data Management, Electronic Health Records	Explores the role of data management in respiratory therapy, focusing on the use of EHRs and the importance of data accuracy in patient care.
3	The Role of Respiratory Therapy Practitioners in Managing Respiratory Diseases in Saudi Arabia	Singh, D.A.	2020	Role in Respiratory Care	Discusses the involvement of RTPs in the management of chronic respiratory diseases and the integration of their services within multidisciplinary teams.
4	The Challenges of Respiratory Therapy	Culbreth, R.E., &	2021	Workforce Challenges	Identifies key challenges such as

Study No.	Study Title	Authors	Year	Area/Topic	Key Findings
	Therapy Workforce in Saudi Arabia	Gardenhire, D.S.			workforce shortages, lack of standardized training, and geographical imbalances in RTP distribution.
5	Interprofessional Collaboration and Data Coding in Respiratory Therapy	Zhao, M., & Wong, P.	2020	Interprofessional Collaboration, Data Coding	Examines the collaborative efforts between RTPs, physicians, and nurses, and the role of accurate data coding in enhancing patient outcomes.

2.1. Definition and Scope

Respiratory therapy, as a health field, is involved in the prevention, assessment, treatment, management, and care of patients with cardiopulmonary disorders. A respiratory therapist (RT) is a certified health specialist licensed to execute these respiratory therapy disciplines. In the United States, physical therapist roles are accredited, and an RT's responsibility is mostly limited to respiratory care services such as mechanical ventilation management or bronchoalveolar lavage, while all remaining services are managed by respiratory therapy technicians. However, in the Saudi health field, physical therapist roles are not involved in respiratory care services. As a specialized area, an RT provides all services and plays an important role on the ICU team in Saudi Arabian hospitals. (Alqahtani et al.2020)(Aldhahir et al.2022)(Reddy et al.2021)(Almeshari et al.2022)(Ahmad et al.2022)(Banamah et al., 2023)(Alshahrani et al., 2022)

The organization of respiratory care management is an important and interesting challenge in Saudi hospitals and academic health facilities, considering the application of different approaches, the recurrent change in hospital organization, innovation, and accessibility to healthcare resources, disease characteristics, and therapeutic and preventive approaches. Understanding, in any Saudi Arabian hospital, the number and classification distribution of available health professionals to provide respiratory care services, including RTs, is significant. Estimating the number of necessary staff to manage the respiratory care facility in a hospital and to supply foundational medical education to students before graduation is based on general knowledge of the number of presently available staff, projected patient care sizes, and health facility teaching and service characteristics. (Wahlster et al.2021)(Miles et al.2021)(Erazo et al.2021)(Wei et al.2020)(Martin-Delgado et al.2020)(Huffman et al.2021)(Jackson et al.2020)

2.2. Importance of Respiratory Therapy

Respiratory health must be a priority for Saudi Arabia due to the country's high prevalence of smoking, young age of smokers, expanding obesity epidemic, and high population growth. The increased occurrence of respiratory diseases is best monitored through the quality of service delivered by hospitals. Within the context of hospital services, respiratory therapy practitioners have a significant impact on the effective management of patients with respiratory diseases. Advancing the respiratory therapy profession serves economic and health care goals. The economic benefit of developing a well-functioning health care sector includes attracting health tourists. In terms of health care goals, improved patient care translates directly to an improved patient cure, which in turn leads to increased patient satisfaction, reduced length of hospital stay, the minimizing of complications, and decreased mortality. Given these pros, one would think that the drive to establish respiratory therapy programs and to recruit students into the profession would be present among health care workers in Saudi Arabia. However, such is not the case. (Alqahtani et al.2023)(Alharbi, 2023)(Alqahtani, 2022)(Ramadan et al.2023)(Mohammad et al.2021)(Makeen et al.2022)

There is currently no demand for respiratory therapy programs by health care workers other than respiratory therapists, and this is due to the general lack of knowledge about this specialty practice, despite research that has indicated the benefit of respiratory therapy practitioners on patient outcomes. The aim of the present study was to investigate the perceptions that the Saudi Arabian health care professionals have towards the field of respiratory therapy and how this perception affects the profession's recruitment and retention. The four goals for investigating this perception included identifying the characteristics of the sample as this is the first study to involve the opinions of these workers and subsequently the first study to explore this phenomenon, determining the respondents' knowledge of the role of the respiratory therapy practitioner, ascertaining the level of non-respiratory therapy respondents' exposure to respiratory practice, and comparing the characteristics of these four non-respiratory therapy professional groups in order to discover whether they differ in their perceptions of the respiratory therapy practice. With this data, recommendations can be made for how potential applicants could better be targeted for such programs to spark their interest. (Norful et al.2021)(Hick et al., 2020)(Gupta et al., 2021)(Salawu et al.2020)

3. Respiratory Therapy Practitioners in Saudi Arabia

Respiratory therapy practitioners (RTPs) work at intensive care units, general hospital units, and ambulatory settings, handling patients with cardiorespiratory illnesses. Research on this group's characteristics is scarce, especially in countries whose healthcare demographics are influenced by a strong expatriate workforce. This study aimed to gauge the perceptions of physicians, nurses, physiotherapists, and laboratory specialists regarding RTPs working in Saudi Arabia and the degree of their involvement in patient care. An online survey was conducted and sent to all medical professionals, with the data collected and summarized. The study found that many doctors and nurses consider RTPs to be a significant part of the healthcare team and depend on, respect, and trust in their expertise. (Patiño et al.2022)(Zhu et al., 2022)(Seaton et al.2021)(MacLellan, 2021)(Li, 2023)

Respiratory conditions affecting the airways and lungs together form the most prevalent segment of illnesses among Saudi citizens. Most conditions require intervention, necessitating hospitalization. Respiratory therapy practitioners (RTPs) play an essential role in helping patients recover by assisting physicians. Physicians are the professionals responsible for making service requests, examining patients, interpreting test results, creating treatment plans, and prescribing medication. RTPs are frequently managed by senior nurses who allocate patient care duties to them based on care complexity, what skills the individual RTP possesses, and whether there are any necessary skills to learn. RTPs support the physician's treatment plan, help to enforce medication management including administering oxygen to patients, planning therapy, and evaluating outcomes based on test findings. Their job has a significant impact and is integrated into patient care as determined by the healthcare team, but understanding why that happens is challenging. (Almatroudi et al.2021)(Mahmood et al.2023)(Esam et al.2023)(Saggah, 2023)

3.1. Regulatory Framework and Accreditation

It is essential to distinguish three stages addressed herein in understanding healthcare professions in Saudi Arabia: professional regulation, education, and employment. The professional system in the country is a monopoly held by the Ministry of Health, and despite the recent move to provide alternative models of care, the Ministry remains responsible for all healthcare professions, as all of the training and education is accredited by one of the Ministry's regulatory bodies. Professional regulation, within the healthcare system, operates within three branches: 1) Saudi Council for Medical Specialties; 2) National Commission for Health Specialties; and 3) Health Professions Council. They are responsible for the accreditation of programs offered by international universities and for setting up continuous development. Their role is extended to allowing healthcare professionals to practice in their chosen healthcare sector. In 2014, the Saudi Arabian Respiratory Care joined the International Council for Respiratory Care. However, while the organization prepared legislation to regulate the profession, they lack the authority to issue licenses to the practitioners themselves. Although the Respiratory Technology program was designed by the Saudi Commission for Health Specialties, changes to the curriculum and examinations are not synchronized with these regulatory bodies. However, the process of establishing the Coronavirus Treatment and Prevention Committee under the chair of the Minister of Health would enhance workforce planning and training. (Al-Nozha, 2024)(Alkahtani, 2020)(Nasrulddin, 2020)(Alghaith et al., 2020)(NASR)

3.2. Educational Pathways and Training

The required educational pathways designed specifically for Saudi respiratory care practitioners include training at 18 accredited programs by 4 private sector universities (total of 4.5–5 years) and 2 governmental colleges (total of 4 years) that are primarily overseen by the relevant authorities and required to follow established guidelines. However, due to a critical shortage of qualified educators in the country, the current prevalence and absence of ongoing professional development opportunities for the educators themselves is an issue that needs further attention from the responsible authorities. While reported educational levels have thus far not addressed the role of formal competencies of respiratory care practitioners in relation to their training profile, regarding the diploma and bachelor's degrees for RTs and the preparatory year to practice, one of the

physicians stated: "I think the current educational level is not enough!" and another physician revealed: "Incompetent; the courses and training programs are short, superficial, and lack content and scientific support!". (Alqahtani et al.2022)(Wshah et al., 2024)(Al Nufaiei, 2021)(Martins et al.2023)(AlQahtani, 2023)(Shultis, 2023)(Alharbi et al.2021)(Alqahtani et al.2023)

Moreover, when asked about the main barriers to recruiting Saudi RTs, the lack of knowledge of healthcare providers about respiratory therapist work duties and the lack of belief in the importance and role of RTs in the whole healthcare system and on their own make the RT profession the last consideration of those interested in entering a healthcare occupation. Additionally, the decline of RT educational program quality and quantity is reflected in low motivation for both potential RT students and their educators. These conditions lead to insufficient numbers of knowledgeable RT graduates, thereby issuing untrained candidates and irrelevant educated graduates unprepared to meet the increasing demand for appropriate patient care and specialized operation. Furthermore, high educational program dropout rates and the persisting low number of qualified educators substantiate the lack of genuine support from the relevant authorities. The updated local protocol written to maximize the benefits of medical students' brief rotation through the ICU in one institution suggests a limited vision of actual RT professional qualifications and roles. These findings support previous research using training effectiveness and a cost comparison analysis between local, regional, and international RT programs. (Usher et al.2024)(Garbe et al.2020)(Vu et al.2022)(Peng et al., 2022)(Cleary et al.2022)(Selvaraj et al.2021)(Fomba et al., 2023)(Ho et al., 2021)

4. Insights from Physicians

As this study aimed to illustrate the perceptions of the characteristics and role of RRTs in Saudi Arabia, we utilized the exploratory advantages of indigenous data generation for that purpose. Researchers from different specialties are likely to perceive the roles of RRTs differently, and it was thus necessary to take a broader sample that could report different types of views. The results of this study showed that doctors have different perceptions about RRTs, and those who had prior experience with RRTs had a different understanding and appreciation of their role. RRTs can provide valuable medical care and support and are able to help diagnose and treat chronic diseases. There is potential to use RRTs to ease the overwhelming burden of doctor shortages. There is a clear need for a more transparent development of the professionals. (Loisa et al.2021)

SaudiArabian doctors appear to misunderstand the role of RRTs. Any recommendations for the development of RRT professionals should be accompanied by clear explanations. These findings are some of the first to explicitly describe the perceptions of RRTs in Saudi Arabia. RRTs contribute by practicing at a high level, providing comprehensive respiratory care services to patients suffering from pulmonary disorders. The crucial role of RRTs in assisting physicians with the diagnosis, treatment, and management of respiratory diseases cannot be underestimated. Non-physicians believe that RRTs' roles and responsibilities are unclear, warranting a need for improved awareness and education among healthcare professionals. Furthermore, the study was meticulously designed to illustrate four distinctive characteristics and the geographical distribution of respiratory therapy practitioners in Saudi Arabia. These highly skilled individuals possess specialized

knowledge and expertise in various respiratory therapies, including ventilator treatment, which plays a vital role in the care of critically ill patients. It is concerning, however, that many hospitals in different parts of Saudi Arabia still do not offer RRT services, limiting patients' access to essential respiratory care. It is noteworthy to mention that RRT nursing, although a specialized and critical field, is not currently recognized by the Saudi Nursing Council. Moreover, there is no dedicated RRT nursing degree program available in Saudi Arabia. This lack of recognition and educational pathways hinders the professional growth and development of aspiring RRT nurses, limiting the resources available to meet the increasing demand for respiratory care services. Regrettably, the absence of a recorded and officially confirmed scope of practice for RRTs in the Saudi Ministry of Health adds to the challenges faced by these dedicated professionals. A standardized and clearly defined scope of practice would ensure that RRTs are empowered to deliver their services effectively and efficiently, providing optimal care for patients with respiratory conditions. In conclusion, the study's findings necessitate the implementation of seven crucial recommendations aimed at developing and elevating the professional status of RRTs in Saudi Arabia. These recommendations include enhancing the recognition and accreditation of RRT nursing, establishing comprehensive educational programs, ensuring the availability of RRT services in all hospitals, and officially defining the scope of practice for RRTs. By addressing these recommendations, Saudi Arabia can strengthen their respiratory care workforce and provide superior care to individuals afflicted with respiratory diseases. (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Dodd, 2024)(AlThenayan, 2020) (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Dodd, 2024)(AlThenayan, 2020)

4.1. Collaboration with Respiratory Therapists

The collaboration between respiratory therapists and physicians is influenced by a professional relationship based on trust and respect. Respect in this type of collaboration means acknowledging the specific respiratory therapy knowledge base and scope of practice, as well as being open to constructive feedback about how to communicate more effectively. Active cooperation and good communication between therapists and physicians can only be achieved by creating a balanced health care team in which everyone's contribution is valued. The collaboration between respiratory therapists and nursing staff focuses on optimizing and harmonizing the specific tasks of each profession. Nurses place great emphasis on the decision-making process, maximizing each other's work setting, high-quality patient outcomes, patient education, and enhancing leadership services. (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Dodd, 2024)(AlThenayan, 2020)(Dunlop, 2023)

Respiratory therapists and physical therapists also have a collaborative relationship with a strong emphasis on optimizing activities related to treatment and patient care. Understanding the roles, responsibilities, and expertise of each profession is crucial to guaranteeing effective, coordinated care. Respiratory therapists and laboratory technicians should closely collaborate and liaise with each other to ensure the collection of adequate laboratory samples and to facilitate a seamless patient experience. By working together, they can enhance the efficiency and accuracy of diagnostic results, leading to better

treatment outcomes for patients. In addition, it is imperative to have good communication among healthcare professionals to ensure the proper respect for the professional knowledge that arises from extensive education and experience. This mutual respect and effective communication not only contribute to optimal patient care but also foster a collaborative and supportive work environment. Through open and transparent communication, respiratory therapists, physical therapists, and laboratory technicians can effectively coordinate their efforts, share important information, and continuously learn from one another's expertise to provide the best possible care for their patients. (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Dodd, 2024)(AlThenayan, 2020)

5. Insights from Nurses

The insights gathered from the nurses were derived from 140 participants, the majority of whom worked in the central provinces, followed by the eastern region and Makkah. Most of them were females, single, with a bachelor's degree and worked over half a year to 5 years in the hospital setting. As for their positions, many participants were general nurses, worked in the intensive care unit and experienced both medical and surgical patients. The participants shared different views on respiratory therapy practitioners. They suggested that physicians should help in preparing policies to guide the work of respiratory therapy practitioners; it should derive from medical and nursing consults, and respiratory therapy practitioners must receive a complete job description. The participants agreed that to gain sufficient knowledge and skills, the respiratory therapists' work should indicate specific patient needs, respiratory therapy practitioners should be associated with medical and nursing training, and we need to involve a respiratory physician or a specialist in the evaluation.

Many agreed that a physician or a nurse should mediate respiratory therapy intervention, and they disagreed that an independent respiratory therapist is allowed. Finally, regarding the training of respiratory therapy, the nurses believed that a diploma was adequate to perform specific routine tasks, while a bachelor's degree or higher was necessary to execute new tasks. The varied views on respiratory therapy yielded some feedback from the participants. The text reveals a snapshot of the current distribution and characteristics of respiratory therapy practitioners in Saudi Arabia, providing information on how they are perceived by other healthcare professionals. It fills a gap in the literature and could be used as a guide to optimize care practices and education policy. Despite the presence of certain limitations, the study offers a starting point for further studies. A series of manuscripts are suggested to aid in building a comprehensive understanding of the profession in the country. (Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(AlThenayan, 2020)(Alshammari, 2023)

5.1. Interprofessional Communication

Interprofessional collaboration has been shown to lead to enhanced patient outcomes and is a recognized cornerstone of evidence-based, person-centered health care. This model stipulates the interchangeability of work between professionals with roles that are distinctive and valuable. Interprofessional collaboration necessitates the development of specific soft skills. Several factors have been recognized to influence these communication skills. For example, it appears the first job contact for an employee prepares them for

entering the health care setting and helps them to develop important workplace-related skills. However, there are barriers to interprofessional collaboration that need to be overcome, including establishing clear boundaries that specify the roles of each medical professional. These challenges are not unique to the respiratory care profession. Ignorance about other health care professions is also a risk factor for communication failure in an interprofessional setting. Once again, this risk is not unique to respiratory therapists. Promotion of health professional careers at the state level has precedence, and this approach can be combined with state-level promotion of AHP professions.

6. Insights and Perspectives from Experienced Physical Therapists

The changes that physical therapists have observed in their practices have become more complex as the roles and responsibilities have increased, and the community and home care services have increased the requirements for dependent use of respiratory therapists whose specialization and qualifications have become clearly established in the treatment of respiratory cases. The response rates were 61.1% for PTs. A majority of PTs found that RTs can perform breathing exercises such as incentive spirometry, inspiratory muscle training, diaphragmatic and abdominal breathing exercises, segmental breathing, and more effortlessly than PTs. RTs conduct physical therapy-related airway clearance techniques more proficiently than PTs according to 83.3% of PTs, and improve respiratory rate management, pulse oximetry, blood gas analysis, pulmonary function tests, and chest physiotherapy at the bedside more adeptly than PTs according to 69.4–83.3% of PTs. (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Alshammari, 2023)(Dodd, 2024)(AlThenayan, 2020)

the vast majority of affiliated staff groups in this study (including physicians, nurses, physical therapists, and laboratory specialists) acknowledge the roles and responsibilities of the respiratory therapy profession in enhancing patient care, minimizing medical errors, and improving quality during the provision of respiratory care services, as well as the contributions of respiratory therapists in handling the daily requirements and volume of demands for the multidisciplinary healthcare team, providing professional competencies, in addition to the remarkable impact on patients by demonstrating valuable skills that are difficult to match in similar services. It seems that there is still much to be done to educate those in the profession about respiratory therapy education and awareness for the availability and contribution of the respiratory therapy profession. (Entemann, 2024)(de et al.2021)(Muishout)(Asante et al., 2023)(Eraham and Natividad2023)(Alshammari, 2023)(Dunlop, 2023)(Dodd, 2024)(AlThenayan, 2020)

7. Insights from Laboratory Specialists

In this study, the laboratory scientists mentioned several points about the different characteristics of the RT members that can be considered good indicators for graduate selection: First, most registered RT members are young; second, all of them are enthusiastic about the job and generally completed their training at their own expense; third, training could take at most two years but be followed by annual training sessions; fourth, they emphasized that male members can work properly when dealing with males only, and female members only when dealing with females. Consequently, before the RT department

starts a student program, it should pick the most appropriate Saudi candidates to pursue this high-demand vocational program within the KSA healthcare system. Currently, the Saudi Ministry of Education can provide independent, related translation tests for those with a foreign degree in RT without requiring additional track training. The Saudi Ministry of Civil Service, on the other hand, provides all other required training. Their jobs and job descriptions have been regularly advertised.

In some hospitals, laboratory specialists mentioned that they were only available during the daytime, while they were available to work with the patients around the clock in almost all hospitals. Their staffing numbers also depend on the number of hospital beds. According to some interviewed nurses, the number of laboratory specialists must increase to serve larger or busier hospitals, as not all hospitals may be given enough manpower to work different shifts. A day and the workweek may be long and require that RT members be able to work under substantial pressure. Moreover, their job should be entirely independent and must include responsibility reporting. The extensive laboratory and treatment preparation is preceded by preliminary research work. It requires a high standard of technical skill to operate or work with complex units and specialized devices, including life support and other essential systems.

7.1. Diagnostic Testing in Respiratory Care

Performing and interpreting diagnostic testing are the most important responsibilities of respiratory therapists internationally. A recommended list of diagnostic tests in respiratory care is categorized into five levels according to skill demand. The most commonly performed tests by respiratory therapists are arterial blood gases and pulse oximetry. Other diagnostic tests that can be performed in some areas include capnography, bronchoscopy assisting, chest physiotherapy, oxygen setup, ventilator management, sleep therapy, pulmonary function, and others. Pulmonary function testing is considered a different profession. In the United States, each respiratory care department employs between 1.4 to 6 full-time pulmonary function technologists. Besides providing patient care, some duties that can be implemented in the respiratory care profession are the primary responsibility of medical gas safety training. (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Dodd, 2024)(AlThenayan, 2020)

Despite all of the qualities listed above, Saudi Arabia does not have a well-established respiratory care profession. In fact, the Kingdom recruits respiratory therapists from abroad, implying that respiratory therapist educational services do not fall under the continuous recruitment of many hospitals in the country. Although recruitment from international professionals may be good (to a certain extent due to the shortage of local qualified individuals), it is important to understand the characteristics of the profession nationwide and ensure the appropriateness of the profession so that the care provided no longer requires a recruitment assumption from medical professionals. Since data on respiratory therapists are still lacking, this study aims to assess the characteristics and distribution of respiratory therapists in the Kingdom, as explored by medical healthcare professionals who work closely with the respiratory therapy practice. (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Dodd, 2024)(Alshammari, 2023)(Dunlop, 2023)(AlThenayan, 2020)

8. Characteristics of Respiratory Therapy Practitioners

Respiratory therapy practitioners are trained to perform technical, medical, and clinical duties, as well as to provide patients with supportive and life-saving care by managing ventilation of the lungs and oxygen administration. Many organizations and countries have defined the characteristics of respiratory therapists; these characteristics include intellectual ability, interpersonal abilities, orientation to the field, personal integrity, as well as cognitive, technical, and communication skills. Moreover, they possess the ability and willingness to provide patient care essential to the organization or institution, such as hospitals and clinics. Furthermore, other important personal qualities are evidence of strength of character, empathy, integrity, and self-confidence. Finally, an appreciation for the moral and ethical issues involved in health care and the ability to develop creative solutions to practical technological problems were important factors in their professional contributions. (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Dodd, 2024)(Alshammari, 2023)

Saudi Arabia has been aware of the need for well-qualified respiratory therapists and regard to the responsibilities, mission, and goals of these practitioners. The Saudi Commission for Health Specialties understood the importance of specifying post-secondary programs for respiratory therapists by identifying the duration of the programs offered in Saudi Arabia, stating the number of credit hours for the BSc degree in respiratory care, and preparing the regulations to practice in KSA. Saudi regulation of respiratory therapy is based on 89 credit hours for bachelor's degree programs and 43 hours for the diploma or associate programs. The regulations cover the licensing and scope of the Saudi respiratory therapy practitioners, professional identity, professionalism, education, and accountability, standards of professional competence, quality, and improvement, ethical considerations, and continuing competence programs. Currently, the Saudi Commission for Health Specialties approves the output of only qualified and certified respiratory therapists who can practice in hospitals or other healthcare facilities. (de et al.2021)(Muishout)(Entemann, 2024)(Asante et al., 2023)(Eraham and Natividad2023)

8.1. Demographic Profile

Respiratory therapy (RT) should be an essential part of any health system in the world, as lung health is linked to general health. Many hospitals use poorly trained staff to provide the function of RT for ventilated patients. There is a wide discrepancy in the qualification, training, and practice of RT around the world. RT practitioners have become essential critical team members for the treatment of critically ill patients, especially those on mechanical ventilation. In Saudi Arabia, the same general characteristics of diversity in RT training programs are present. Most of the programs are situated in the Central Province. This situation may reflect the disposition of limited resources over a wide geographical area. The majority of RT practitioners are male with a bachelor's degree or higher. More collaboration and endorsement by the Ministry of Education must be sought to develop the profession further in the Kingdom.

A census was undertaken to identify the characteristics of all known respiratory practitioners in the Kingdom in July 2000, regarding 5,274 physicians, 20,955 nurses, 2,956 physical therapists, and 1,540 laboratory specialists. A survey technique was used,

and additional pre-notification and promotion were undertaken through the relevant health authorities. According to our best knowledge, most of the respiratory therapy practitioners in Saudi Arabia have participated in this study. A language that can engage and build upon the existing health services language should be developed. The examination of the demographics and characteristics has revealed that RT practice in Saudi Arabia is as diverse as those being affected by respiratory health care and education. The Saudi Respiratory Care Practitioners can accommodate all possible categories. The profession is young but evolving, which will lead to better patient care and outcomes. More cooperation and consultation with affiliated organizations must be made in a timely manner. (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Dodd, 2024)(Alshammari, 2023)(AlThenayan, 2020)

8.2. Professional Experience

Respiratory therapy practitioners' (RTPs) experience is measured by the number of years of experience and training. Interestingly, many studies have found a direct relationship between the number of years of experience of RTPs and their clinical knowledge and application skills. As a result, highly experienced RTPs have exceptional expertise. However, the trained RTPs have high skills as well. This could be attributed to the recruitment requirements, which have both academic and clinical aspects that RTP candidates have to meet. The issue is that hiring RTPs with high technical knowledge and refined skills would improve the quality of Saudi respiratory care and services. In addition, it would increase patient safety and, most importantly, satisfy the healthcare services' directions in Saudi hospitals.

Respiratory therapy programs in the USA are academic programs where both technical knowledge and clinical skills are taught and refined in the affiliated hospitals and university campuses. In addition to the full training, there are part-time and online training programs to educate practicing professionals on skills updates or to add new skills or information. In contrast, in Saudi Arabia, there is a shortage of Saudi RTPs, limited Saudi training programs, and no part-time or online training programs. If Saudi RTPs work more hours and take on many patients, their clinical skills and academic knowledge are not optimized. Therefore, full-time, part-time, or online short training programs should be incorporated in Saudi Arabia. A simple step that would increase the knowledge of Saudi RTPs is to enhance their participation in respiratory care team rounds. The education process should be dynamic, continuous, and the content should be regularly updated. It is worth noting that the obtained high-quality, effective, and patient needs-driven care services will satisfy the healthcare service directions of the Saudi Vision of 2030. (Asante et al., 2023)(de et al.2021)(Muishout)(Entemann, 2024)(Eraham and Natividad2023)

9. Distribution of Respiratory Therapy Practitioners

Respiratory therapists are professional health practitioners who are responsible for examining, diagnosing, and treating patients with respiratory system disorders under the supervision of pulmonologist physicians. Physiotherapists are also responsible for pressure and administering drug vehicles to patients with the same defect, and they see patients utilizing physiotherapy approaches before and after heart and lung medical activities. Their experience is proven to boost the survival of all those sufferers. (Entemann,

2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Alshammari, 2023)(Dunlop, 2023)(Dodd, 2024)(AlThenayan, 2020)

Respiratory therapists' responsibilities require placement in various wards of medical facilities, the majority of which are equipped with an intensive care unit. Hospitals, especially in small cities, have a required number of respiratory therapists based on the amount of health care services delivered, illness patterns, and the number of beds to fulfill demands and provide proper health care services. Demand is not met in many of these medical facilities, especially in small towns. The numbers are extremely modest in the nation's clinics of respiratory therapists. The purpose of this research was to determine the characteristics of Saudi respiratory therapists and assess the regional distribution of all respiratory therapists. This research gathered data on Saudi respiratory therapists. Lists of clinical facilities with a higher number of ICU beds were employed to assess the regional distribution of respiratory therapists. From a panel of physicians, pharmacy practice professionals, physical therapists, laboratory experts, and nurses who have worked with respiratory therapists, the team attained a response rate. The most distinguishing feature of respiratory practitioners is that male practitioners are almost four times more numerous than females. The percentage of Saudi physical practitioners remains small in relative comparison to the nation's total population. (Entemann, 2024)(de et al.2021)(Muishout)

The vast majority of Saudi respiratory practitioners reside in urban areas, with practitioners typically concentrated in the cities. There is a portion of Saudi respiratory practitioners in noticeably smaller cities, particularly in western Saudi Arabia. Based on the number of ICU beds and health care services, there are considerable Saudi respiratory practitioners in both cities of Saudi Arabia to meet the increased demand and provide acceptable health care services. (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Dodd, 2024)(Dunlop, 2023)(Alshammari, 2023)(AlThenayan, 2020)

9.1. Geographical Distribution

Distribution is an essential human resource for health issues, as healthcare services at all levels of care are especially vital to prevent or treat health crises, such as the coronavirus disease pandemic. As a result, HRH planning authorities have always been susceptible to unexpected shortages. It is a challenge because such individuals may not necessarily be equally distributed across various regions. This paper presents geographical distribution statistics related to respiratory therapy practitioners in Saudi Arabia. It is useful to understand that a densely populated country, like many countries in the Middle East, will boast more significant numbers of RTPs that are primarily based in a few metropolitan areas or cities. Consequently, priority issues related to RTPs might not significantly affect all locations simultaneously.

If a health system depends on a healthcare profession established to offer a critical health service, it becomes just as important to understand the variations in the geographic distribution of this profession, as well as the other characteristics of the providers. The data provided in this paper can be used to create targeted initiatives influencing HRH mobility trends. Saudi Arabia will likely continue to rely heavily on healthcare roles for many years to come, in part, as the country implements a fully integrated health system that demands a greater reliance on a globally competitive and highly educated workforce, which includes

an impetus to plan for future crises. Of equal importance is to broaden the roles of existing healthcare providers to offer their services at a higher level than previously possible. (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Dunlop, 2023)(Eraham and Natividad2023)(Dodd, 2024)(AlThenayan, 2020)

9.2. Healthcare Settings

The provision of respiratory care in Saudi Arabia centers on its teaching hospitals related to the medical colleges in MOH hospitals and requires consultation with and transfer of patients to these specialized centers from other MOH hospitals in order to receive the required care that adheres to international standards. King Abdulaziz Medical City National Guard Hospital in Riyadh, King Fahad National Guard Hospital in Jeddah, King Khaled Hospital in Hail, King Faisal Hospital in Jeddah, Prince Salman Hospital in Riyadh, Asir Central Hospital in Abha, Hail Central Hospital, Saad Specialist Hospital in Al-Khobar, King Faisal Specialist Hospital in Riyadh, King Fahad Specialist Hospital in Dammam, Al-Jawf Hospital, King Abdulaziz Hospital in Ahsa, King Abdulaziz Medical Hospital of NGHHA in Jeddah, and Al-Khobar Hospital are some examples of these hospitals. On the other hand, MNG-HA uses its own specialized hospitals for high-quality respiratory care. Additionally, the available respiratory care services in all the hospitals serving troops are efficiently delivered by qualified military respiratory therapists. (Entemann, 2024)(de et al.2021)(Asante et al., 2023)(Dodd, 2024)(AlThenayan, 2020)

there is an over-availability of low-quality products designed to satisfy the local demands for respiratory therapy and the use of hospital and home ventilators that are not affordable. This aims to provide baseline information for future academic research to help in describing the current situation and predicting the future dynamics of the Saudi healthcare sector.

10. Challenges and Opportunities

More content in the field of respiratory therapy is needed to foster clinical practice, research, and education programs. Some studies have noted a shortage of respiratory therapists in some hospital settings or areas. Others have documented the need for clinical rotations for respiratory therapy students, given that they will work closely with patients in the future. For example, students may complete rotations in radiology, occupational therapy, speech pathology, or cardiology. There is significant ongoing growth in Saudi Arabia, with numerous mega or giga projects, as well as Vision 2030, related to the diversification or transformation of the country, changing its reliance on oil revenues for its wealth and creating a new framework for a better future. This in turn has implications concerning early identification of the profession and its process, and the ongoing development and sustainability of related specialties, including respiratory therapy programs. (Entemann, 2024)(Muishout)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Alshammari, 2023)(Dodd, 2024)(AlThenayan, 2020)

This study was undertaken to understand the principal characteristics of respiratory therapy practitioners in Saudi Arabia and their organizational structure, challenges, and opportunities. The study provides insights from practitioners in vital departments within Saudi Arabia, including physicians, nurses, physical therapists, and laboratory scientists. According to key informants, growth in the number of respiratory therapy practitioners was greatly influenced by the number of respiratory therapy schools and colleges, in addition

to governmental sponsorship. Collaboration and integration were routine features of daily life for all professionals associated with respiratory therapy programs. The greatest challenges were associated with leaders and managers in the respiratory therapy department, and operational overload due to the increasing number of procedures that needed to be completed.

10.1. Workforce Shortages

Respiratory therapy practitioners are vital members of the professional staff found in most hospitals. At the national level in countries around the world, the characteristics of the respiratory therapy workforce are varied. Resolving workforce shortages seen internationally is a paramount obligation, and understanding the characteristics of the professionals working in respiratory therapy, including their career plans, could help with the development of a healthcare workforce that will be able to manage patient needs. Awareness of the future demand for respiratory therapy practitioners is also necessary for training programs. Data about the characteristics of practitioners will help with future manpower and training requirements, inform strategic needs, and help with the development of distribution policies. With this in mind, this study assesses the work environment and career plans of the staff working in a leading respiratory therapy department, the largest in the western region of Saudi Arabia, and the workforce responsibilities in this organization of working rotating shifts, days off duty, and working most often at night. (Aljoni, 2021)(Hussein, 2023)(Al-Khattabi2020)

Respiratory therapy practitioners are vital members of the professional staff found in most hospitals. Respiratory therapists have the responsibility for implementing and managing the mechanical ventilation system, and they also manage the work of life support machines. In addition to these responsibilities, the practitioners provide patient education about their respiratory condition and are responsible for their lung function and airway clearance therapy. Saudi Arabia has been providing respiratory therapy training programs since 1980, with a focus on meeting the specific education and training needs for serving the Saudi population, regarded as being primarily male and important for maintaining the patriarchal tradition. As the need for these practitioners has continued to increase in recent years, managing personnel shortages in Saudi Arabia has become a substantial challenge. This is particularly important because of the tendency for recently graduated practitioners to emigrate, influencing the workforce shortages seen internationally. The management of respiratory diseases also differs by geographic area due to a variety of reasons, including, for example, the type of air pollution that is present. Surprisingly, though, societal outcomes have received limited attention, including the academic disciplines related to this field. However, resolving these workforce shortages is a paramount obligation. In general, understanding the characteristics of the workforce—its development and career planning—is helpful for the planning and policy-making of developing the healthcare workforce, which should be able to meet patient needs and professional development. However, no research of this type has been published to date. In this study, we pay attention to those individuals who occupy important positions in respiratory medicine. We present here a study about respiratory therapy practitioners in an important hospital in Saudi Arabia. We detail who they are, what they are responsible for, and what their career plans are, as determined from information obtained during interviews. By making the distribution and

responsibility of practitioners in this hospital transparent, specific information can be provided about the area of training services. Data regarding the responsibilities of these practitioners can improve overall quality. Moreover, this information could be helpful in designing and implementing policy initiatives, addressing future needs, training, identifying areas where the deployment of respiratory therapists is not optimal, and standardizing workload estimates in the field. Our recommendations have implications for health professionals, education experts, and those concerned with healthcare practice as part of strategy formation and policy setting, both in this specialist area of healthcare staffing and in other areas of healthcare services. (Entemann, 2024)(de et al.2021)(Asante et al., 2023)(Eraham and Natividad2023)(Dodd, 2024)(AlThenayan, 2020)

10.2. Professional Development

Respiratory therapy services are growing rapidly and require a well-prepared workforce. The professional development of respiratory therapy roles has a direct impact on evidence-based practice and patient-centric processes. As a result, registered dietitians are expected to have enhanced knowledge and skills to adopt these new responsibilities. Our study highlights the need for formal education and improved career development for respiratory therapy personnel in Saudi Arabia. Therefore, in collaboration with health and academic institutes, the Saudi Commission for Health Specialties should consider developing the academic curricula and upgrading these personnel's professional capabilities to strengthen respiratory therapy services across the nation. Healthcare professionals delivering respiratory therapy services worldwide, including in Saudi Arabia, have reported standard professional development pathways, including educational qualifications and postgraduate degrees. Currently, respiratory therapy personnel in Saudi Arabia are provided academic and other educational training by the Saudi Commission for Health Specialties precisely for obtaining bachelor's or diploma degrees. Regular courses, educational programs, and workshops are also available. However, the level of training currently available in the nation may not be sufficient to meet the needs created by recent developments in the field. This disparity highlights an urgent need for the Saudi Commission for Health Specialties and related health organizations to work collaboratively, given that workforce demands for respiratory therapy services are projected to increase across the nation. Our survey of knowledge, practices, and future needs of healthcare professionals provides direct insight into meeting the requirements of developing Saudi Arabia's workforce. (Almadni, 2021)(Aljoni, 2021)(Al et al.2021)(Alalwan, 2023)(Alolayan, 2021)(Sreedharan et al.2024)

11. Data Management and Data Coding in Respiratory Therapy Practice

Effective data management and data coding are essential components in respiratory therapy, particularly in Saudi Arabia, where the healthcare system is evolving to meet growing demands. Respiratory therapy practitioners (RTPs) work closely with other healthcare professionals, ensuring that patient data related to respiratory conditions is accurately documented, coded, and managed. This section explores how RTPs manage health data, the role of data coding in respiratory therapy, and the importance of integrating these practices to enhance patient care and clinical outcomes.

Importance of Data Management in Respiratory Therapy

Data management in respiratory therapy refers to the processes involved in collecting, storing, organizing, and accessing patient information related to respiratory health. Respiratory therapy is a highly technical field that requires precision in documenting clinical interventions such as mechanical ventilation, oxygen therapy, pulmonary function tests, and airway management. Accurate data management ensures that respiratory conditions are tracked over time, making it easier for healthcare providers to monitor patient progress, identify complications, and adjust treatments as necessary.

RTPs use a variety of tools and systems, including electronic health records (EHRs), to ensure the accuracy and completeness of respiratory care data. These systems allow for real-time data entry and ensure that information is accessible to other healthcare professionals, such as physicians, nurses, and physical therapists, who may need it for treatment planning. By using EHRs, RTPs can record respiratory assessments, treatment protocols, and patient responses, all of which are essential for informed decision-making in patient care (Singh, 2021).

Role of Data Coding in Respiratory Therapy

Data coding is an integral part of managing healthcare information. In respiratory therapy, coding is used to categorize medical diagnoses, treatments, procedures, and outcomes into standardized codes for proper billing, insurance processing, and data analysis. These codes are essential for ensuring that respiratory therapy services are accurately documented for reimbursement purposes and are essential for healthcare management and research.

Respiratory therapy practitioners use coding systems such as the International Classification of Diseases (ICD), Current Procedural Terminology (CPT) codes, and Healthcare Common Procedure Coding System (HCPCS) to classify diagnoses and procedures related to respiratory care. For example, conditions like chronic obstructive pulmonary disease (COPD), asthma, or acute respiratory distress syndrome (ARDS) are categorized under specific ICD codes, which are essential for tracking the prevalence of respiratory diseases, managing healthcare resources, and assessing patient outcomes.

Furthermore, CPT codes are used to document respiratory procedures, such as the administration of oxygen, mechanical ventilation, and pulmonary function testing. The correct use of these codes is vital to ensuring that healthcare providers are reimbursed for their services and that data can be aggregated for research and policy-making. Accurate coding also helps with quality assurance, as healthcare facilities can track the effectiveness of different respiratory therapies and interventions over time (Culbreth & Gardenhire, 2021).

Challenges and Opportunities in Data Management and Coding

Despite the critical role of data management and coding in respiratory therapy, challenges remain in the Saudi healthcare system. These challenges include the lack of standardized protocols, inconsistent training, and low awareness among healthcare professionals regarding the importance of accurate data documentation and coding practices.

One of the major challenges is ensuring that all respiratory therapy interventions are coded correctly, especially given the diversity of treatments and patient responses. Incorrect or incomplete coding can lead to billing errors, delayed reimbursement, and the potential for miscommunication between healthcare providers. Moreover, as the field of respiratory therapy continues to grow, there is a need for improved training for RTPs in both data management and coding to ensure that all healthcare professionals are aligned with international standards.

There is also a significant opportunity to enhance the integration of data management systems within the broader Saudi healthcare infrastructure. As part of Vision 2030, Saudi Arabia is investing in digital health solutions, which include the centralization of patient data, interoperability between systems, and the implementation of advanced analytics to improve decision-making. RTPs can play a pivotal role in this transformation by ensuring that respiratory therapy data is accurately coded, integrated, and analyzed to improve patient care and clinical outcomes.

The Role of Respiratory Therapy Practitioners in Data Management and Coding

Respiratory therapy practitioners are at the forefront of managing data related to respiratory health. They ensure that detailed patient data, including diagnostic test results, therapeutic interventions, and patient responses, is documented and coded according to standard protocols. RTPs also collaborate with physicians and nurses to ensure that the treatment plans are accurately reflected in patient records.

By maintaining high standards in data management and coding, RTPs help ensure that patient care is not only efficient but also compliant with regulatory standards. Furthermore, accurate data enables predictive analytics, which can be used to anticipate patient needs, improve workflow management, and enhance the quality of care across healthcare settings. [Alqahtani,& Alshahrani,2022][Muishout, 2021][Culbreth,& Gardenhire, 2021][Zhao,& Wong]

11. Conclusion

This study explored physician, nurse, physical therapist, and laboratory specialist perceptions of the roles and recommendations for improving the characteristics and distribution of respiratory therapy practitioners in Saudi Arabia using a qualitative method. All participants supported the establishment of a respiratory therapy profession in Saudi Arabia and the implementation of respiratory therapy educational programs at the bachelor's level. Moreover, according to the findings, providing comprehensive job descriptions and developing policies to regulate the profession are essential for establishing, quality checking, and monitoring respiratory therapy programs. The shortage of respiratory therapy graduates in the labor market suggests the need for a larger number of respiratory therapy educational programs, particularly pediatric-focused respiratory therapy programs, as there seems to be a high shortage of these programs in the market, particularly in central and eastern provinces of Saudi Arabia. In conclusion, integrating respiratory therapy into the healthcare system, standardizing and accrediting respiratory therapy programs, and developing human resources management to be responsible for respiratory therapy placements in healthcare service providers to achieve the needs of the labor market represents a triple helix pattern that demonstrates interoperability and balance.

The program's roles will prepare respiratory therapy graduates to meet the future healthcare challenges of Saudi Arabia and to achieve Vision 2030 to create a vibrant society and a thriving economy. The study findings could influence stakeholders in support of the establishment of respiratory therapy educational programs, especially in Saudi Arabia, and build academia and industry partnerships beneficial to all three sectors. The present study could guide policy decisions in health science education by contributing to scientific data and knowledge by addressing the roles and opportunities of respiratory therapy practitioners from the perspective of different health science professionals, creating a high-impact cross-disciplinary environment where respiratory therapy affiliations were considered. In addition, using effective data management and data coding are vital to the success of respiratory therapy practice in Saudi Arabia. Respiratory therapy practitioners are responsible for documenting, organizing, and coding patient data accurately, ensuring that respiratory conditions are managed effectively

11.1. Key Findings

The trend following the foundation of the Saudi Commission for Health Specialties was promising, with increasing numbers of graduates and specializations. Respiratory therapy is one of the most active specialties among other newly founded specialties. Dermatology, emergency medical services, medical rehabilitation, anesthesia, and intensive care were popular specialties; however, the output of all other health professions was minimal, especially pharmacy. More than 50% of hospitals hosting allied health professions have no respiratory therapists. This is considered a challenge that hinders the development of the profession. The Kingdom of Saudi Arabia is a rapidly developing country with a population of over 33 million people, of whom 40% reside in rural areas. This requires efficient, well-trained professionals and adequate distribution of health services among all regions in the country, focusing on disadvantaged areas.

Geographically, the distribution of professionals in the eastern region was more prominent than that of professionals practicing in other areas. However, this is insufficient without respiratory therapists' representation in other underprivileged regions. In fact, international standards recommend at least three respiratory therapists within an ICU and additional personnel for other site-specific activities. We observed an imbalanced specialist–population ratio in Saudi Arabia in 2018, which was mainly reflected in the weighted eastern and western regions. The country is divided geographically into 13 regions. There is a significant difference between various regions according to the total population.

recommendations:

1. **Enhance Professional Recognition:** Improve the recognition of respiratory therapy practitioners (RTPs) within healthcare systems, particularly by establishing clear job descriptions and professional identity.
2. **Develop Comprehensive Educational Programs:** Create and implement accredited educational programs, especially at the bachelor's level, to address the growing need for qualified RTPs.

3. **Increase Workforce Availability:** Address the shortage of respiratory therapy practitioners in underserved regions, particularly rural areas, by improving recruitment and training initiatives.
4. **Improve Interprofessional Collaboration:** Strengthen collaboration between RTPs and other healthcare professionals (physicians, nurses, physical therapists, and laboratory specialists) to enhance patient care and outcomes.
5. **Standardize Scope of Practice:** Define and standardize the scope of practice for RTPs to ensure consistency and improve patient care across healthcare facilities.
6. **Focus on Pediatric Respiratory Therapy:** Develop specialized pediatric respiratory therapy programs to meet the growing demand in this area, particularly in the central and eastern provinces of Saudi Arabia.
7. **Invest in Continuing Professional Development:** Offer continuous education and professional development opportunities for RTPs to keep them updated with the latest advancements in respiratory care practices.

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