



Thoracic surgery in United Arab Emirates

Redha Mohammed Souilamas, Mateen Haider Uzbek, Yusuf Bayrak, Nacira Guenif, Fadi Hamed, Irfan Shafiq, Vivek Kakar, Mahmoud Elkaissi, Hicham Abada, Fadi Younes, Ashraf Alzaabi, Zaid Zoumot, Ali Wahla

Heart, Vascular & Thoracic Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates

Contributions: (I) Conception and design: RM Souilamas; (II) Administrative support: Z Zoumot, A Alzaabi, H Abada, N Guenif; (III) Provision of study materials or patients: I Shafiq, MH Uzbek, A Wahla, RM Souilamas, F Younes; (IV) Collection and assembly of data: Y Bayrak, RM Souilamas; (V) Data analysis and interpretation: MH Uzbek, RM Souilamas, F Hamed, M Elkaissi, Z Zoumot; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Redha Mohammed Souilamas, MD, PhD. Heart, Vascular & Thoracic Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates. Email: SouilaR@clevelandclinicabudhabi.ae; souilamas.redha@gmail.com.

Abstract: The United Arab Emirates (UAE) has undergone a significant change in its population and economy in the last decades and in parallel its healthcare system has evolved rapidly to provide advanced, innovative and world-leading care. At the forefront of this revolution in healthcare is the development of a multidisciplinary multimodality thoracic service provision, offered at quaternary referral hospitals amalgamating academics, training, research and innovation. Previously, thoracic service care was limited to single providers at various public and private hospitals, usually performing lower complexity cases. Most complex thoracic cases were repatriated outside the UAE. This practice was replaced with the opening of Cleveland Clinic Abu Dhabi (CCAD), in 2015, which created a multidisciplinary thoracic program. This included the start of a mini-invasive surgical and lung transplantation program. Since that time other public and private hospitals have emerged providing care in a similar model. The impact of these programs has been a decreased transfer of patients abroad for treatment. Under the umbrella of the Emirates Thoracic Society (ETS) a platform for greater collaboration aimed at improving patient care, potential research and physician education has been created. Direct links have been established with world-leading Thoracic surgery and Respiratory Medicine Centers facilitating this development and offering support and guidance. This article charts these changes in thoracic care in the recent past, present, and delineates plans for the future in the UAE.

Keywords: Thoracic surgery; United Arab Emirates (UAE); hybrid

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Introduction

The United Arab Emirates (UAE) is an Arabian Gulf Country located at the southeast end of the Arabian Peninsula consisting of seven emirates with a population of 9.7 million people.

In this article, we do not intend to discuss thoracic surgical techniques or go into the complexities of “How to do it?”, for example Open versus Minimally invasive surgery, Video Assisted Thoracic surgery (VATS) versus

Robot Assisted Thoracic Surgery (RATS), and so on as there are already multiple scientific manuscripts comparing these techniques published over the last decade (1,2).

This article is a review of the state of thoracic surgery and its evolution in the UAE. In order to offer the full picture of its rapidly evolving healthcare system and of the thoracic surgery innovations inception in the UAE, this article weaves in an anthropological perspective that sheds light on the recent history of this federation of emirates. It helps understand how this young nation has equipped itself

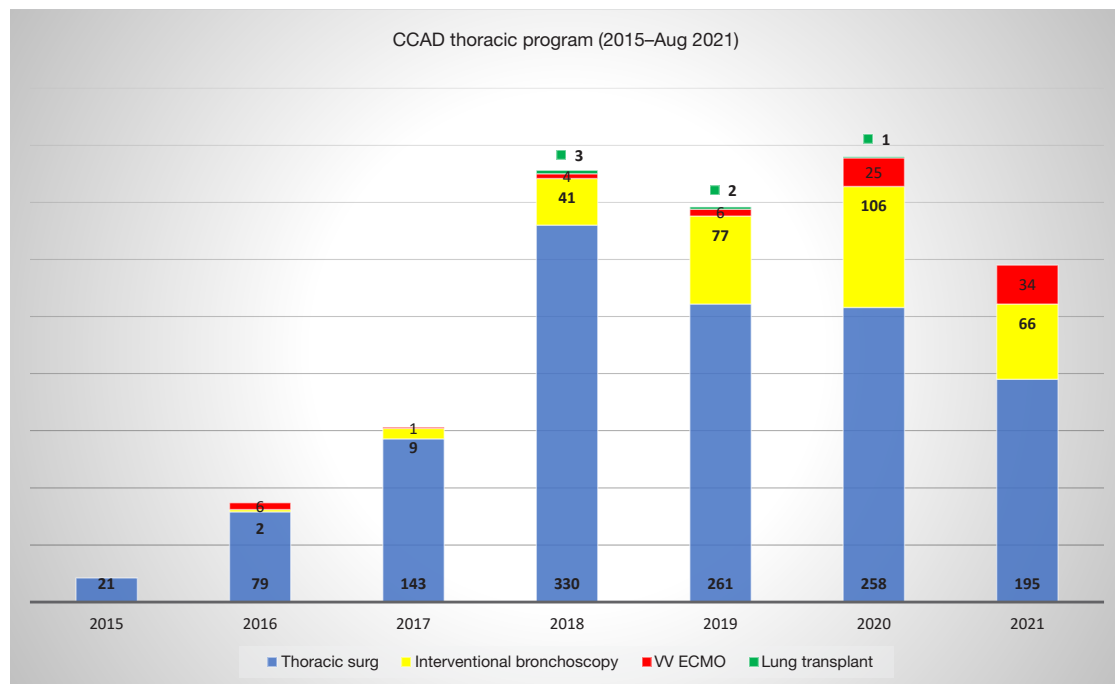


Figure 1 Cleveland Clinic Abu Dhabi (CCAD) Thoracic Program volume per year.

with such a highly effective healthcare system in less than half a century, to address the challenge of providing high quality healthcare locally for every patient (3).

The healthcare System and the current state of Thoracic Surgery in United Arab Emirates

The UAE healthcare system consists of both public and private healthcare providers and is regulated at both federal and emirate level. The public healthcare system currently consists of 17 public hospitals and 86 primary healthcare centers across the country and provides free healthcare for all UAE citizens through a universal healthcare insurance system (4).

UAE has made great strides in health care over the past several years and has among the highest life expectancy in the region (5).

Currently, there are 12 board certified General Thoracic surgeons practicing in the UAE and providing a variety of thoracic surgical services across the country. In addition, there are general surgeons and cardiothoracic surgeons who perform non-complex thoracic procedures in both public and private entities.

Until 2015, thoracic surgery care was available in the UAE but it was limited to single providers at various public

and private hospitals performing lower complexity cases. Most complex thoracic surgery was repatriated outside the UAE. Since Cleveland Clinic Abu Dhabi opened in 2015, this practice has now been replaced with high quality multimodality Thoracic care provided by a highly skilled multidisciplinary team. As part of the Cleveland Clinic Foundation, we adopted the patient centered philosophy of “Patient first” (6).

There are three other major hospitals in the UAE which have dedicated thoracic surgery services: The Emirate of Abu Dhabi Health Authority’s network of public hospitals (Abu Dhabi Health Services Company - SEHA), has the second Thoracic surgery service in this Emirate.

This single surgeon service working as part of a multidisciplinary Medical Oncology team was based at Tawam Hospital in the city of Al Ain until 2020, when the surgical team was expanded to include three surgeons and the service was transferred to the new Sheikh Shakhbout Medical City (SSMC). In 2020, the team performed around 250 cases including chest trauma, lung cancer, esophageal cancer and pleural disorders predominantly by VATS and rigid bronchoscopy.

In the Emirate of Dubai, Rashid Hospital houses the thoracic surgery program of the Dubai Health Authority Hospitals group. Its Cardiothoracic surgery

department was established in 1992 in cooperation with Gothenburg University in Sweden, and in 2006 a Thoracic trauma program was added to General Thoracic surgery. Currently, per annum the team of 3 thoracic surgeons perform approximately 700–1,000 trauma procedures, and 50–60 elective interventional bronchoscopy procedures, minimally invasive and open surgeries for benign and malignant thoracic disease excluding esophageal procedures.

In the northern Emirate of Ras Al Khaimah, The Oncology Center of the new Sheikh Khalifa Speciality Hospital aggregates medical and surgical subspecialty departments. The Department of Surgical Oncology includes one Thoracic surgeon.

The Cleveland Clinic Abu Dhabi (CCAD) multi-disciplinary thoracic program

CCAD is a new high-tech multispecialty hospital which opened in 2015 in Abu Dhabi. This hospital offers high level tertiary care in a multicultural professional setting based on the Cleveland Clinic Foundation's guiding principle of "Patients First". The hospital offers 40 different surgical and non-surgical specialties.

Since its opening, a Multidisciplinary Thoracic Team which includes thoracic surgeons, pulmonologists including some with strong interventional pulmonology (IP) backgrounds, thoracic and interventional radiologists, medical and radiation oncologists, and pathologists was set up establishing a Comprehensive Multidisciplinary Thoracic Program. Biweekly multidisciplinary clinical meetings, one for thoracic malignancies and the second one for advanced lung diseases including lung transplant cases are conducted. In addition, there is active participation by physicians representing various regional hospitals who present complex clinical cases for discussion and board recommendations.

Beside thoracic malignancies, CCAD offers a comprehensive general thoracic surgery program, including tracheal, thyroid, Myasthenia Gravis syndrome, pleural and diaphragmatic disorders, chest wall deformity, hyperhidrosis, ECMO and lung transplantation. An overview of our global activity is attached in *Figure 1*.

Lung cancer screening (LCS) and lung nodule management

The United Arab Emirates has been witnessing an increase in the incidence and prevalence of lung cancer, associated with an increase in smoking prevalence especially among

the younger population. In line with the latest clinical evidence base showing a reduction in lung cancer mortality with the use of low dose screening CT (LDCT) scans (7), the UAE department of health (DOH) has initiated population screening with inclusion criteria modified to take into account local forms of tobacco use (Midwakh & Sheesha) (8), and has approved CCAD as the emirate's sole LCS center. Patients who screen positive for lung nodules or masses are then followed in the lung nodule clinic at CCAD where uniform care is provided implementing our hybrid lung nodule management guidelines.

Hybrid program

In addition to standard thoracic surgery and interventional pulmonary and radiological procedures, CCAD has established the regions first hybrid program to provide patients access to rapid diagnosis and management of pulmonary nodules. This comprehensive approach is performed in the hybrid operating room (HOR), an advanced angiography suite with cone beam CT (CBCT) capability equipped with needle guidance software, Electromagnetic Navigation (EMN) with dye marking, Endobronchial Ultrasound (EBUS), Intrathoracic Ultrasound Nodule Localization (IUSNL), Radiofrequency Ablation (RFA), and Video Assisted Thoracoscopic Surgery (VATS) (9). Carefully selected patients can have diagnostic and ultimately therapeutic procedures performed by a multidisciplinary team of interventional pulmonologists, radiologists and thoracic surgeons in the HOR in one setting. During the hybrid procedure, an onsite pathologist provides rapid on-site evaluation ROSE and frozen-sections if indicated.

Lung transplant program & ECMO

The UAE has taken great strides in introducing new legislation for organ procurement in order to support transplant operations. Since 2017 and following that a comprehensive multi-organ transplant program has been established at CCAD (10).

As the only lung transplant center in the UAE, the transplant committee at CCAD uses the Lung Allocation Score (LAS) and clinical urgency criteria to allocate. When there are no suitable recipients the organs are offered to the Saudi Lung Transplant group.

The first lung transplantation was performed in February 2018, since then, six double lung transplantations have

been performed, with outcomes of 86% 1-year survival, that matches the international society for Heart and Lung transplant registry (11).

We have the capacity to utilize all possible configurations of VV ECMO as bridge to transplant and recovery in patients with ARDS. In the ongoing COVID pandemic, we were able to salvage many patients with 53.6% survival rate.

Also patients who previous received lung transplant overseas are now routinely followed up at our lung transplant clinic.

Education & research

Multiple residency programs currently exist in the UAE. The Pulmonology and thoracic surgery group at CCAD is actively involved in supervising and teaching internal medicine and general surgery residents, as well as medical students through the current medical internship and residency programs established already in UAE.

In the near future, we plan to develop dedicated Pulmonary Medicine and Thoracic Surgery fellowship programs, neither of which are currently available in the UAE.

Our emphasis will be on coordinated multidisciplinary care utilizing our clinical hybrid thoracic care approach, taking advantage of our existing strong links with Cleveland Clinic Lerner College of Medicine, Case Western Reserve University, Cleveland, Ohio, USA. The success of such a program will require close collaboration with local and regional universities and teaching hospitals. These fellowship programs have potential to contribute to local talent development, improving care of patients with a myriad of respiratory and thoracic diseases.

Cleveland Clinic Abu Dhabi has a Research Department to support its Caregivers in conducting research studies and clinical trials, aiming to speed up the development of new treatments and to enhance medical care in the UAE. The Research Ethics Committee (REC) ensures that research studies meet the standards of good clinical practice (GCP) and comply with strict rules set out by the Abu Dhabi DOH. Since 2015 around 800 scientific articles were published at CCAD (12).

Emirates Thoracic Society (ETS)

The ETS previously named Emirates Respiratory and Allergy Society created in 1999, brings together physicians, surgeons and allied health care professionals, to promote lung health by means of organizing multidisciplinary and

accredited educational and training opportunities for local and regional professionals.

The society is also actively involved in local guideline and protocol development for thoracic diseases. The thoracic surgery council is one of the nine interest groups of the ETS comprised of experts from both public and private institutions from all parts of the UAE. It provides oversight in fields which include general thoracic surgery, thoracic oncology, lung transplant and ECMO support, and supports the advancement of innovation, education and guideline development. It has particularly close links with the Interventional Pulmonology, Thoracic Imaging and Interstitial Lung Disease ETS interest groups conducting joint meetings and sessions. Beyond its Academic role, the Emirates Thoracic Society will facilitate the implementation of new collaborative clinical pathways between UAE thoracic groups. This will nurture the expansion of a structured national and regional thoracic network.

Conclusions

Thoracic surgery in the third decade of the 21st century has evolved away from a surgeon performing procedures in isolation, into a “new era” in which patient management is guided by a multidisciplinary thoracic decision making process offering patient- centered up to date evidence based and innovative options.

The UAE holds its Bedouin culture and Arab values very highly in a way that does not insulate it from its present, the region, or the world, but rather offers it the impetus to embrace all it encompasses and promises for the future. Through the late 20th and early 21st centuries, this middle-eastern federation of micro-states, founded in 1971 in one the cradles of human civilization, seized the path to achieve a unique and unprecedented modernization (13). There is therefore nothing random in this State’s choice of a high-profile healthcare US institution such as the Cleveland Clinic Foundation with which it shares a spirit to nurture the past in order to build the future. Indeed, when Cleveland Clinic opened in 1921 in Ohio, conceived and brought to its flourishing present out of the imperative to survive and learn from World War One, the deadliest war humankind ever encountered, by putting the patient at the center of every decision. Innovation drives both the UAE and Cleveland Clinic intensifying their collaboration. This is what defines the day to day methods in medicine that the CCAD has come to exemplify in the UAE. Therefore, anchored on a reclaimed island in the center

of the nation's capital, CCAD is a one-of-a-kind facility that houses the paradigmatic healthcare policy meant by the state to deliver self-sustainable health and wellbeing for all. One can observe such a paradigmatic shift with the solid organ transplantation program that required major transformations in the law and social mindsets attained in only three years, meeting and exceeding the high expectations with outstanding outcomes.

A myriad of small islands stretching along a gulf and anchored to a peninsula, sitting between the desert and the sea, the UAE proves to be driven beyond boundaries to international collaborations, such as the recent successful launch, journey and orbiting of the Hope Probe around Mars. Such success sums up the Emirati trademark: set the goals, offer the means, bring together the talents and let them thrive. This one-of-a-kind model should be seen as a template, and used to foster future changes conceived in other healthcare settings across emerging countries "... we found that there is so much synergy between what we do in the emirates and what we do on Mars, there is desert both here and on Mars, there is hydrogen and oxygen that evaporate and do not become water..." (14).

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