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Feature Article

The State of Cancer Care in the United Arab Emirates in 2020: Challenges and Recommendations, A report by the United Arab Emirates Oncology Task Force

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Abstract

With cancer being the third leading cause of mortality in the United Arab Emirates (UAE), there has been significant investment from the government and private health care providers to enhance the quality of cancer care in the UAE. The UAE is a developing country with solid economic resources that can be utilized to improve cancer care across the country. There is limited data regarding the incidence, survival, and potential risk factors for cancer in the UAE. The UAE Oncology Task Force was established in 2019 by cancer care providers from across the UAE under the auspices of Emirates Oncology Society. In this paper we summarize the history of cancer care in the UAE, report the national cancer incidence, and outline current challenges and opportunities to enhance and standardize cancer care. We provide recommendations for policymakers and the UAE Oncology community for the delivery of high–quality cancer care. These recommendations are aligned with the UAE government's vision to reduce cancer mortality and provide high quality healthcare for its citizens. The State of Cancer Care in the United Arab Emirates in 2020, Humaid Al-Shamsi, et. al.

Introduction

The UAE is a relatively young country established in December 1971 and located in the southeast of the Arabian Peninsula. It is a federation of seven Emirates (states) composed of: Abu Dhabi (which serves as the capital), Dubai, Sharjah, Ajman, Fujairah, Ras Al Khaimah and Umm Al-Quwain (the last 5 Emirates are known collectively as the Northern Emirates). The population of the UAE has almost tripled between the 1990 and 2005 due to large inward migration with an estimated population of 9.2 million in 2013 (population estimates: 287,000 in 1971, 4.1 million in 2005, 8.3 million in 2010) ^{1'2.} The majority of the population in 2013 (7.8 million) were expatriates from around the world specially Asia. Only 1.4 million (15.2%) were UAE citizens (Emiratis) (Figure 1). This multinational population with varying degrees of education, religious and cultural backgrounds may pose a challenge for public health strategies¹. The UAE has the world's third-largest conventional oil reserves, and the fifth-largest natural gas reserves ^{3.} The UAE's 2015 GDP per capita ranked in the 95th percentile globally⁴. The UAE is classified by the United Nation as a developing country ^{5.} The UAE health system was ranked twenty-seventh in the world by the World Health Organization ^{6.} The health services in the UAE are covered by government funded health insurances, private insurance, or self-pay ⁷. The current UAE Immigration Rules mandate compulsory basic health insurance for all expatriates. All UAE citizens have government-funded health insurance with variable coverage based on the Emirate of residence.

Cancer is a major health issue in the UAE leading to considerable morbidity and mortality. It is the 3^{rd} leading cause of death after cardiovascular diseases and injuries accounting for 10% of all mortality in the UAE in 2010 and



Fig 1: UAE Population for the year 2013 according to Citizenship

16% of all mortality in the Emirate of Abu Dhabi in 2015⁸. The UAE is determined to bring down cancer mortality by nearly 18% by 2021. Reducing the number of deaths due to cancer is one of the key performance indicators of the UAE national agenda as "Pillar of World–Class Healthcare" ⁹.

The Oncology Task Force was founded in 2019 by practicing cancer care providers from across the UAE under the auspices of Emirates Oncology Society in 2019. This paper provides an insightful review of the demographic, economic, and oncologic practice trends that affect cancer care in the UAE. We summarize the history of cancer care in the UAE, report the national cancer incidence, outline current challenges and opportunities, and provide recommendations for policymakers and the UAE Oncology community to deliver high–quality cancer care to meet the expected increase in demand and cancer burden over the next few years.

Health care system in the UAE

It is critical to understand the complexity of the healthcare system in the UAE prior to making any UAEwide recommendations. The health care system of the UAE was chiefly regulated by the level federation from 1971 to 2005 where emirate level authority in Abu Dhabi was introduced.¹⁰ Currently the regulations are delivered by the collaborative efforts of different authorities across the UAE. The prime federal regulatory health authority of the UAE health system is the Ministry of Health and Prevention (MOHAP)^{11.} In the emirate of Abu Dhabi (Abu Dhabi, Al-Ain and the Western region of the UAE which is part of Abu Dhabi) Department of Health – Abu Dhabi (DOH) which was established in 2007 regulates the healthcare system in Abu Dhabi. Of note between Jan 1st 2005 and until Jan 1st 2007, DOH was known as "The General Authority of Health Services for the Emirate of Abu Dhabi" 12. Likewise in Dubai, Dubai Health Authority (DHA) (established in June 2007) is the regulatory body in Dubai^{13.} Similarly, Sharjah Health Authority (SHA) which was established in 2010 and MOHAP regulate health services in Sharjah. The rest of the UAE Northern Emirates (excluding Sharjah) Ajman, Fujairah, Ras Al Khaimah and Umm Al-Quwain health services are regulated only by MOHAP.

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History of Cancer Care in the UAE

There is no documentation of cancer care in the UAE from the 1960s or 1970s. The first scientific documentation of cancer care in the UAE in medical literature was from Al–Qassimi Hospital in Sharjah. The report was a case series of 5 cases of Hepatocellular Carcinoma published in 1981¹⁴ (Figure 2).

The first cancer care facility in the UAE was Tawam Hospital in Al-Ain (in the Emirate of Abu Dhabi), which opened in September, 1979. Tawam hospital was the first hospital in the country to offer Radiation therapy ^{14.} In February 1983, Tawam Hospital was named the official cancer tertiary referral hospital for the UAE¹⁴. In August 1983, Al Mafrag Hospital, located 35 kilometer from the capital Abu Dhabi, opened its door to the public and provided medical treatment for various specialities including cancer care services 14. By September 1983 Al Mafrag hospital opened both Chemotherapy and Radiation services. However .The radiation service was terminated in 2007 but the medical oncology service continued until November 2019, when it was relocated to the newly opened Sheikh Shakhbout Medical City (SSMC)^{15.} Al Mafrag hospital was permanently closed on January 9th 2020, Sheikh Khalifa Medical City (SKMC) in Abu Dhabi which was created in 2005 as a result of the merger of all publicly held healthcare organizations in Abu Dhabi island has a specialized adult and pediatric hematology and oncology service since 2005. SKMC is one of the largest leukemia services in the UAE.

Dubai hospital was the third government funded hospital established in 1983. It provides adult medical and surgical oncology, pediatric oncology and hematology services. Radiation therapy facilities are currently not available in Dubai hospital. However, feasibility study has been completed for comprehensive cancer centre in Dubai Hospital including radiotherapy. Dubai hospital also has well established nuclear medicine department which provides range of diagnostic and therapeutic services. PET/CT was also added in 2018. Historically, patients from across the UAE traveled to Tawam Hospital for specialized cancer care.

The Cleveland Clinic Abu Dhabi (CCAD), a 364 bed, multispecialty hospital, part of the Cleveland Clinic Foundation, USA, has been open to the public since May 2015. It provides surgical and medical oncology services. Radiation Oncology is planned for Fall 2021.

The private sector has been reluctant to provide oncology care services in the UAE due to lack of specialized staff and equipment, and associated high capital expenditure. Cancer treatment was provided for free to all UAE population regardless of their citizenship or residency status until 2007. Visitors to the country with cancer diagnosis were also eligible for free cancer treatment and many patients from Asians countries traveled specifically to get free cancer treatment in the UAE. In 2005, the first privately owned outpatient facility delivering Chemotherapy was launched at the American Hospital Dubai. Radiation therapy was added later in



Figure 2. UAE Oncology landscape timeline

2011. The Gulf International Cancer Center (GICC) in Abu Dhabi, which opened in 2007 remains the only center in both the government or private sectors to be specialized only in cancer care. It provides both chemotherapy and radiation therapy. The center introduced the first positron emission tomography – computed tomography PET/CT scanner in the UAE in 2009^{16.} The 2nd PET/CT scanner in the UAE was introduced at the American hospital in Dubai. In 2013 the privately-owned Tawam Molecular Imaging Centre (not related to Tawam hospital mentioned earlier) was the 3rd center to provide PET scan in the UAE.¹⁷ This center is now known now as the Cleveland Clinic Abu Dhabi – Al Ain. The 3rd center (After Tawam Hospital, GICC and closure of radiation service at Al Mafrag) to provide radiation treatment in the UAE was the American Hospital in Dubai followed by the government-funded Sheikh Khalifa Speciality Hospital in Ras Al Khaimah, which opened in February 2015. It became the 4th provider for Radiation therapy in the UAE, and the first Radiation facility in the Northern Emirates. In 2016 Mediclinic City Hospital became the 5th Radiation provider in the country, providing the first stereotactic body radiotherapy (SBRT) in the UAE. Advanced Oncology Cancer center which is a specialized private cancer center in Dubai, started providing radiation therapy in 2019. Other major private oncology hospitals in UAE include Alzahra Hospital and Mediclinic city hospital in Dubai and Zulaikha Hospitals in Dubai and Sharjah.¹⁸ Multiple private hospitals will open Radiation facilities in the near future including Burieel Medical City in Abu Dhabi (expected in April 2020), Mediclinic Abu Dhabi (June 2020), Saudi-German Hospital Dubai (June 2020), and Neurospinal Hospital Dubai (Summer 2020).

The only comprehensive cancer center in the Northern Emirates is the Sheikh Khalifa Speciality Hospital in Ras Al Khaimah. Sharjah University Hospital provides cancer screening and treatment (Surgery and Chemotherapy), but has no radiation treatment facility.

As of 2018 there were 66 registered medical and radiation oncologists in the UAE. DOH has the largest number of Oncologists with 34 medical and radiation Oncologists (breakdown information was not provided by the DOH), followed by 26 oncologists in DHA, and 6 oncologists under MOHAP. ¹⁹ The number of oncologists per 100,000 population is 0.6 in the UAE. This is a low rate compared with developed countries like Canada, which has 1.6 oncologists per 100,000 in 2016; ²⁰ Switzerland 3.3 in 2010, and the United Kingdom 3.6 in 2010^{21.} The rate of oncologists per 100,000 in the UAE is higher than other developing countries for example Turkey has 0.4^{21,} and India 0.0001^{22.} most likely due to the large populations of these countries.

The UAE is a multicultural society comprised of more than 190 nationalities. Physicians applying for licensure in the UAE go through a rigorous evaluation system prior to licensing. medical oncologists, radiation oncologists, and surgical oncologists come from different backgrounds including European, North American, South Asian (Pakistan and India), South American, Australian, and African among others. This poses a challenge in delivering a standardized quality of cancer care.

Incidence of cancer in the UAE

There are approximately 4,500 new cancer cases per vear in the UAE.⁹ To describe and report cancer incidence in the UAE, we need first to outline and address the challenges and limitations of the current multiple, fragmented Tumor Registries across the UAE. The first Tumor Registry in the UAE was compiled in 1983 as a hospital-based Tumor Registry at Tawam Hospital, the official cancer tertiary referral hospital in the country. The Registry was established by Mr Antony D. R. Beal, a Radiation Physicist. The Registry contained significant information on the occurrence of cancer in the UAE and the data were presented in the first UAE Cancer Congress in 1985.¹⁴ Tawam tumor registry did not contain any data about the cases treated elsewhere in the country, excluding patients who had received cancer treatment at other hospitals such as Al Mafrag Hospital, where all hospitals were reporting the cancer data to MOHAP^{14.} The first official cancer incidence report was published in 2002 by Dr Falah Al-Khatib and colleagues (Tawam Hospital) under the auspices of MOHAP^{23.} The data was incorporated into the regional Gulf Countries Cancer Registry based in Riyadh (King Faisal Hospital), which included all the GCC countries. Their report was published in a paper titled "Cancer incidence for common cancers in Gulf Cooperation Council countries during 1998–2001"^{24.}

DOH published its cancer statistics for the Emirate of Abu Dhabi (which included Tawam Hospital data) for the first time in 2011.²⁵ The data only reported cancer mortality without any cancer incidence data. As per their report, cancer caused 14% of all deaths in the Emirate in 2011, with 14.8% of male mortality due to lung cancer, and female mortality 27% mostly due to breast cancer. In 2012, DOH launched Abu Dhabi Central Cancer Registry (ADCCR) with a mission to monitor trends in cancer incidence rates. An additional objective was to monitor the effectiveness of the cancer screening programs in Abu Dhabi by identifying risk factors for cancer, and plan effective public health interventions to control and prevent cancer. The first comprehensive cancer incidence data by the Department of Health (known previously as Health Authority Abu Dhabi) in the Emirate of Abu Dhabi were published in 2012. There were 1729 cases of cancer reported that year: 28% were UAE citizens and 72% were expatriate. Hematological malignancies were most common cancer in males (29%), and breast was the most common cancer in females (26%). Cancer mortality was 12.9% ²⁶. (Figure 3).

Dubai Hospital's tumor registry has accumulated data since 2001, but the data has been never published independently. However, data reported to MOHAP annually. In March, 2014, MOHAP Central Cancer Registry (MCCR) the official reporter of cancer data collection for the entire Northern Emirates hospitals was established, and reporting of all malignant cases became mandatory in both private and government hospitals ^{27.}

MOHAP aimed to establish unified accurate national Diseases Registries. Theses Registries were created to facilitate access to county-wide medical information while safeguarding data confidentiality. The United Arab Emirates National Cancer registry is a population-based cancer registry for the United Arab Emirates established under the jurisdiction of the Ministry of Health and Prevention (MOHAP) by the order of UAE Cabinet and the Minister of Health and Prevention. The Registry systematically collects, stores, summarizes, analyses and distributes information about cancer patients who are diagnosed and/or treated in the UAE. It provides information on cancer patterns and trends over time, and monitors cancer incidence in UAE. The data can be used to plan cancer services, cancer screening programs, and cancer research projects. The Cancer Registry is a part of the National Diseases Registries and it comes under the auspices of the Statistics and Research Center. The UAE National Cancer Registry produces a report on cancer incidence on an annual basis. The aim from the registry is to try to uncover disease trends which would help in studying the distribution of such conditions in different regions of the country.

The Registry collects data on malignant neoplasms according to the recommendations of the International Agency for Research on Cancer (IARC) from a combination of sources, such as:

- a) DOH central cancer registry: highly qualified central based cancer registry in DOH, this registry acts as a central one covering all cancer data in Abu Dhabi.
- b) DHA central cancer registry: highly qualified central based cancer registry in DHA.
- c) Hospital admissions and medical records departments from all public, private, and university hospitals all over UAE through International Classification of Diseases and International Classification of Diseases for Oncology.

هيئة الصحة HEALTH AUTHORITY



Figure 3: Cancer incidence in the Emirate of Abu Dhabi in 2012, the first officially published cancer incidence in UAE by the Department of Health (known previously as Health Authority Abu Dhabi).

Cancer incidence 2012

- d) Notifications by the medical profession.
- e) Reports from Pathology Laboratories.
- f) Mortality data, medical treatment abroad and others. Notifications were made mandatory as of 2013.

According to the latest data published, a total of 3968 new cancer cases were diagnosed in UAE for the period of January – December, 2015; of which 3744 (94.4%) were malignant and 224 (5.6%) were in situ cases. Among UAE citizens, a total number of 1113 of cases were newly diagnosed with cancer; of which 1048 (94.2%) cases were malignant and 65 (5.8%) were in situ cases. Similarly, in Non–UAE citizens, 2855 cases were newly diagnosed with cancer, 2696 (94.4%) cases were malignant and 159 (5.6%) were in situ cases. Breast, colorectal, thyroid, leukemia and prostate cancer were the top ranked cancers among the Non–UAE citizens. breast, colorectal, thyroid, leukemia and Non– Hodgkin lymphoma were the top ranked cancers among UAE citizens.²⁸ (Table 1)

As per GLOCOCAN 2018, there will be an estimated 355% increase in all malignancies in UAE by year 2040 ^{29.} This significant estimate increase may be an over estimate and higher than the actual increase in cancer incidence 2040.

Government funded cancer care medical tourism

The UAE spent an estimated \$163 million U.S dollars in 2013 for government-funded cancer care medical tourism outside the UAE. 30 There are no official details about the types or stages of patients treated abroad. The 5 top destinations for cancer care medical tourism are the United States of America, , Republic of Korea (South Korea), Federal Republic of Germany, Republic of Singapore and Kingdom of Thailand 31. One study in which administrative data were obtained from the DHA for UAE nationals who sought medical treatment overseas during 2009-2016 included data from 6557 UAE nationals. The top three treatment destinations were Germany (46%), the UK (19%) and Thailand (14%). The most common medical specialties were Orthopedic Surgery (13%), Oncology (13%) and Neurosurgery (10%). Oncology had the highest expected number of trips adjusted for a number of covariates (IRR 1.34, 95% CI: 1.24-1.44) ³².

There are multiple different independent sponsoring agencies for cancer care abroad in the country, including all the health authorities (DOH, DHA, MOHAP), Presidential affairs offices, Armed forces, police and charity organizations as well as self-pay. The sponsoring requirements and processes vary between the different sponsoring agencies, the most important requirement besides being a UAE national is to document that the required treatment is not available in the UAE. There are a significant number of patients who receive exemptions from local treatment to be treated abroad. There are no uniform guidelines or criteria for these entities/agencies to guide patient selection for treatment abroad.

In an internal review of 273 patients who requested to travel abroad between January – September 2017 in a tertiary referral oncology centre in UAE, 54% (147 cases) of the referrals were not clinically indicated based on the availability of these Oncology services in UAE.

Current screening programs

The UAE has made strident efforts to promote early cancer detection. DOH initiated screening programs for colorectal, breast and cervical cancers in 2008. DHA introduced breast, cervical and colon cancer screening in 2014¹³. In January 2017 lung cancer screening using low dose computed tomography (CT) scan was recommended by DOH for people aged between 55 and 74 with a history of smoking at least one cigarette pack daily for 30 years or two packs for 15 years ³³. In 2017 DHA launched BASMAH initiative. Under this initiative, the basic benefit plan of the Dubai Mandatory Health Insurance Scheme now covers screening as well as treatment of breast, colorectal and cervical cancer ³⁴.

In September 2015, the Ministry of Health launched an official cancer screening initiative to raise awareness about cancer and the importance of early detection through regular medical check–ups for colorectal, breast and cervical cancers ³⁵. This initiative complemented the longstanding efforts of the Friends of Cancer Patients organization , that organized the high–profile "Pink Caravan" across the UAE every year since 2011 to raise awareness about breast cancer early detection and screening ³⁶. The campaign has screened approximately 45,000 female across the UAE ³⁷.

Modifiable cancer risk factors in the UAE

There are a number of modifiable recognized cancer risk factors that needs to be addressed as part of any national cancer control plan in the UAE. We will summarize these factors in the following section.

Obesity

There is consistent evidence that obesity is associated with increased risk of a number of cancers including ovarian, endometrial, breast, colon, gastric, esophageal, renal, pancreatic cancers and multiple myeloma ^{38 39}. Adult UAE Nationals in Abu Dhabi were screened for cardiovascular

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		Non–UAE Citizens			UAE Citizens		
Primary Site ICD–10	Female	Male	Total	Female	Male	Total	Total"
(C00–C96) All invasive cancers (malignant cases)	1377	1319	2696	605	443	1048	3744
C00-C14 Lip, Oral cavity & Pharynx	21	66	87	14	16	30	117
C15 Esophagus	7	13	20	1	4	5	25
C16 Stomach	22	56	78	11	19	30	108
C17 Small intestine	7	9	16	1	7	8	24
C18–C21 Colorectal	84	172	256	57	60	117	373
C22 Liver and intrahepatic bile ducts	13	37	50	8	10	18	68
"C23–C24 Gallbladder, Other and unspecified part of							
biliary tract"	11	18	29	3	2	5	34
C25 Pancreas	14	20	34	8	11	19	53
C30, C31 Nasal cavity, middle ear, accessory sinuses	2	2	4	1	1	2	6
C32 Larynx	0	38	38	0	6	6	44
C34 Bronchus and Lung	33	78	111	15	35	50	161
C40-C41 Bone and articular cartilage	4	8	12	3	2	5	17
C43 Skin melanoma	11	16	27	0	4	4	31
C44 Skin	32	75	107	4	13	17	124
C45 Mesothelioma	3	2	5	0	0	0	5
C46 Kaposi sarcoma	0	1	1	0	4	4	5
C48 Retroperitoneum and peritoneum	2	5	7	5	1	6	13
C49 Connective and soft tissue	8	22	30	5	6	11	41
C50 Breast	548	8	556	208	1	209	765
C53 Cervix uteri	61	0	61	13	0	13	74
C54–055 Uterus	64	0	64	35	0	35	99
C56 Ovary	45	0	45	17	0	17	62
C61 Prostate	0	119	119	0	47	47	166
C62 Testis	0	32	32	0	7	7	39
C64–C65 Kidney & Renal pelvis	10	47	57	11	18	29	86
C66, C68 Ureter and Other urinary organs	0	3	3	1	1	2	5
C67 Urinary bladder	11	47	58	11	30	41	99
C69 Eye	0	2	2	1	4	5	7
C70–C72 Brain & CNS	29	46	75	13	11	24	99
C73 Thyroid	173	61	234	83	27	110	344
C74–C75 Other endocrine glands	3	5	8	4	2	6	14
C76–C80 Unknown and Unspecified sites	26	24	53	7	9	16	69
C81 Hodgkin's lymphoma	14	30	44	6	12	18	62
C82–C85, C96 Non–Hodgkin lymphoma	30	89	119	24	27	51	170
C88, C90 Multiple myeloma	13	37	50	2	8	10	60
C91–C95 Leukemia	67	119	186	30	37	67	253
Other malignancy	9	9	18	3	1	4	22
(D00–D09) Non–invasive cancers (in situ cases)	115	44	159	49	16	65	224
"D00 Carcinoma in situ of oral cavity, oesophagus							
and stomach"	0	3	3	1	0	1	4
"D01 Carcinoma in situ of other and unspecified							
digestive organs"	2	8	10	2	2	4	14
D03 Melanoma in situ	2	1	3	0	0	0	3
D04 Carcinoma in situ of skin	2	2	4	0	0	0	4
D05 Carcinoma in situ of breast	48	2	50	13	0	13	63
D06 Carcinoma in situ of cervix uteri	56	0	56	25	0	25	81
"D07 Carcinoma in situ of other and unspecified							
genital organs"	3	3	6	2	0	2	8
D09 Carcinoma in situ of other and unspecified sites	2	25	27	6	14	20	47
Grand Total	1492	1363	2855	654	459	1113	3968

Table 1. Cancer prevalence by primary cancer site, patient gender and citizenship status (2015).

risk factors in 2008 as a condition for enrollment in national insurance. Analysis of results of this screening showed obesity rates of 33% in males and 38% in females. ⁴⁰ This is comparable to the obesity rate in the U.S.A ⁴⁰.

A 2016 study which included 44,942 students in the UAE revealed that 40% were overweight, a further 24.4% obese and 5.7% extremely – or morbidly – obese as per the World Health Organization definition of obesity. While there were children from 30 countries involved in the study, more than 90 per cent were UAE nationals. ⁴¹ Another study also concluded a similar finding where the prevalence of childhood obesity was found to be high across the school age spectrum in the UAE ⁴².

Smoking

Smoking is an epidemic in the Middle East, and there is an associated expected increase in smoking levels and tobacco-related morbidity and mortality in the future 43,44 . In the largest study reporting smoking practices in the UAE, the prevalence of smoking overall was 24.3% among males and 0.8% among females. It was most prevalent among males aged 20–39. cigarette smoking was the commonest form of tobacco use (77.4% of smokers), followed by Midwakh (15.0%), shisha (waterpipe) (6.8%), and cigar (0.66%)⁴⁴.

Despite tobacco smoking being the most popular form of smoking in the UAE ⁴⁴, there has been a concerning increase in the trends of other forms of traditional smoking, including shisha and Midwakh. ^{44–48}

Shisha smoking – also known as hookah, narghile, waterpipe, or hubbly bubbly smoking – is a way of smoking tobacco, mostly mixed with fruits or molasses sugar, through a bowl containing water and hose or tube for inhalation of the smoke orally. ⁴⁹ One shisha pipe and the charcoal is the equivalent of smoking approximately 100 cigarettes. ⁴⁹ It has been shown that waterpipe mainstream smoke contains high levels of the human carcinogen Benzene and many other potential carcinogens. ⁵⁰ Re–emergence of shisha smoking in the last 2 decades in the Arab world has been well described. ^{43,47} Pre–marital screening by DOH in 2011 found that 6.8% of men and 2.8 % of women smoke shisha. ⁴⁵

A midwakh is a small smoking pipe of Arabian origin, in which dokha, a sifted Iranian tobacco product mixed with aromatic leaf and bark herbs, is smoked ⁵¹. The bowl of a midwakh pipe is typically smaller than that of a traditional western tobacco pipe. It is usually loaded by dipping the bowl into a container of dokha flakes ⁵². Midwakh is primarily produced in the UAE and Iran.

Previous research has demonstrated that dokha had similar acute effects on blood pressure and respiratory

rate as other forms of smoking ⁴⁴, but it is suspected that it has significant amount of carcinogens given the use of tobacco mixture.

Recommendations

Establishing a Federal Cancer Care Agency

In order to unify and standardize cancer care across the UAE we recommend establishing a Federal Cancer Care Agency to be the government's cancer care advisor. This agency should be led by experts in implementing a comprehensive cancer control plan. The federal agency would cover the entire spectrum of cancer care – from prevention and screening to diagnosis, establishing treatment guidelines – to ensure that cancer patients across the UAE receive safe, evidence–based, effective treatment.

One of the challenges in implementing this recommendation are the multiple regional regulatory authorities in the UAE. This issue needs to be addressed at higher governmental level and collaboration between the regulatory authorities will be crucial for a successful outcome.

Enhancing and facilitating national cancer registry reporting

Enhancing and facilitating reporting to the National Cancer Registry is a key component to advancing cancer care in UAE. The data will help evaluating patient outcome, provide follow-up information, calculate survival rates, analyze referral patterns, allocate resources at regional or Emirate level, report cancer incidence, and will evaluate the efficacy of cancer screening and treatment modalities. Unifying the cancer reporting across the UAE between DOH, DHA and the MOHAP is a paramount step toward improvement of cancer care in the UAE. Areas for further improvement in the National Cancer Registry include clearly defined data requirements. The current reported data are basic data and lack in depth. for example ageadjusted cancer incidence. A close working relationship between the Registry Administrators and Clinicians is needed to understand how new clinical practices will impact data requirements. Adaptation to change is critical, particularly with respect to new technology. Record linkage is an important tool for maximizing data use. Responsiveness to changing demands for timely, more comprehensive and accessible data is necessary and will ensure that the Registry will remain relevant.

Establishment of a central comprehensive tertiary oncology referral center of excellence

Cancer care in the UAE is currently dispersed across the country between public and private sectors. We recommend a central comprehensive tertiary referral Cancer Center to serve the entire UAE. The UAE population is relatively small but expanding. Volume-outcome relationship in surgery for esophageal, colorectal, gynaecological malignancies has been shown to improve cancer specific morbidity and mortality. 53-56 A recent study concluded that cancer patients who receive care at hospitals that specialize in cancer and treat a large number of cases have better long-term survival rates ^{57.} The outcome of these studies is of interest to patients, healthcare providers and payers, particularly regarding service reconfiguration and more specifically centralization of services. Measuring differences in survival rates among hospitals is a first step toward improving cancer care

Currently Tawam Hospital is the assigned tertiary referral center in the UAE. Some of the challenges with Tawam Hospital is the location of the hospital in the far east of the country where travel time has been a major issue for patients and their families (can be up to 4 hours driving from northern areas in the UAE). Travel time and geographic location has been shown to affect treatment plan and cancer outcomes. ^{58–63}.

We recommend satellite offices affiliated with tertiary oncology centers in the UAE which can be easily accessed from all the cities in the UAE, with multiple affiliated satellite offices with chemotherapy facilities. We also recommend integrating the private sector to facilitate the delivery of oncology care to various regions in the UAE.

UAE–wide cancer electronic health records (EHR) and chemotherapy ordering system

With various government and private cancer care providers in the UAE, patients tend to seek multiple opinions during their cancer treatment. We recommend investing and establishing a country-wide oncology patients' Information System to document patient care, gather imaging studies, Pathology reports, and to establish an electronic chemotherapy drug ordering system. An electronic chemotherapy ordering system would improve patient care and safety by allowing the immediate electronic communication among cancer care providers to ensure reliable and efficient care, replacing handwritten prescriptions to reduce prescription errors and adverse drug events, flagging drug allergies to prevent adverse drug events and minimize the need for repeat imaging studies. This will help expand data collection to help support performance measurement and quality improvement of the cancer system.

Cancer care quality council and cancer system quality index

As mentioned earlier, practicing oncologists in the UAE come from various training backgrounds. Specialized training in oncology has been shown to improve cancer outcomes ^{55,56,64}. The delivery of standardized cancer care in the UAE is challenging and requires a cancer system quality index to ensure quality of care delivered. Generic quality indicators should focus on metrics such as surgical waiting times, chemotherapy utilization, 30–day mortality from starting chemotherapy, radiation planning, multidisciplinary approach, advance care planning, end–of–life care, and documentations of cancer care including pain management.

We recommend the establishment of an independent Advisory Cancer Care Quality Council to monitor the quality of care in both government and private hospitals across the UAE. We recommend adopting a cancer system quality index similar to the index used in Ontario, Canada, which was established in 2002 and is considered one of the longest established indexes. ^{65 66,67} Prior to the adaptation and implementation of the Ontario cancer system quality index or any other quality index, we must first evaluate its appropriateness to our health care system. Collaboration between the newly formed UAE cancer system quality index and other regional or international cancer care quality organizations is recommended to share knowledge and experience.

We also recommend a weekly centralized on site or virtual Multidisciplinary Tumor Board delivered by DOH, DHA and MOHAP. There should be a mandating rule that every confirmed cancer case should be discussed and documented at an accredited Multidisciplinary Tumor Board and subsequent management based on the recommendations of that meeting.

Cost reduction strategies

With the expected increased in cancer care burden coupled with the increasing cost of new cancer treatment agents, forming and implementing cost reduction strategies is of paramount importance. National guidelines will need to be implemented to regulate the more costly immunotherapy and targeted therapy agents. Contemporary internal reports from different oncology centres indicates differential pricing for chemotherapy, immunotherapy and targeted therapies between different regulatory jurisdictions within the UAE. In meetings with oncologist colleagues from Saudi Arabia and Oman, it is apparent that the drug prices are much lower in neighbouring countries than the UAE. This is largely due to the fact that all drugs purchased in these neighbouring countries are negotiated for the entire country and not only for a specific hospital or jurisdiction. Bulk purchasing agreements seek to reduce per unit costs of medicines by increasing the volume purchased by a conglomerate of purchasers. In UAE, this requires health authorities join forces to purchase medicines in higher volumes in pursuit of price reductions from manufacturers.

We recommend the introduction of biosimilar agents into cancer center formularies. Holding educational sessions for cancer care providers to increase the awareness and utilization of biosimilar agents will also be required to facilitate the utilization of biosimilars.

Another cost reduction recommendation is to regulate the use of imaging studies like CT, MRI and Positron emission tomography (PET) scans. There is a perception that CT and MRI are overused modalities and utilized in cases when there is little evidence to support their need. Consequently, there are concerns that PET imaging is following this path, even though PET has a far more restricted number of indications. While it is beyond the scope of this report to evaluate the use of CT and MRI, this perception (or misperception) suggests it may be time for policymakers to develop a systematic approach to assess the proper utilization of CT and MRI, rather than limit the expansion, and utilization, of PET technology in clinical care ⁶⁸. PET scan which is currently in our opinion excessively used without proper indications. This can be achieved by implementing a national evidence-based approach for policies and indications of PET scan use to ensure appropriate utilization of PET scans in the UAE. A successful program is implemented in Ontario, Canada 69.

Screening

The UAE has been making excellent progress in cancer screening. As mentioned earlier in this paper, DOH, DHA, and MOHAP have introduced screening programs for breast, cervical and colon cancer. Lung cancer screening is offered only by DOH. There is no official data about the screening compliance by any health authorities, and compliance is believed to be guite low. ⁷⁰ Internal non-published data from MOHAP from recent years indicate low screening uptake (6.7% of women in UAE accessed a breast screening mammogram; 7% of eligible women received a cervical cancer Pap smear test; and for colorectal cancer screening, only 1.6% of eligible targeted population had a FIT test or colonoscopy). These numbers may underestimate the actual screening uptake. For example de novo stage IV breast cancer has declined from 20% in 2000 to 6% in 2015, which is most likely attributed to breast cancer awareness and screening ²⁸.

There has been a debate about compulsory screening programs in the UAE. Since 2009 all UAE national women

older than 40 have been required to be screened for breast cancer in order to renew their health insurance policies in Abu Dhabi. In our view mandatory screening is not practical and we recommend advocating for increased awareness of the importance of early detection of cancer.

A pilot colorectal cancer screening scheme using colonoscopies was launched in July 2010 to screen 15,000 nationals aged between 50 and 75 by the end of 2010.⁷¹ The results of this pilot study was never published. We recommend the health authorities publish their screening data and reports to help monitor the effectiveness of current screening protocols, and to guide and direct future efforts.

Another aspect that needs to be addressed is the private insurance coverage for approved cancer screening tests. Insurance providers vary from no cancer screening coverage, limited coverage to more advanced and comprehensive cancer screening coverage. There is a need for mandatory coverage for approved cancer screening. This can be achieved by regulations from various health authorities to mandate this coverage.

National prevention program to modify cancer risk factors

Obesity

Prompt actions are needed to initiate preventative and interventionist strategies to reverse the trend of obesity epidemic in the UAE. 72 We recommend comprehensive campaigns to raise awareness of obesity and its detrimental health effects. Counselling services, intervention programs and outpatient health-promoting clinics are highly recommended and needed. Of particular concern is to increase the awareness of parents about the risks associated with childhood obesity and the importance of implementing healthy lifestyles choices, for example avoiding high fat diets and fast food, regular exercise, and in-school sport activities ⁴¹. In an effort to fight obesity, the Federal Tax Authority (FTA) in the UAE implemented a tax on sweetened beverages as of December 1, 201973. This is in addition to the prior excise tax of 50% on sugary beverages introduced in 2017. 74

Vaccinations

Human Papillomavirus (HPV)

Cervical cancer is the 8th most common cancer in females in the Abu Dhabi. ²⁶ In 2008 the DOH introduced free optional HPV vaccination for all eligible schoolgirls in both public and private schools. DHA also recommended to start vaccination of all girls at age 11– 12 years. ⁷⁵

There are no official reports about the uptake of the vaccination since its introduction. Recent reports and cross—sectional studies from the UAE indicate likely low uptake due to lack of knowledge of HPV vaccination ^{76–} ⁷⁸ We recommend improving parental and adolescent education about HPV, specifically to reduce the fears and misconceptions surrounding HPV vaccination ^{.79}

Hepatitis B Vaccination

Hepatitis B virus (HBV) is a well–studied risk factor for the development of Hepatocellular Carcinoma ⁸⁰. There is high ecological correlation between areas of HBV prevalence and HCC incidence and mortality worldwide. Chronic HBV infection accounts for approximately 50% of the total cases and virtually all of childhood HCC ⁸¹.

The Hepatitis B vaccine was introduced and mandated in the UAE in 1991.⁸² Since 2006, any new migrant to the UAE is required by law to be evaluated for and Hepatitis B and C infections If the subject is not HBV immune then it is mandatory to receive HBV vaccination.⁸³. Currently there are no official reports about the uptake of Hepatitis B vaccine for the newborn or the migrants. Further research is needed to assess the uptake and barriers to vaccinations.

Tobacco Smoking

Banning the shisha and midwakh products may not be an effective solution giving its cultural and social roots. Although it should be mentioned that shisha smoking is currently banned in public areas in Sharjah city⁸⁴. However, shisha products can nonetheless be purchased in Shariah. Increase awareness and education about the shisha and midwakh-specific warning labels may aid in encouraging cessation of this practice.⁸⁵ Enforcement of tobacco control laws, including implementation of clean indoor air laws and tobacco tax increases, and targeted health education programs are required to reduce tobacco consumption and concomitant tobacco-related morbidity and mortality⁴⁵. More specifically effective outreach health education programs, targeting adolescents, especially school students before they take up the habit of smoking has also been proposed as one of the key solutions for this smoking epidemic in the UAE ⁴⁶.

In January of 2014 the Federal government made a very important step forward in anti–smoking efforts. This included banning advertising of tobacco products in any form, warning labels on the front of cigarette packages, age restriction to 18 years or older to purchase tobacco products, and it became illegal to display tobacco products near items marketed for children. They also introduced a restriction on smoking in the car in the presence of a child below 12 years of age ⁸⁶. Sharjah city has recently also

banned coffee shops that serve Shisha. As of December 1, 2019, a minimum excise tax of Dh0. 40 (US \$0.11) must be applied per individual cigarette, and a minimum excise tax of Dh 0.10 (US\$0.027) must be applied per gram of water pipe tobacco, ready—to—use tobacco and electronic smoking devices, according to a decision issued by the Ministry of Finance ⁸⁷.

Pediatric hematology and oncology

In 2015 there were 165 children, aged between 0-14 vears, diagnosed with cancer in UAE. This constitutes about (4.2%) of all registered malignant and in situ cases ²⁸. Pediatric Oncology in the UAE is a well-established speciality. The Pediatric oncology Unit in Tawam Hospital was established in 1983 as the UAE referral center for childhood cancer. The unit is staffed by pediatric oncologists, clinical associates, and oncology nursing staff. In addition, there is a Psychosocial team, and community support staff, who work for both in the in-patient ward and outpatient clinics. The oncology unit maintains a system of registry and database entry of all patients treated. The 2nd governmental hospital with specialized pediatric oncology service is Dubai Hospital. Sheikh Khalifa Medical City in Abu Dhabi has a specialized pediatric oncology service since 2005. The only private pediatric hematology and oncology service in UAE is provided at American Hospital Dubai. One of the limitations of pediatric hematology and oncology services in the UAE is the lack of hematopoietic stem cell transplantation service, as discussed in the next section.

Hematopoietic Stem Cell Transplantation (HSCT) service

At this point in time there are only a few established hematopoietic stem cell transplantation (HSCT) programs in the Middle East region, principally in the Kingdom of Saudi Arabia, Hashemite Kingdom of Jordan and Republic of Lebanon. Patients residing in the UAE have little option but to seek treatment abroad. The cost of this treatment is very high, compounded by the associated travel, accommodation, and family member expenses. The number of UAE-based patients sent abroad for treatment is difficult to establish but estimated around 100 adult and pediatric cases per year. DOH has started the process to open an HSCT Program in Abu Dhabi. Multiple government and private hospital in Abu Dhabi will be bidding for this service to start at their facility. Tawam and SEHA have developed a comprehensive financial model for the HSCT program. HSCT is a program that can be associated with a high treatment mortality. For an HSCT program to be successful there must be sufficient patient volume. Our recommendation is there should be no limit in the initial years of establishing the HSCT service regarding insurance eligibility for access to care, otherwise the necessary volume required to gain experience will not be available. ⁸⁸

Palliative care

Palliative care and supportive service is very limited in the UAE. Currently the only government funded palliative care service is available at Tawam Hospital. Cancer palliative care has been shown to improve quality of life in cancer patients.^{89,90} Cancer patients in the UAE have historically had difficulty in accessing palliative care services due to the limited palliative care facilities and trained physicians and other palliative health support workers in this field. There is a general lack of national recognition and investment in palliative care as an essential component of cancer care.

In November 2016 a new UAE Federal Law on Medical Liability (Law No. 4 of 2016) came into Effect ⁹¹. The New Law permits healthcare professionals to allow natural death by refraining from performing cardiopulmonary resuscitation ('CPR') on terminally ill or dying patients who are sufferings from incurable illnesses, provided that the following conditions are met:

- the patient suffers from an irremediable medical condition;
- all the treatment methods have been exhausted;
- the treatment is proven to be useless in such medical condition;
- the treating doctor advises not to provide CPR to the patient; and
- at least three consulting doctors decide that the patient's interests require that the natural death is allowed and that CPR should not be provided (In this case, the consent of the patient, his guardian or custodian is not required).

However, resuscitation may not be denied if the patient expressly requests to be resuscitated even if resuscitation is useless for the treatment.

We recommend establishing a national Palliative Care Program with multiple clinics across the UAE and a hospice as part of a national cancer control plan.

National central cytogenetics and molecular genetics laboratory

Molecular diagnostics is a part of laboratory medicine. Personalized selection of cancer drugs based on the presence of actionable mutations has become an integral part of cancer therapy. The development of cancer drugs and corresponding predictive markers currently focuses mainly on tumor molecular portraits. The utility of circulating tumor DNA for the control of surgical tumor eradication as well as the response to systemic treatment has already been exemplified in a number of studies ⁹².

Molecular genetic testing for haematological cancers and solid tumours, hereditary cancer gene panels and Next Generation Sequencing (NGS) using custom, targeted gene panels are highly utilized in the cancer care in the UAE. One of the limiting factors is the extended time which can be up to 4-6 weeks to obtain the results of these essential tests, almost all these tests are done out of the UAE due to the lack of laboratory specialized in these tests. This extended time to obtain the results may have an adverse effect on patient's outcome due to the delay in obtaining and utilizing these results into the patient's clinical care. We recommend establishing or assigning a reference national cytogenetics and a molecular genetics laboratory for all the testing related to cancer care. This will expedite the testing process and reporting of results and can also reduce the cost significantly rather than sending these tests abroad.

Cancer survivorship

Improvements in cancer screening, early detection, and treatment are resulting in increased numbers of patients cured of cancer. Psychosocial and physical effects among cancer survivors are common and may lead to considerable detriment in quality of life as they may face a wide range of medical and psychosocial challenges that need to be planned for and appropriately managed.⁹³

Identifying the components of the transition from Oncology care to Primary will include providing Patients and their primary care provider with a treatment summary and care plan, educational about a survivor's unique needs ⁹⁴.

Research

Specific research directed at the UAE population is needed to understand the biology of cancers in this understudied population. ⁹⁵ Understanding the prevalence and incidence of cancer in the UAE is paramount and a critical step for further evaluation of cancer burden and resource allocation.

We have previously illustrated that , the UAE females likely to develop breast cancer at least a decade earlier than their counterparts in western countries, and the adoption of Western breast cancer screening guidelines without critical amendment in planning local breast cancer programs will likely miss a significant at-risk younger populations and may not achieve the desired outcomes of reducing BC–related morbidity and mortality ⁹⁶. There is a need for epidemiological studies directed at the UAE population. Cancer epidemiology cohort studies are among the key approaches for advancing understanding of the complex etiology of cancer and provide fundamental insights into environmental, lifestyle, and genetic risk factors responsible for cancer burden in the UAE population.

More recent studies have revealed variations in gene mutations and clinicopathological features between Arab population and western populations. This genetic variation likely contributes substantially to the variation in Chemotherapy and responsiveness to therapy. 97-100 Chemotherapy and targeted agents developed in North America and Europe have become the golden standard for cancer treatment.¹⁰¹ However treatment outside the West is often conducted in the absence of substantial follow-up analyses, precluding the assessment of the effectiveness and toxicity in our own population. Thus the identification of similarities or differences in the frequency of polymorphisms that may affect the clinical outcome is not yet studied ^{102.} The cataloging of polymorphisms in the UAE population would provide an impetus towards rational and regionally tailored clinical trials and refinement of therapy 101.

We recommend establishing a National Cancer Research Center integrated with the national tertiary referral center and under the auspices of the UAE Cancer Federal Agency. We also recommend government and public campaigns to raise funds for the proposed research center to accelerate and advance specific research pertaining to our population. We will need to recruit national and international experts in Oncology and public health to formulate a strategic research plan.

Education and training

Clinical fellowship programs in Oncology related fields such as medical, surgical, and radiation oncology as well as allied health disciplines such as oncology nursing, pharmacology, and psychology are needed. These are opportunities for cancer care providers to obtain advanced structured training to acquire more specialized expertise in cancer care within their specific fields of practice. Training involves both clinical and research activities. The first fellowship training program in Medical Oncology was started in November 2019 at Tawam Hospital. This is a very important step to introduce cancer care training to local doctors to avoid shortage in Medical Oncologists in the future. This is expected to set a fertile ground for other cancer care providers to establish discipline specific cancer care training programs.

Other recommendations

- 1. Access for patient to Oncology services is a very important aspect, many patients from our experience hold basic insurance that does not cover cancer treatment which can lead to significant morbidity and mortality due to the lack of access.
- 2. Insurance limitations and caps: many insurance providers limit the coverage to 150,000 Dhs (\$ 40,760 US Dollars) which can be consumed within the initial few months of treatment. For example, colorectal surgery can cost 80,000–120,000 Dhs and in case of colorectal cancer requiring adjuvant treatment the patient will be out of coverage with estimated 150,000–200,000 Dhs (\$40,760 US to \$54,347) out of pocket for the adjuvant chemotherapy treatment which can be a barrier for receiving a cancer mortality reducing treatment.
- 3. A significant number of UAE nationals travel abroad for cancer treatment. This practice is not sustainable in the long term and as discussed in our previous report 103. Treatment abroad should be limited to complex cases which require specialized care that is not available in the UAE after a consensus review by the Federal Cancer Care Agency. Promoting the public trust in cancer care within the UAE is an important aspect that needs special attention. Research aimed at identifying barriers to receiving treatment locally is necessary in order to be able to make recommendations that will help reduce the need and demand of seeking medical attention abroad.
- 4. Measurement of patient-reported outcomes (PROs), including symptoms, is an essential component to cancer care focused on the illness impact to the patient and family. PROs can be useful at the individual level for monitoring and promoting symptom care both in the clinic and remotely at the population level for aggregating population data for use in research and quality improvement initiatives. There needs to be a centralised agreed outcome measures questionnaire for the cancer services within UAE.
- 5. Standard written information about cancer, Chemotherapy and Palliative care, agreed by the experts within UAE should be available for Patients, and available in both in English and Arabic, and as an online resource.

Conclusion

The UAE is a developing country with solid socioeconomic resources that can be utilized to improve cancer care for its citizens. There are numerous opportunities to enhance cancer care in the UAE. In this article we identified some of these opportunities, highlighted challenges, and provided practical solutions. Our recommendations are aligned with the UAE government's vision to reduce cancer mortality and provide the best healthcare for its population. This includes improving data collection and cancer reporting across the UAE, and encouraging and facilitating UAE– specific cancer research. We recommend clinical decision making through a unified, multidisciplinary approach using evidence–based medicine. We advocate for improving existing cancer screening programs in an effort to increase the trust of the general public and improve screening uptake. The UAE Cancer Care Task Force will continue to work closely with health authorities and policymakers to advance cancer care across the UAE.

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