



Radiation therapy elective in Beirut: A brief insight into the challenges of radiation delivery in Lebanon

Osama Mohamad, MD, PhD

Having spent my entire medical and residency training in the US, I was fortunate to receive the Association of Residents in Radiation Oncology (ARRO) Global Health Scholar Award and spend a month as a visiting resident in the Department of Radiation Oncology at the American University of Beirut Medical Center (AUB-MC) in Lebanon.

To describe my experience during the elective, I would like to start by introducing Lebanon and AUB-MC. Lebanon is a small country (10 452 sq km) along the Mediterranean coast in the Middle East (**Figure 1**). According to data from the World Bank, Lebanon is classified as a middle-income country.¹ While exact numbers are unfortunately unavailable due to complex sociopolitical reasons, most recent estimates indicate a Lebanese population of more than 6 million, including over 2 million



FIGURE 1. Map of the Middle East showing the geographic proximity of Lebanon, Syria and Iraq. Credit: Wikimedia Commons contributors, "File:Syria-Iraq-Lebanon location map.svg," Wikimedia Commons, the free media repository, https://commons.wikimedia.org/w/index.php?title=File:Syria-Iraq-Lebanon_location_map.svg&oldid=266603958 (accessed November 6, 2019).

refugees (1.5 million Syrians and 0.5 million Palestinians).² With respect to cancer statistics in Lebanon, the GLOBOCAN 2018 report estimates about 17 294 new cases of cancer (242 cases per 100 000) and 8976 deaths due to cancer in 2018.³ While overall cancer care in Lebanon is significantly better than that of many countries in the region, the quality of care is region- and hospital-dependent with remarkable variations in access to care (including

significant variations in screening and preventive cancer programs), medications (including chemotherapies and/or immunotherapies), imaging, and radiation therapy technologies. In addition to out-of-pocket expenses, the medical bill in Lebanon is shared by the social security fund (which does not cover all citizens), the Ministry of Public Health, and private insurance. In an already struggling economy plagued by political corruption, modern feudalism,

Dr. Mohamad is an assistant professor in the Department of Radiation Oncology, University of California, San Francisco. Disclosure: The author has no conflicts of interest to disclose and has not received outside funding for the production of this original manuscript. No part of this article has been previously published elsewhere.



FIGURE 2. Aerial view of Beirut showing the American University of Beirut (AUB). The inset (in red) shows the AUB Medical Center (AUB-MC) (A). The main entrance of the AUB-MC is pictured (B), and the radiation oncology department is one story below ground level. New buildings of the AUB-MC vision 2020 medical complex are also shown (C). AUB-MC vision 2020 is an ambitious initiative aiming to expand current medical facilities and provide state-of-the-art patient care services, medical teaching, and biomedical research to citizens of the Middle East. Photos from www.aub.edu.lb and www.aubmc.org.lb

total neglect of natural resources, and decades of regional and civil wars, the influx of hundreds of thousands of refugees from nearby war-torn countries has strained the economy even more and added more pressures on the health-care system in Lebanon.

AUB-MC was originally established in 1902 as a 200-bed hospital associated with the Syrian Protestant College (later known as AUB) and has grown to become a remarkable hospital and medical school with superior patient care, medical research, and medical education earning it accreditations from the Joint Commission International and the Accreditation Council for Graduate Medical Education International (**Figure 2**). AUB-MC has always strived to provide exceptional patient care in the community and the region. Similar to the efforts of the University Hospital in general, the Department of Radiation Oncology has provided exceptional radiation therapy services to thousands of patients since the 1960s even during times of extreme violence from the civil war. Currently, the department is staffed by 5 radiation oncologists, most of whom were trained in the United States, and 4 physicists/dosimetrists. This team manages an operation that uses 2 linear accelerators to deliver world-class 3-dimensional conformal radiation therapy, image-guided radiation therapy, intensity-modulated radiation therapy, stereotactic body radiation

therapy, and high dose rate brachytherapy, among others, to treat about 70 to 80 patients a day, while training 4 radiation oncology residents (typically 1 resident per year). In addition, the radiation oncology department at AUB-MC staffs the Nabatieh Governmental Hospital (NBGUH), a public community hospital housing a single linear accelerator and providing the only radiation therapy unit in the south of Lebanon (2 governorates). In addition to AUB-MC, there are about 12 operational linear accelerators in 7 radiation therapy centers in Lebanon, with 2 or 3 centers in the planning or construction phases. Based on the International Atomic Energy Agency (IAEA) recommendation for needing 1 linear accelerator for every 500 new cancer cases in any country⁴ and assuming 17 294 new cases (see above), Lebanon needs about 34 linear accelerators to meet the demand of its cancer patients. Zeidan and Geara provide a good review of the status of radiation therapy in Lebanon.⁵

During my 1-month stay at AUB-MC, I attended daily resident teachings (physics and clinical case conferences), weekly chart rounds, multiple tumor boards, and I shadowed attendings in their daily clinics (both at AUB-MC and NBGUH). The radiation oncologists at AUB-MC typically see all kinds of malignancies but since the team had recently expanded to 5 attending physicians, the trend has shifted to some

degree of specialization within the department. Radiation oncologists, residents, physicists, nurses and therapists at AUB-MC are capable of delivering treatment plans adherent to international guidelines while at the same time operating with tight resources and little time. Having been trained at the University of Texas Southwestern in Dallas, it was interesting to see radiation treatments performed with less dependence on daily image guidance and custom mold cushions, and with significant savings in treatment time. Another interesting aspect of practicing radiation oncology and medicine in general in Lebanon is the culture and stigma around the diagnosis of cancer. This cultural paradigm makes it difficult for physicians to navigate some cases. For example, it was not too uncommon to have families visit our clinic without the patients because families worry that the emotional burden of the diagnosis may affect the patient's response to treatment.

The most interesting aspect of my brief visit was observing Iraqi cancer patients traveling from Iraq to get treated in Lebanon. Once regarded as a model healthcare system in the region with excellent infrastructure and universal coverage, decades of tyranny, regional wars, foreign invasion, terrorism, civil unrest, neglect, and deeply rooted corruption in all national institutions, Iraq's health care system is now fragmented and unable



to provide appropriate medical care, let alone cancer care, to Iraqi citizens. This instability has led to a significant lack in funds, critical infrastructure, and professional personnel, making optimal health-care delivery unfeasible. Violence did not spare doctors, leading to the death, kidnapping, and forced immigration of many specialists, causing a significant drop in the number of oncologists and radiation specialists in most provinces including the capital Baghdad.⁶ Of special oncologic and humanitarian significance in Iraq is the use of depleted uranium-based weaponry during the Gulf Wars, which allegedly increased the incidence of malignancies in many communities.⁷ Additionally, years of embargo against the Saddam Hussein regime meant that many cancer treatments and technologies (including but not limited to chemotherapies and linear accelerators) did not reach Iraqi citizens for fear that the regime would use them to synthesize chemical weapons. Most recently, the health consequences of the 2003 invasion of Iraq were devastating⁸ and the influx of immigrants from nearby Syria compounded the problems.⁹ With respect to radiation oncology services, a recent report indicated the presence of 18 mega-voltage machines (35% of the ideal number of machines recommended by the IAEA), and 76 radiation specialist physicians (20% of the recommended number).¹⁰ Accordingly, Iraq is clearly unable to meet the demands of its cancer patients and it is no surprise that Iraqi citizens flee to neighboring countries for cancer treatments.

Every Iraqi patient I met had a unique story, but all stories shared similar elements such as poor access to care in their home country; lack of appropriate care (wrongful diagnoses or wrongful treatments) leading to disease exacerbation;

and national security concerns, which ultimately prompted travel to Lebanon with the hope of cure. As stated above, Lebanon does not have enough radiation therapy resources to meet the needs of its own citizens. Still, many institutions in Lebanon, including AUB-MC, are absorbing these additional needs and providing care to Iraqi patients. The trip to Lebanon, however, is exhausting physically, financially, and emotionally to the patients and their families. Unfortunately, Iraqi patients pay a portion of the medical bill out of pocket in addition to costs of living (housing, food, and transportation) in Lebanon. Many patients have witnessed significant delays in their care and did not have an appropriate or full medical workup in Iraq, which often meant additional costs and more treatment delays in Lebanon. Often, patients receive part of their care in Lebanon (such as radiation) and resume the remaining portions of their treatment plan (such as chemotherapy) in Iraq, leading to suboptimal and interrupted care. I can only imagine those patients who leave Iraq for better services only to die abroad. Not only would they have paid a significant portion of their savings or sold precious belongings to get treated, but their families must also pay for the repatriation of their bodies. The current cancer care status in Iraq is intolerable and unsustainable. There is an utmost need for a long-term plan that siphons the investments from a band-aid approach to a bold plan for cancer control focusing on building cancer centers in Iraq and training local physicians to deliver appropriate care. Anything short of that is a waste of time and resources.

In conclusion, I am very appreciative of the opportunity provided by ARRO and the great time I had at AUB-MC. Everyone in the radiation oncology

department, including physicians, residents, physicists, nurses, therapists, and staff, were extremely kind and generous. My time in Lebanon and the interactions I had were highly insightful. I made new friends in our field and learned new ways of delivering radiation therapy. Most importantly, I saw first-hand the suffering of patients in countries where radiation therapy is not available. There is an urgent need for radiation therapy services in low- and middle-income countries. More innovative entrepreneurial approaches supported by academicians in the field are needed to fill the void.

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