

Challenges and Outcomes in Launching the First Board-Certified Program in Radiation Oncology in Iraq

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Background

Board-certified residency programs are essential for safe and competent practice in any medical specialty, including radiation oncology. In some countries, these specialty training programs are not yet established (Mula-Hussain et al. 2021). This chapter describes how, despite the political, economic, and social obstacles, the first board-certified residency program in radiation oncology was successfully launched in Iraq during 2013–2017. The result was the work of many, especially my co-authors of the earlier versions of this report. The effort would not have been possible without the public fund through the Ministry of Health at the Kurdistan Regional Government in Iraq and the support of the Kurdistan Board for Medical Specialties (KBMS), besides additional support from many private and not-for-profit authorities and individuals.

By definition, radiation oncology is the discipline of clinical medicine that uses ionizing radi-

ation, either alone or in combination with other modalities, to treat patients with malignant diseases (mostly) or nonmalignant conditions (occasionally) (International Atomic Energy Agency 2009). The common cancers controlled by radiotherapy are the prostate, lung, rectum, uterus, head, and neck and many other sites. Of those cancer patients who are cured, it is estimated that 49% are cured by surgery, about 40% by radiotherapy alone or combined with other modalities, and 11% by chemotherapy alone or combined (International Atomic Energy Agency 2017).

The first establishment of radiotherapy services in Iraq dates back to the 1920s when the Radiology Institute was established in Baghdad (Al-Ghazi 2016). This institute was the only place in Iraq offering radiation services until the late 1950s when a deep X-ray therapy unit was installed in Mosul in 1959. The Iraqi pioneers in this field got governmental scholarships to complete their specialty programs in the UK. After their return, and similar to the British training program in the 1960s–1970s, the College of Medicine at the University of Baghdad established the first specialty program in Iraq (two-year DMRT) in 1985 (Mula-Hussain 2012). These early initiatives came before many similar developments in the nearby countries to Iraq (Mula-Hussain et al. 2019c). Unfortunately, the progress discontinued due to wars and its consequences that Iraq passed through from the 1990s onward, where many professionals left the coun-

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try and development was halted by the embargo and sanctions, which further increased by the occupation in 2003. In 2010, there were only about 30 radiation (or clinical) oncologists and 6 megavoltage machines (MVMs, which are the machines used in radiotherapy) in the whole country. This small number supposed to serve over 32 million Iraqis and around 20 thousand new cancer patients at that time (Mula-Hussain 2012). The resulting ratio of less than one radiation oncologist for every million population is about a tenth of the recommended staffing ratio in other countries (usually 8–12 radiation oncologists per million) (International Atomic Energy Agency 2010).

I describe the challenges and outcomes associated with the establishment of the first board-certified radiation oncology program in Iraq during the period 2013–2017, including the steps that were taken to overcome the challenges. This effort may serve as a mirror for other colleagues trying to establish such educational programs in their countries.

Challenges and Baseline Status

Recognition of the Obstacles

The obstacles in establishing a board-certified radiation oncology program in Iraq were due, but not limited, to lack, or insufficiency, of (1) qualified board-certified trainers in radiation oncology; (2) clinical training centers; (3) modern equipment with required maintenance; (4) quality assurance measures in radiation oncology; (5) academic education, accreditation, and certification; (6) administrative support; (7) financial support; (8) political stability; (9) scientific and professional connectedness; and (10) straightforward bureaucratic processes.

Baseline Status of the Radiotherapy Center

The Zhianawa Cancer Center (ZCC) is a public, tertiary cancer care facility in Sulaimani City

(360 km northeast to Baghdad and 200 km east to Erbil, Fig. 1). ZCC is a dedicated center for radiotherapy, established in 2009. Its services are free of charge and open to all Iraqis (Zhianawa Cancer Center 2017). ZCC was initially staffed by two specialists in radiation oncology with eight residents. These junior resident physicians were enrolled in this center after passing the center's requirements during the period from 2009 through 2012. Unfortunately, they stayed without recognition as the center was not yet staffed with qualified trainer(s) in radiation oncology. The residents needed structured academic and practical guidance to become certified specialists and practice independently and safely.

Overcoming the Challenges

Part I: Defining the Structured Training Program

Contract Agreement with an External Qualified Radiation Oncology Trainer

As many professionals left the country from the 1990s onward, it was impossible to establish an advanced (board-level) program in this field without the availability of a single board-certified radiation oncology trainer locally (Mula-Hussain and Al-Ghazi 2020). Radiation oncology is a complex clinical field and requires well-trained personnel. Investment in personnel should precede that in equipment to achieve a satisfactory outcome. Based on this, the first step was to choose a board-certified person from abroad and qualified to lead the effort of establishing such a program locally. To achieve this goal, ZCC in Sulaimani started to contact external trainers during the 2010s. Eventually, the officials from the Regional Ministry of Health signed a four-year contract with an external trainer (the author of this chapter).

The local leaders of ZCC invited this external trainer to visit the center in 2011 to address its suitability for the postgraduate accredited training program. The visitor examined the infrastructure and the available human and equipment resources. He wrote a visit report with recom-



Fig. 1 Sulaimani (Sulaymaniyah) and its relation to the federal capital (Baghdad) and the regional capital (Erbil), northeast of Iraq. Both cities are part of Kurdistan. J.: Jordan. Source: Getty Images

mendations to update the available equipment resources and a roadmap for moving forward. This visit was also coupled with meeting the academic leadership team at the KBMS to meet their organizational requirements in postgraduate

medical education and recognition. After about 18 months from the visit report and following the recommendations, the external trainer returned to ZCC to start the in-house training process in the second quarter of 2013.

Accreditations

With the in-house external trainer's availability, ZCC got the accreditation of the KBMS to be a certified training center in radiation oncology for a four-year residency program. Another accreditation followed this recognition by the College of Medicine—the University of Sulaimani for an alternative three-year Master of Science (MSc) program in radiation oncology (for those who already have a minimum of one-year training in radiation oncology).

Definition, Mission, and Vision

The training pathway is settled to let the trainee acquire knowledge in oncologic science and gain clinical experience in radiation oncology. The mission was defined as “serving patients, the public, and the medical profession by certifying that ZCC diplomates have acquired, demonstrated, and maintained the requisite standard of knowledge, skill, understanding, and performance essential to the safe and competent practice of radiation oncology” (Datta et al. 2014). The vision is that by 2020, ZCC will have advanced safety and quality in healthcare by setting definitive professional standards for radiation oncology (Mula-Hussain 2013), which it has achieved.

Training and Study Syllabus

The syllabus was devised using well-structured resources in clinical radiation oncology programs, like the syllabi from the Royal College of Radiologists in the UK, the Royal Australian and New Zealand College of Radiologists, the CanMEDS framework of the Royal College of Physicians and Surgeons of Canada, the American Board of Radiology, and the International Atomic Energy Agency (IAEA) syllabus that was endorsed by the American Society for Therapeutic Radiology and Oncology (ASTRO) and the European Society for Therapeutic Radiology and Oncology (ESTRO). There were 10 modules, with 100 credits over 4 years in the KBMS board program and 75 credits over 3 years in the university MSc program. The residents have to achieve the seven competency requirements (medical experts, communicators, collaborators, leaders,

advocates, scholars, and professionals in radiation oncology, as defined by CanMEDS). The academic credits are summarized in Table 1 (Mula-Hussain 2013).

For the length of the structured training, we opted to make it full-time 4 years in radiation oncology, following the Royal College of Physicians and Surgeons of Canada and the American Board of Radiology. Due to administrative logistics and the need to increase the acceptance but keeping the quality, we designed an alternative pathway of specialty certification through the university and of a full-time 3-year course of study leading to the MSc degree for those who already have 1 year of uncategorized training in radiation oncology. For the latter, we followed the well-established syllabi adopted by the Royal College of Radiologists in the UK and the IAEA syllabus (International Atomic Energy Agency 2009).

Admission and Academic Requirements

The main admission requirements include graduation from a recognized medical school by the ministry of higher education, hold a practice license by the medical association, and completion of a rotatory general residency of a minimum of 12 months. Applicants must pass the entry examination in oncology foundations, be good English users, and successfully pass the personal interview (Mula-Hussain 2013). Each trainee must publish a paper in a peer-reviewed journal and/or complete a research thesis in the final year of training. According to the board and university regulations, every specialist needs to show scientific merit and critical appraisal before getting a certification degree in that particular field.

Clinical Training (Major and Minor Rotations)

Under supervision, residents rotate in four groups, two residents each, sequentially. Each major rotation has a duration of 3 months in radiation oncology and is repeated three to four times during the studies with increasing independence granted to residents as their skills develop. During each rotation, the resident passes through

Table 1 Academic disciplines, didactic and practical hours, and equivalent credits (Mula-Hussain 2013)

| | Academic disciplines (modules) | Training hours | | | Credits ^a (D/P) |
|-----|--|------------------|---------------------------------|--|----------------------------|
| | | Didactic (D) | Practical (P) | | |
| 1. | Cancer biology and radiation biology | 45 (first Y) | 0 | | 3 |
| 2. | Medical physics | 45 (first Y) | 135 (1st–second Y) | | 6 (3 + 3) |
| 3. | Medical research and cancer epidemiology | 45 (first Y) | 0 | | 3 |
| 4. | Onco-pharmacology | 30 (first Y) | 0 | | 2 |
| 5. | Radiological anatomy and diagnostic oncology | 30 (first Y) | 45 (first Y) | | 3 (2 + 1) |
| 6. | Tumor pathology and laboratory | 30 (first Y) | 45 (first Y) | | 3 (2 + 1) |
| 7. | Medical oncology | 30 (second Y) | 90 (second Y) | | 4 (2 + 2) |
| 8. | Surgical oncology | 15 (second Y) | 45 (second Y) | | 2 (1 + 1) |
| 9. | Clinical radiation oncology | 75 (1st–third Y) | 265 ^b (1st–fourth Y) | | 64 (5 + 59) |
| 10. | Academic work | 30 (third Y) | 360 (third Y) | | 10 (2 + 8) |
| | | 375 | 3375 | | 100 (25D + 75 P) |

Notes

- ^a One credit equals 15 didactic hours (1 h/week for 15 weeks) or 45 practical hours (3 h/week for 15 weeks).
- ^b 2655 h distributed as 500, 750, 750, and 655 annual hours during the first, second, third, and fourth year, respectively.
- One-hundred credits for the four-year KBMS board program and 75 credits for the three-year university MSc program (similarly 375 didactic hours, correspondingly proportionate practical hours)

new patients' clinics, on-treatment clinics, post-treatment follow-up clinics, simulation techniques, volumes' contouring, and plan evaluation sessions. Minor rotations were arranged, too, each of 2–4 weeks duration, in diagnostic radiology, tumor pathology, medical oncology, surgical oncology, palliative care, and cancer research (Mula-Hussain 2013).

Evaluation, Promotion, and Examination

A regular evaluation, that is, a written examination and oral assessment, was arranged at the end of each clinical rotation and each didactic course. Annual evaluation (written examination and practical assessment) was organized at the end of each training year. Feedback from all the peers and co-workers was considered. However, the infrastructure so far was not permissive to a 360° review. On campus (at ZCC) and a yearly report were sent to the KBMS and the university about promoting the trainee to the following year. Part one examination was conducted at the KBMS and the university after successful completion of the first year. The final examination took place at the KBMS and university upon successful completion of the last year. A significant guideline for assessment is to see if the candidate demonstrates the competency to practice safely and independently. This examination consisted of two written exams (over 2 days) and an oral and practical OSCE examination (set by external, volunteering examiners).

Specialty Certificates

Successful completion of the curriculum results in the award of the title of “Fellow” (post-nominal “FKBMS”) by KBMS or the MSc in radiation oncology by the University of Sulaimani.

Part II: Adjunctive Collaborative Opportunities

Internal Academic Assistance

Radiation oncology practice is closely related to many basic and clinical sciences. Based on the syllabus, contact with local academics at the

University of Sulaimani was arranged to cover the required subjects. All of them enthusiastically helped in covering the syllabus.

International Individual Assistance

Individual contacts with colleagues in different disciplines and countries were made to arrange short professional visits to ZCC. This proved to be successful. Many colleagues from various disciplines and countries (Jordan, Saudi Arabia, the UK, the USA, Canada, and Italy) visited ZCC and spent days to weeks working voluntarily with the local mentors and residents. These visitors shared their expertise as lecturers and trainers and as external examiners in the final year of OSCE examination for the first cohort in May 2017.

Global Institutional Networking

Considerable efforts were made to establish external outreach with international centers and organizations. Memoranda of understanding were arranged with centers in Turkey, India, the USA, and Canada. ZCC obtained membership of the most extensive global umbrella for cancer control, the Union for International Cancer Control (UICC), making it the first in Iraq.

ACR (American College of Radiology) In-Training Examination

In an endeavor to standardize our training program in line with international programs in developed countries, the American College of Radiology allowed our residents to enroll in its annual in-training examination in March 2017 after arranging the required examination fees. Seven ZCC residents sat the examination on the same day as their peers in the USA. They did well in general; even one of them passed his peers' mean in the USA. This provides benchmarking for both the residents and their program.

This orientation and benchmarking experience was, however, not repeated due to financial hardship of the ZCC resulting in a lack of providing the necessary infrastructure for its proper conduct. It would be desirable to provide this examination for the current and coming residents

in order to secure an objective measure for the teaching success.

Scientific Meetings and Courses

To further improve evidence-based, multidisciplinary approaches to cancer care, ZCC was successful in arranging the following four international activities:

- Multi-Disciplinary Oncology Course series in Iraq (February 2015) covered general cancer care, a five-day course attended by 206 attendees.
- Best of ASTRO Iraq meeting (December 2015), officially licensed by ASTRO, covered best abstracts from the 2015 annual ASTRO meeting, with 197 attendees.
- Multi-Disciplinary Oncology Course series in Iraq, second course, covered gynecologic oncology in September 2016, over 2 days, attended by 227 attendees.
- Best of ASTRO Iraq meeting (May 2017), officially licensed by ASTRO, covered best abstracts from the 2016 annual ASTRO meeting, attended by 152 attendees.

In addition to attendance and benefiting from these events' scientific opportunities, the residents presented their work and assumed organizational and leadership roles. The invited external speakers shared their expertise in teaching the residents through dedicated "meet the professor" sessions. They also joined ZCC examination days that were arranged in the periods of the meetings.

Online Education and Telemedicine Tools

Some of the program residents were able to further improve their educational knowledge through accessing ESTRO School FALCON courses (Fellowship in Anatomic DeLineation and CONtouring). One of the residents, who participated in this international course in 2017, came first among all the international participants and was acknowledged by IAEA during the International Conference in Advanced Radiation Oncology in Vienna, June 2017.

Quality and Safety Culture

ZCC fosters a culture of quality and safety. All residents, physicists, therapists, and other staff are obliged to report any incidents or accidents during daily work. An emphasis on the double- and triple-check is the norm to improve patient care safety and quality. This includes but is not limited to contours and plan check, treatment delivery, and the entire patient care process.

External Training Opportunities

Some of the residents participated in a palliative care course organized locally by an international expert. Other residents attended international clinical attachments for some days and weeks to months at advanced centers in Turkey, the UK, and the USA.

Research Promotion and Collaboration

Simultaneously and in parallel with the education and clinical training program, research activities were supported. During the period 2013–2018, ZCC residents and staff accomplished 2 books, 7 theses, 10 peer-reviewed manuscripts, 19 oral presentations (5 were international), and 17 poster international presentations covering miscellaneous topics (Mula-Hussain et al. 2019b). ZCC hosted an international student from the University of Toronto for 4 weeks in 2017 to let her voluntarily help in a supervised medical and laboratory experience and assist in the residents' research activities from the English language editing perspective.

Local Funding and Supporting Opportunities

Civil society, nongovernmental organizations, the private sector, and philanthropic individuals in Sulaimani and across Iraq were approached to help the training center and its educational programs and scientific activities. This proved to be helpful to ZCC in furthering its clinical and educational mission. These opportunities helped in covering the costs of the four scientific events that ZCC arranged, the membership cost at UICC, partial support of the external visits that the residents did abroad, costs of the travel and accommodation expenses of the external

short-stay trainers and lecturers, updating some of the tools and equipment at ZCC, etc.

Follow-Up

After beginning the program in 2013, new cancer cases almost doubled compared to 2012. The center's registry reported 1040 in 2013 compared to 655 in 2012. This increased gradually to 1155 in 2015. In addition to the standard baseline three-dimensional conformal radiotherapy, more services started after launching the training program in ZCC, such as intensity-modulated radiation therapy (IMRT) in the mid-2013 and high-dose rate brachytherapy in the mid-2016, both for the first time in Iraq.

To date (2021), ten residents had enrolled and completed its requirements and are currently working independently. Eight of them initially were the local ZCC residents who had enrolled in 2013 and 2014 in two different batches and presently working as specialists in ZCC itself. Another two were from other centers, and they returned to their home centers in Mosul and Erbil (350 km and 200 km from Sulaimani, respectively). The program is still running with four ongoing residents in its path.

Niloy R. Datta et al. reported in 2014 that only 4 of 139 low- and middle-income countries (LMICs) have the requisite number of MVMs and 55 (39.5%) have no radiation oncology facilities (Datta et al. 2014). Patient's access to radiotherapy in the remaining 80 LMICs ranges from 2.3% to 98.8% (median: 36.7%). By 2020, these 84 LMICs would additionally need 12,149 radiation oncology practitioners (Datta et al. 2014).

While currently there is no apparent shortage in radiation oncology workforce at ZCC and Sulaimani as a city, the deficit is evident in the number of machine that is not enough for the governorate itself. The gap will be more pronounced when we know that ZCC accepts patients from any place in Iraq, particularly those who come from the governorates that do not have radiotherapy services. There is a significant shortage of the ideal MVM number and the radiation oncology practitioners in Iraq as a whole

country. These gaps will increase in the future due to population growth unless there will be good momentum in advancing the human resources and the functional MVMs. In 2019, in the whole country, there were about 49 radiation oncologists (Ministry of Health/Environment 2019) and 19 MVMs (International Atomic Energy Agency 2020), to serve the 35,864 new cancer patients (Iraqi Cancer Board 2020), among the 39 million Iraqis in 2019–2020. Based on the ratio of one MVM per one million population that can be suitable to Iraq, the coverage in 2019 was about 46% of the ideal MVMs (International Atomic Energy Agency 2008). In 2022, the estimates are 52,855 new cancer cases over 42 million Iraqi population, and this necessitates additional human resources and MVMs to decrease the gap in radiotherapy across the country.

Conclusions

After 18 months of logistical preparation and over 4 years of structured and accredited training in the 2010s, the process of establishing the 4-year board-certified residency program in Iraq was accomplished (2013–2017) (Mula-Hussain et al. 2019a, b). Despite all the challenges, the program continued running till now. This program's success was significantly driven by the high level of enthusiasm of all those involved, including trainees, as well as other personnel from the academics and leaders of the institutions involved. We believe that this successful experience is noteworthy, and it can serve as a model for other developing unstable nations.

Perseverance paid off as it became the first board-certified program in radiation oncology established in Iraq. Ten physicians (including two female colleagues) completed the training requirements in radiation oncology in 2017–2020, seven with the four-year board KBMS program and three with the three-year MSc university program. They are serving six Iraqi governorates (Sulaimani, Erbil, Duhok, Halabja, Kirkuk, and Mosul) with a combined population of over ten million.

ZCC was successful in its vision, and it achieved the mission with its bridging program. ZCC staff are transitioning from being general certified radiation oncology practitioners to being site-specific radiation oncology practitioners. Each specialist is responsible for 2–3 cancer sites to master their expertise further. The program is still running with ongoing residents in its path.

It took a team of local professionals and a global collaboration with medical institutions dedicated to elevating the standard of cancer care to have this success story. We believe that many countries that are similarly coming out of war may achieve similar success. This experience can be duplicated in other underserved developing countries if the minimum requirements are available.

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