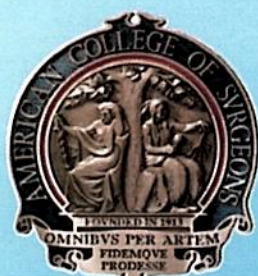


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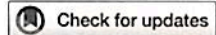
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# Medical Capacity-Building in War-Torn Nations: Kurdistan, Iraq as a Model



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*I can do things you cannot; you can do things I cannot; together we can do great things.*

Mother Teresa

Medical capacity building is necessary to improve global health, but is a very challenging endeavor, particularly in war-torn, politically unstable regions. This involves training physicians' procedural and clinical management skills that they otherwise would not have learned on their own, and most importantly, tasks that can continue independent of outside involvement and participation. Surgical and medical capacity can be built through perseverance, careful deliberation, and empowering the local medical community. We present our 28-year experience of surgical and medical capacity building in Kurdistan, Iraq, a war-torn region of the world.

## Magnitude of the global surgical burden

Approximately 5 billion people, or two-thirds of the world's population, lack access to safe, consistent, affordable surgical and anesthetic care. Almost one-third of all these medical conditions can be managed and addressed by surgical teams. Of the 313 million procedures that are performed globally each year, only 6% are performed in the poorest countries. These statistics underscore the need for intensive capacity building in many parts of the world.<sup>1,2</sup>

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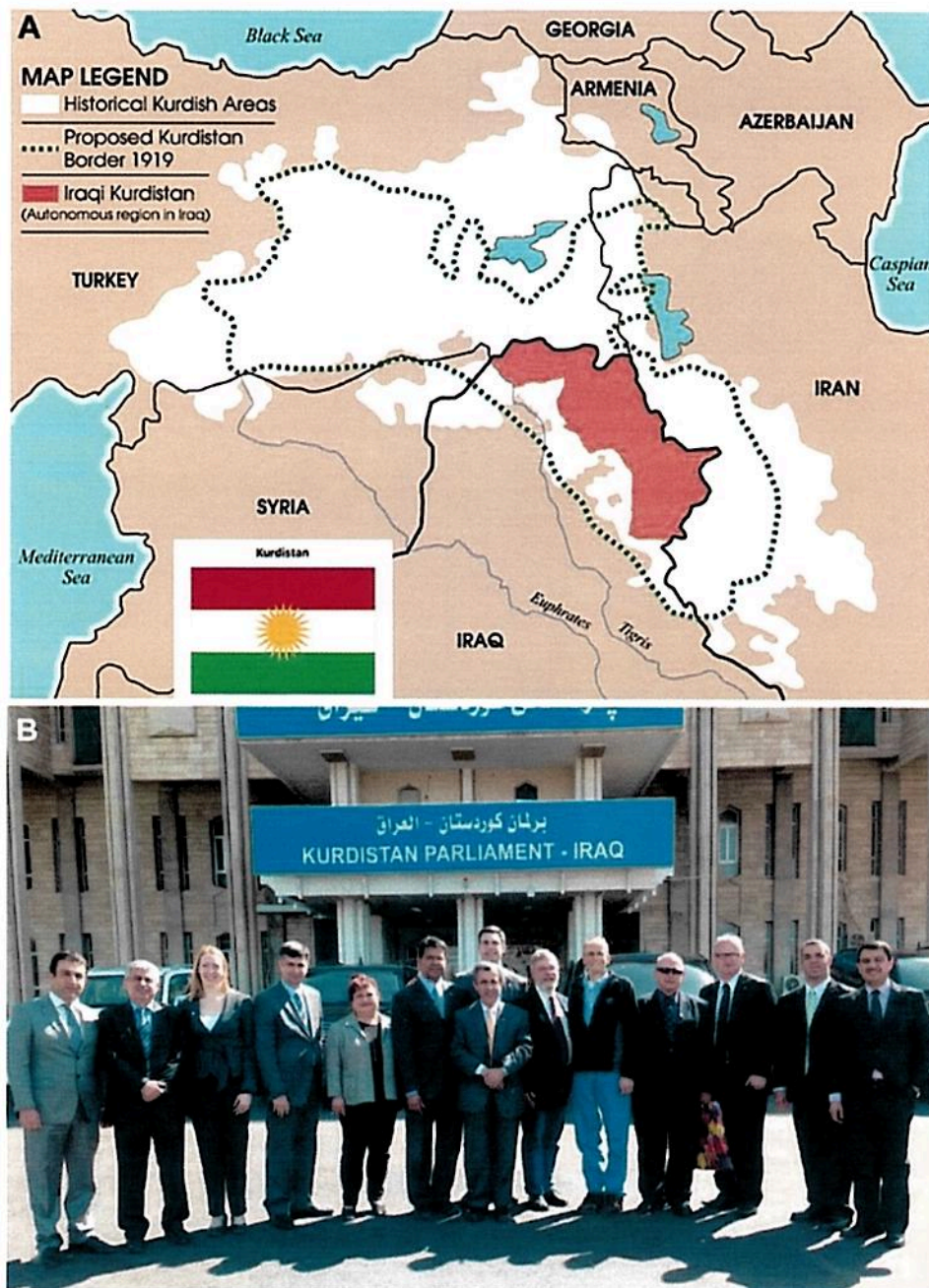
The autonomous Kurdistan Regional Government (KRG) is located at the heartland of ancient Mesopotamia, the cradle of civilization (Fig. 1A).<sup>2</sup> After many decades of wars and oppression, the people of Kurdistan have sought to build an independent nation and strived to build a self-sustaining healthcare system with limited resources. This article describes how several volunteering American surgeons and physicians traveled to war-torn Kurdistan (1992 to 2020), in order to support a motivated, yet resource-depleted, local Kurdish medical community. These volunteers also took care of the refugees and the wounded Kurdish Peshmerga (soldiers), victims from the Islamic State of Iraq and Syria (ISIS). Our goal of surgical and medical capacity building revolves around Southern (Bashur) Kurdistan, Iraq.<sup>2</sup>

## Background on Kurdistan

The Kurds are an Aryan race, and their language is of Indo-European origin. Most scholars believe that the Kurds are descendants of the Medes, an ancient people who overthrew Nineveh in 612 BC. Xenophon in 400 BC, mentioned Kardouchoi, who gave Alexander the Great and his 10,000 army a mauling as they retreated from Persia, many historians believe they were the ancestors of the Kurds.<sup>3</sup> Kurdistan covers around 190,000 square kilometers (73,000 square miles), and is as big as Colorado. The Kurds are the largest ethnic group on earth without a homeland. They comprise between 45 and 50 million inhabitants who live in the upper Mesopotamia region of Ararat Mountain, an area where both the Tigris and Euphrates rivers originate and border with Turkey, Iran, Iraq, and Syria. Of the 45 to 50 million Kurds, roughly 6.5 to 7.0 million reside in Kurdistan, Iraq.

Current Kurdistan, surrounded by neighboring states, is a byproduct of colonial powers controlling the Middle East post World War I.<sup>4</sup> The KRG is in northern Iraq. The current borders of Iraq were drawn in 1920 under the Treaty of Sevres, which allowed the League of Nations to partition the collapsed Ottoman Empire.<sup>5,6</sup> For Iraq, the treaty had essentially amalgamated 3 different groups of people—the Arab Sunni, Arab Shiite, and Kurds—into 1 nation. Other minorities, such as Assyrian and





**Figure 1.** (A) Kurdistan map and flag (B) Team visiting Kurdistan Parliament (Photo provided courtesy of the authors, with permission).

Chaldinian, as well as Turks and Yazidi Kurds, also inhabit the country.<sup>2</sup> The Yazidi Kurds practice their ancient religion, Zoroastrianism, and have been persecuted over the centuries. In many ways, Kurdistan is a land of tolerance, with a plurality of religions being practiced safely. Kurds have their own culture and language,

and their history demonstrated fierce resistance against Arab expansion in the sixth century.

In June 1992, for the first time in its history, Kurdistan formed its own parliament and had a “No Fly Zone” in a region in Kurdistan, Iraq that was under NATO’s protection. Members of the parliament were democratically



elected, and the government appointed a cabinet under a ratified constitution. However, the Kurdish people continued to suffer under the Saddam Hussein government. Ultimately, with Operation Iraqi Freedom, the Kurds were finally liberated from Saddam's control. However, in 2014, as Kurdistan's economy and infrastructure began to flourish, a new specter emerged—the Islamic State of Iraq and Syria (ISIS). However, fighting side by side with American soldiers, the Kurdish armies (Peshmerga) were able to liberate Kurdistan, Iraq. Now that peace and stability have improved in the region, the Kurds can focus on repairing their lands from the years of conflict.

### Why Kurdistan was the first outreach destination

The Iraqi people, in general, and the people of Kurdistan in particular, went through multiple governmental changes and military coups and suffered numerous lengthy and protracted vicious wars (Table 1). During a decade-long Iraqi/Iran war in the 1980s, more than 1 million lives were lost on both sides, with more than 10 million land mines still remaining near the borders between the 2 countries. Both countries suffered catastrophically, both economically and environmentally.

Subsequently, Kurds were subjected to chemical warfare and the Anfal Campaign by the Baghdad Government in 1988. Millions of Kurds had to take refuge abroad. After the second Gulf War, more than 500 mass graves of civilian Kurds had been identified all over Iraq. Lastly, Kurdistan had suffered significantly from the double embargo: 1 imposed by the United Nations on Iraq as a whole, and 1 imposed by Saddam Hussein on the KRG. It was impossible for even Doctors without Borders to travel to Kurdistan because Baghdad, Turkey, Iran, and Syria prohibited international healthcare personnel from entering Kurdistan of Iraq.

Kurdistan is landlocked by these neighboring states. There were no airports in Kurdistan until after the Second Gulf War, and only after the war was one built in the

KRG capital city, Erbil (Hawler). Unfortunately for the people of Kurdistan, just when things were beginning to become more settled, the emergence of ISIS led to atrocities over large parts of Syria and Iraq. ISIS targeted and massacred the Yazidi Kurds in the city of Shinghal and the Christians in the plains of Nineveh. Fortunately, NATO provided air coverage while also arming and training the Kurdish Peshmerga to defeat ISIS. Unfortunately, the war with ISIS led more than 2 million refugees entered Iraqi Kurdistan. The city of Duhok's population doubled, from 1 million to 2.2 million in a matter of months. This put a significant strain on an already tenuous health system, as the Kurdish physicians were overwhelmed with the number of refugees, wounded Peshmerga, and Iraqi soldiers. Therefore, the Kurdish health system sought help from the international medical community, the World Health Organization (WHO), and the United Nations. It was at this point that our team answered their call and assembled a robust and comprehensive surgical and medical team to travel to Kurdistan via the new Erbil (Hawler) airport.

### Early medical outreach trips to the Kurdistan “No Fly Zone”

Dr GB Zibari, the senior coauthor of this article, was one of the fortunate Kurds who survived Saddam Hussein's atrocities. More than 50% of his high school classmates, including one of his first cousins, were killed during the Iraq/Iran war and the Iraq/Kurdish war. On May 1, 1976, Dr Zibari took refuge in the US after graduating from high school in an Iraqi Kurdish refugee camp in Kurdistan of Iran. However, after 16 years in absentia and immediately after the first Gulf War, Dr Zibari returned to Kurdistan in June 1992, while completing a solid abdominal organ transplant fellowship at Johns Hopkins. His return was possible only because NATO had created a “No Fly Zone” over Kurdistan of Iraq. Dr Zibari's initial visit to Kurdistan in 1992 was a fact-finding medical mission. It was a historic time for the region, as 1992 was the first year that the Kurds could vote freely and elect a Kurdish Parliament (Fig. 1B). At that time, Dr Zibari visited the only public hospital in Duhok, a city 50 miles north of Mosul, a city that later became a stronghold for ISIS. The Azadi Hospital of Duhok, formerly known as Saddam Hussein Hospital, became the main center of Dr Zibari's humanitarian medical outreach program for almost 3 decades.

As would be expected after decades of war, the Kurdish medical community was isolated and had a severe lack of resources and outdated infrastructure. By Dr Zibari's estimates, the Kurdistan medical system was at least 3 decades, if not more, behind that of the US healthcare

**Table 1.** Recent History of Iraqi War, which Led to Significant Destruction, War Crime, and Genocide Against the People of Kurdistan

Event	Year
Iraqi-Kurdish Wars intermittently	1961-1991
Iraq/Iran War	1979-1988
Anfal campaign and chemical warfare	1988
First Persian Gulf War	1991
Northern “No Fly Zone” created	1991
Second Persian Gulf War	2003
Islamic State of Iraq and Syria (ISIS) War	2014

system. Several challenges that needed to be addressed included refilling empty pharmacies, updating antiquated ultrasound and x-ray machines, establishing blood banks, and improving the availability of laboratory testing. The health system needed to replace obsolete medical texts and journals for all the medical, dental, nursing, and allied health schools. Also, they did not have any air ambulances. Pre-hospital care and ambulance transportation was nonexistent. There was no such thing as a level 1 trauma center, cancer center, cardiovascular unit, neonatal unit, or an OB-GYN hospital.<sup>2</sup> Furthermore, the central government in Baghdad, which was still controlled by Saddam Hussein at that time, had refused to pay salaries to any government employee who lived in the "No Fly Zone," despite a UN mandate that Baghdad pay the salaries of all employees and give the Kurds their allotment of resources under the UN Oil for Food Program. Despite these obstacles, the Kurdish medical community was enthusiastic to revitalize and rebuild their healthcare system. With the assistance of US and western volunteers, they were able to make great strides in achieving their goals.<sup>2</sup>

#### **Building a local team and establishing a foundation for future outreach trips**

Most of the earlier trips to Kurdistan were spent meeting and achieving buy-in from key stakeholders, such as local healthcare leaders, the governor of the province, the Kurdish political leadership, and members of the KRG.<sup>2</sup> Dr Zibari sought advice from these parties and supported the founding committee for the creation of the Duhok Medical School. The Governor of Duhok and the Prime Minister of the Kurdish regional government (Mr Nichervan Barzani) donated a significant portion of land to the Azadi Hospital of Duhok to build the medical school and allow for future medical center expansion. Six years later, in June 1998, Dr Zibari attended the first graduation ceremony for the medical school. These successes led to the establishment of the University of Duhok, which now comprises 12 colleges.

With each subsequent medical capacity building trip, Dr Zibari assembled a cadre of volunteers from different disciplines. This team included general surgeons, surgical oncologists, transplant surgeons, hepato-pancreato-biliary (HPB) surgeons, laparoscopic surgeons, traumatologists, otolaryngology—head and neck (ENT) surgeons, neurosurgeons, emergency physicians, medical oncologists, nephrologists, cardiologists, anesthesiologists, obstetricians and gynecologists, ophthalmologists, optometrists, plastic surgeons, podiatrists, residents and fellows, physician extenders, paramedics, and nurses. On each trip, we also organized an academic surgical symposium, where each

volunteer gave a formal presentation on a specific topic. We also invited local surgeons to speak on topics of their choice. The symposia were well attended and stimulated interesting discussions (Fig. 2A).<sup>2</sup>

Each trip to Kurdistan was roughly 10 days. After the introduction and discussion with the leaders of Duhok Hospital (Fig. 2B), the physicians split into several groups: neurosurgery, trauma/emergency care, otolaryngology, surgical oncology, ophthalmology (Fig. 3A), general surgery, laparoscopy (Fig. 3B), transplant surgery (Fig. 4),<sup>2</sup> and hepatobiliary & pediatric surgery (Fig. 5). We treated many cases with varied complexity. Between cases, the teams assessed patients and performed pre- and postoperative evaluations. As in many regions of the developing world, patients would arrive with their medical records in hand.<sup>2</sup>

Unlike US healthcare facilities, a centralized area dedicated to maintaining medical records does not exist in Kurdistan. Unfortunately, we would often assess patients who we simply did not have the resources or expertise to treat: specifically, those with major orthopaedic, chronic pain, and gynecologic disorders. Even though not all could receive treatment, the patients were grateful that we had taken the time to assess them. Many patients had traveled long distances to be evaluated by the "doctors from the US." In fact, as a testament to the skill and dedication of our Kurdish colleagues, many patients were already on the correct treatment course for their chronic disease and simply required reassurance.<sup>2</sup>

After each exhausting day, we would break bread with our Kurdish colleagues. This was one of our most enjoyable moments because this enabled us to personalize our relationships to a larger degree.<sup>2</sup> On each trip, our Kurdish colleagues would reserve time for us to visit General Babakir Zibari, who has been very supportive of our outreach work in Kurdistan. On our more recent trips, we visited refugee camps to care for the people who had escaped ISIS. We used a telehealth platform to consult with our colleagues in the US.<sup>2</sup>

#### **Building medical capacity**

International health, with the goal of medical capacity building, is substantially and fundamentally different from most medical missions. We are working alongside our colleagues, sharing medical and nonmedical knowledge, educating and training the local care teams, and using the tactics and techniques they will be able to continue, independent of our availability and involvement.<sup>7-12</sup> For many years, Dr Zibari had spent his vacation time traveling to Duhok to assist the medical community with capacity building. It was not until Mr





**Figure 2.** (A) Team members with local medical leadership at symposium in Sulaimani, KRG at 25th Anniversary of Halabja chemical warfare in April 2013. (B) Director of Duhok Province Health System with our team and local leadership participating in media conference. (Photos provided courtesy of the authors, with permission).

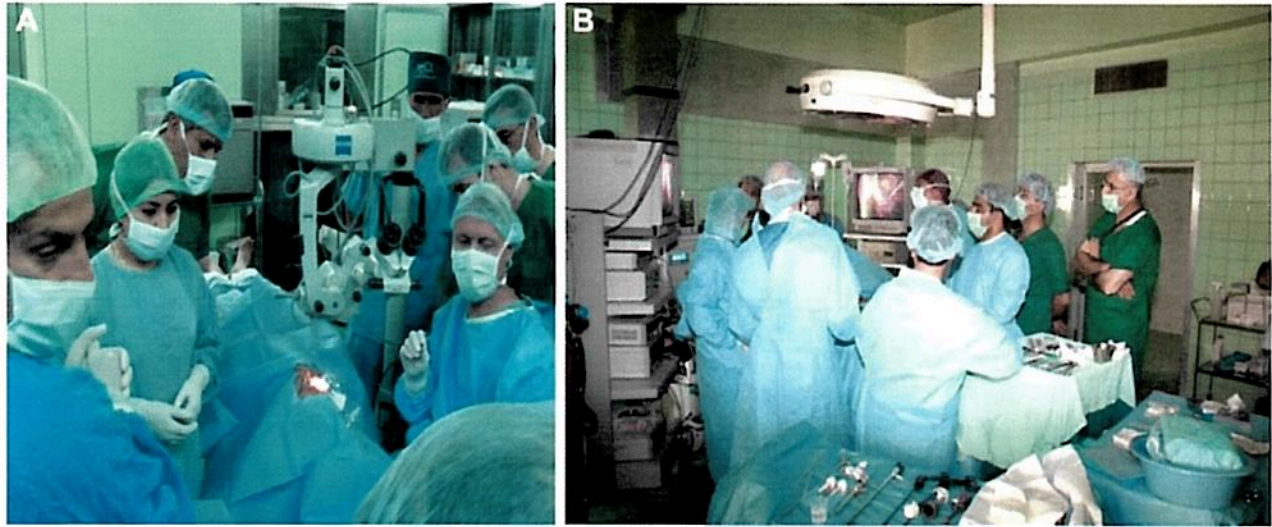
Hussein's toppling that he felt comfortable enough traveling to the country to solicit help from medical colleagues who could provide the support needed to launch a capacity-building effort. For more than a decade, Dr Zibari has consistently brought a dedicated and committed team of 15 to 20 clinicians to assist with capacity building.

The team works closely with the most skilled physicians at the Azadi Teaching Hospital and ensures their competency by serving as highly skilled assistants who then provide critical management advice or technical skills training through the procedure. The Kurdish trainees are also present and participate in many aspects of the surgical mission, such as preparing and presenting cases as well as intraoperative participation. By ensuring competence in the attending physicians, we ensure that subsequent generations of physicians can learn lessons from

our work and therefore, propagate the skills further in the Kurdish region.

More specifically, with our renal transplant system, we first helped with patient selection and started living-related transplants. With each donor nephrectomy and re-implant, we limited our participation until finally, we were able to wean ourselves entirely from the operating room, enabling the surgeons to be entirely self-sufficient. We then approached hospital and governmental health officials to inform them of the Kurdish surgeons' competency and requested permission to allow them to create a renal transplant program (which was quickly approved). They then selected transplant fellows for a 2-year training program, which has now graduated several classes. Aspects of the same strategy were used across numerous procedures such as laparoscopic cholecystectomies. Throughout the process, volunteer surgeons





**Figure 3.** (A) Dr K Labor teaching modern cataract surgery at Azadi teaching hospital. (B) Dr John Thomas and Dr Bill Day teaching minimal invasive surgery at Azadi Teaching Hospital, Duhok, KRG. (Photos provided courtesy of the authors, with permission).

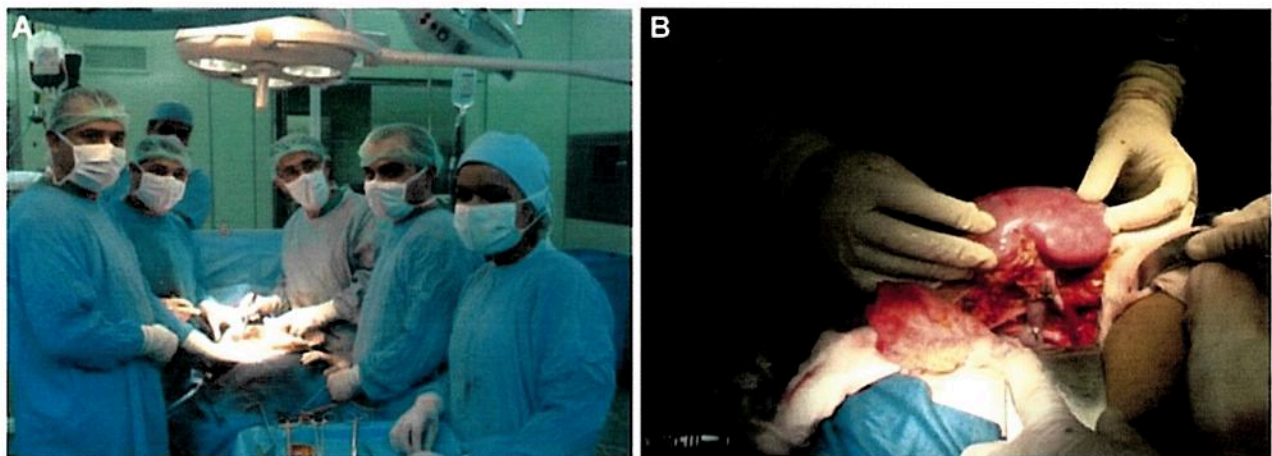
were intimately involved with assessing competency of the local surgeons, and they made recommendations to the senior surgeons of the institution.

A critical aspect of the success and sustainability of this team with our Kurdish counterparts is funding. We have been able to form reliable partnerships that help offset the costs associated with these missions. These teams have been co-sponsored by the Americas-Hepato-Pancreato-Biliary Association (AHPBA), the International Hepato-Pancreato-Biliary Association (IHPBA), Operation Hope, the World Surgical Foundation (WSF), the American Kurdish Medical Group, the Kurdish Regional Government (KRG), and other organizations. Mr Nichervan

Barzani's Health Foundation provided the most financial help.

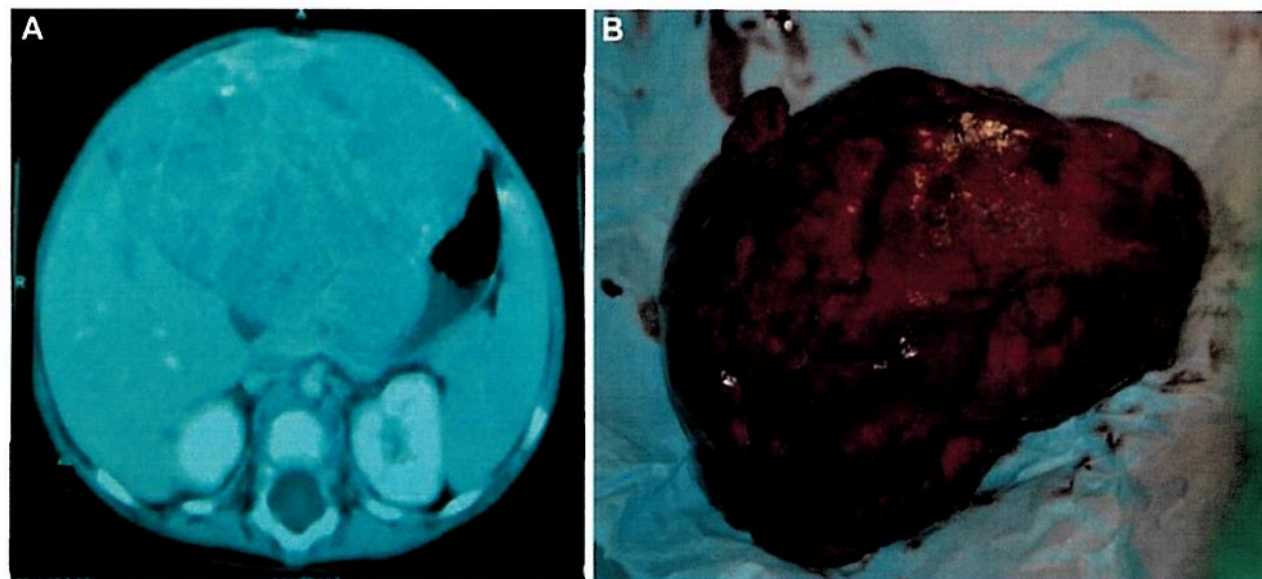
Through the years, the team has been able to achieve several notable accomplishments, including the following:<sup>2</sup>

1. Developing the resources, personnel, and facilities needed to offer basic and advanced laparoscopic operations. The first laparoscopic cholecystectomy was performed in Duhok in early 2000. Now, laparoscopic cholecystectomies are performed more than 80% of the time over open cholecystectomies. Other advanced laparoscopic operations now include adrenalectomy,



**Figure 4.** (A) Dr Zibari with local transplant team (Drs Balindi, Dr Abdulla, Dr Saeed and Mrs Suaad) performing renal transplant at Azadi Teaching Hospital, Duhok, KRG. (B) Intraoperative renal transplant. (Photos provided courtesy of the authors, with permission).





**Figure 5.** (A) CT of abdomen of a child with large left lobe liver mass. (B) Drs Chu and Zibari and local pediatric surgeon performed left extended hepatectomy specimen. (Photos provided courtesy of the authors, with permission).

splenectomy, nephrectomy, Nissen fundoplication, gastric sleeve resection, and gynecologic procedures.

2. Establishing a living-related renal transplantation program. More than 3,000 renal transplantations have been performed since Dr Zibari established the program (1 in Duhok and 1 in Erbil) in June 2004. Today, an average of 2 renal transplants are done weekly in Duhok, and 4 are done in Erbil. They have established their own fellowships.<sup>2</sup>
3. Training local surgeons to perform complex neurosurgical procedures such as craniotomy for temporal lobe tumor, resection of sphenoid wing meningioma, and spinal decompression/stabilization for traumatic fracture/dislocation.
4. Training local surgeons to perform complex hepatopancreato-biliary and oncologic operations such as the Whipple procedure, major liver resections (central hepatectomy, formal lobectomy), radical cholecystectomy, esophagectomy, and gastrectomy with lymphadenectomy; and the team introduced them to modern technology and surgical devices such as the Ligasure, Harmonic, Sono-incision staplers, and modern laparoscopic instruments, radiofrequency ablation (RFA); BookWalter and Sonosite Ultrasound.
5. Supporting the first medical journal in Duhok, *Duhok Medical Journal*.
6. Engaging surgeons in the global surgical community by assisting them with obtaining membership to professional organizations such as the American College

of Surgeons (ACS) and the Americas Hepato-Pancreato-Biliary Association (AHPBA). Of note, to our knowledge, there was not a single surgeon in Kurdistan who had ACS Fellowship and now they have in excess of 35 ACS Fellows among Kurdistan surgeons.

7. Establishing an annual Joint AHPBA, the International Hepato-Pancreato-Biliary Association (IHPBA), Operation Hope, and World Surgical Foundation Surgical Symposium to update the medical community on innovations and technologies.
8. Establishing a trauma team composed of trauma surgeons, critical care clinicians, neurosurgeons, and an emergency medicine clinician, who taught the local surgeons prehospital patient care, mass casualty triage, and management of patients exposed to chemical weapons. Also, they taught mini Advanced Trauma Life Support (ATLS) courses and ultrasound for surgeons like Focused Assessment with Sonography for Trauma (FAST).<sup>9-13</sup>
9. Anesthesiologists have used advanced pain management practices, such as nerve blocks, epidurals and enhanced recovery pathways to improve perioperative outcomes.<sup>7,8</sup> At present, efforts are under way to establish telemedicine and tele-fellowship programs. We have also continued our scholarly collaborations remotely, with clinical case reports and case collaborations being shared on a routine basis between our respective physicians.<sup>2,7,8</sup>



### Lessons learned through the decades of medical outreach and capacity building

During our efforts in Kurdistan, we have learned several lessons that may be of value to other healthcare professionals interested in providing surgical care to patients in underdeveloped countries, including the following:<sup>2</sup>

1. Plan far in advance (at least 9 months to a year).
2. Start with a fact-finding mission to assess patient needs to determine which specialties are in greatest demand.
3. Have a reliable contact person at the host institution.
4. Travel with the support of a recognized healthcare outreach organization, such as the American College of Surgeons, Operation Giving Back Program, AHPBA, IHPBA, Operation Hope, or World Surgical Foundation.
5. Do your homework and contact the state department and the embassy. Make sure to inform the US embassy once you arrive at your destination.
6. Obtain adequate vaccinations and go to the state department Web page to learn more about the host country.
7. Obtain medical/airlift insurance in case of an emergency medical evacuation.
8. Learn as much as possible about the culture and customs of the country where you will be providing care. The last thing you want to do is to offend the patients whom you are trying to help.
9. Ship supplies ahead of your scheduled arrival, and make sure a contact person in the host country can verify that necessary equipment clears customs and is available for use. Carry any must-have devices (such as reusable instruments, electrocautery devices, and retractors) and keep a list of supplies/equipment to bring on subsequent trips.
10. Know the host institution's infrastructure and resource capacity before tackling big cases.
11. Start with straightforward, low-risk cases initially to build confidence and trust among your hosts.
12. Seek help and advice from local government, as well as from the healthcare system leadership.
13. Empower the local medical team, and get its members involved from the start. This effort will ensure the establishment of great relations with your counterpart healthcare community.
14. Prepare to revisit the same destination multiple times to have a meaningful impact on capacity building.
15. Be ready to improvise. The host country may not have all the equipment and support to which you have grown accustomed in the US.

16. If possible, arrange for a host surgeon to visit your medical center, so he or she can see how surgery is practiced in the US.
17. Help host surgeons become members of US surgical societies.
18. Plan at least a day for an academic symposium during your visit.
19. Encourage host physicians to publish clinical papers, and assist them in establishing their own surgical journal if one is not available, so they can better share their research and best practices.
20. Use telemedicine/global communication to build the international surgical community.
21. Build cultural bridges.

### Strength and weaknesses of the Kurdistan outreach program

No medical outreach program has the same strengths and weaknesses as one would expect. This goes hand-in-hand with regional variations in the needs and capacities of different populations. There are a few significant unique strengths of the program developed in Kurdistan compared with others, including the strong history and relationships between the leadership of the hosts and visitors; the ability to have longstanding trust between the teams, the communities, and the country; the understanding and appreciation by the visiting team of the cultural norms; and the motivation and time spent by the host country to embrace, engage, and share have translated into a robust amount of infrastructural and economic support.

As the Kurdish outreach program has evolved over time, there has been an expansion in multiple areas of medical capacity building. This has led to more team members, more hospital sites, and more resources being needed. Weaknesses associated with this expansion include fragmentation in the system across all key areas of clinical development; dilution in quality and quantity of training and educational opportunities across specific programs that require key leaders to multitask more intensely; and, assuming that certain more complex programs can be built without proper preparation.

### Conclusions

With appropriate assistance, time, dedication, and most importantly, perseverance, healthcare providers can help build advanced surgical programs, such as renal transplantation, advanced laparoscopy, HPB surgery, esophageal surgery, as well as complex neurosurgical procedures and trauma in a developing nation. It is



important to keep in mind that the care of the patients of the host country should be no different than that in the US. It is advisable to provide care only for those cases with which the surgeon is comfortable, and it is also important to ensure that patients can be cared for by the local clinicians when a surgical team, like the one described in this article, has departed the country. The work that we have accomplished in Kurdistan is a testament to the effective and meaningful results that can be achieved through collaboration with major stakeholders.

## DEDICATION

This article is dedicated to the memory of Professor Michael Moore and US Army Lieutenant Colonel Mark Weber.

## Author Contributions

Study conception and design: G Zibari, Chu, Smith, Annamalai, Jha

Acquisition of data: R Zibari, Lagrass

Analysis and interpretation of data: R Zibari, G Zibari, Chu

Drafting of manuscript: R Zibari

Critical revision: G Zibari, Chu, Smith, Guthikonda, Annamalai, Shokouh-Amiri

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