

# Nephrology Workforce and Education in Conflict Zones



Sahar H. Koubar<sup>1</sup>, Khaled Hajj Nasan<sup>2</sup> and Mohamad Abdul Karim Sekkarie<sup>3</sup>

<sup>1</sup>Department of Internal Medicine, School of Medicine, American University of Beirut, Beirut, Lebanon; <sup>2</sup>Mohammad Wassim Maaz Hospital, Azaz, Syrian Arab Republic; and <sup>3</sup>Nephrology and Hypertension Associates, Bluefield, West Virginia, USA

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“All War is a symptom of man’s failure as a thinking animal.”

—John Steinbeck

Shortages in nephrology workforce are thought to exist throughout the world, especially in low- and middle-income countries.<sup>1</sup> This is more pronounced in areas affected by chronic conflicts. In Syria, for example, it is estimated that the number of physicians dropped from 11,305 (0.529 per 1000 population) in 2010 when the conflict started to 5889 physicians (0.291 per 1000 population) in 2018.<sup>2</sup> This dramatic drop is a result of many factors, including economic pressure to migrate, deliberate targeting of the health workforce by combatants,<sup>3</sup> and weakening of medical education systems.<sup>4</sup> In fact, the latter is crippled by the massive exodus of teacher-physicians, destroyed infrastructure, limited resources, including the internet,

shortages of medications and laboratory tests, disrupted commute because of safety concerns, and a shift of health care focus.

Specifics on the availability of nephrology workforce in areas of conflict (AoCs) are scarce but point toward a significant shortage. One example is the fact that kidney transplant patients in Northwestern Syria were primarily taken care of by an endocrinologist who was a transplant patient himself.<sup>5</sup> Tragically, this physician died of COVID-19 in 2020 (personal communication).

This paper aims to further our understanding of the degree of nephrologists’ shortages in conflict zones and the effects of conflict on nephrology training. It also proposes possible solutions to mitigate the consequences of deficient appropriate training imposed by war.

## Methods

We abstracted data collected originally to establish a conservative kidney management program in Northwestern Syria, an area of 4.2 million inhabitants, which lost all Syrian government support and is currently under the control of nongovernment forces and the Turkish government.

Data on the number and location of hemodialysis facilities, their staffing by nephrologists, other physicians, and technicians, and number of their patients were abstracted from a database collected in February 2021. No patients’ specific data were collected. The reported statistics are descriptive.

## Results

Collectively, the area has 1 pediatric and 3 adult nephrologists responsible for the care of 800 patients on hemodialysis. Peritoneal dialysis (PD) is scarce (few patients enrolled through Turkish programs). One of the nephrologists was recently trained under a newly established program designed to train physicians in that area. The other 3 nephrologists were trained in different regions of the country in established universities, some of whom were internally displaced. Consultations to nephrologists and technicians were available from expatriate nephrologists practicing in Europe and the United States. These were facilitated through international nongovernmental organizations. Data on facilities, staffing, available machines, and number of patients are summarized in Table 1. Some of the dialysis units have no nephrology or internal medicine supervision. Patients are sent out to community general practitioners or local hospitals if needed.

## Discussion

The dire consequences of armed conflict on medical education and training are well known.<sup>6</sup> At times, where safety and survival become a priority, armed conflicts lead to a forced educational pause. Unfortunately, inadequate training exacerbates the poor outcomes of

**Correspondence:** Sahar H. Koubar, Department of Internal Medicine, School of Medicine, American University of Beirut, PO Box 11-0236, Riad El-Solh, Cairo Street, Beirut, Lebanon. E-mail: [sk62@aub.edu.lb](mailto:sk62@aub.edu.lb)

**Table 1.** Statistics of dialysis facilities in Northwest Syria

Parameter	n
Area population	4.2 million
Hemodialysis patients	800
Nephrologists	4
Dialysis facilities with no physician supervision	4/20
Dialysis facilities with internal medicine physician supervision	10/20
Dialysis facilities with nephrologist supervision	6/20
Dialysis nurses and technicians	84
Dialysis machines	183
Nephrologist per million population	1/million <sup>a</sup>

<sup>a</sup>This number is comparable with low- and low-middle-income countries in sub-Saharan Africa.<sup>S6</sup>

an already compromised and strained health system.

A similar scenario to the Northwest Syria example cited previously is found in besieged Gaza. In 2018, there were 553 referrals for treatment abroad for kidney diseases.<sup>7</sup> Gaza, with a surface area of 365 km<sup>2</sup> and 2.048 million inhabitants, has currently only 6 functioning dialysis centers. Lack of nephrologists remains a major obstacle in the care of patients with kidney disease in Gaza (personal communication). In Syria, the number of nephrologists has dropped from 3 to 5 per million pre-war to 1 per million after the conflict (personal communication). The same is true for other areas with conflicts such as Venezuela where 150 nephrologists have fled the country in the past 4 years.<sup>8</sup>

Patients' outcome data in this environment are scarce and likely to be adversely affected by shortages in health care workers. In one study, the annual mortality rate in a besieged dialysis unit in Syria was 48% whereas it is <20% in the United States. These patients had less access to dialysis, erythropoietin-stimulating agents, and laboratory testing.<sup>9</sup> Most patients were dialyzing through a temporary catheter as the number of vascular surgeons is also dropping. Examples from war-inflicted areas such as Northwest Syria and Gaza provide clear evidence for the need to train local nephrologists.

The biggest advantage in training local nephrologists is that it alleviates the cultural, language, and social barriers usually experienced by displaced patients.<sup>S1</sup> Propositions to enhance local nephrology training are summarized in [Table 2](#).

One of the findings of the above-mentioned survey is that many of the patients with advanced renal failure are taken care of by general internists and non-nephrology subspecialists. These shortages may necessitate some more versatile general internists who are trained in areas that are considered to be in the realm of subspecialists. Examples include being comfortable in making decisions in starting and withholding renal replacement therapy and basic dialysis prescribing. Internal Medicine training programs in conflict zones could be restructured to include more nephrology training, such as these programs may incorporate mandatory dialysis training in their curricula.

Perhaps, the largest obstacle toward adequate nephrology training in AoC is physicians' exodus or brain drain. In the United States, for example, nephrology has one of the highest proportions of international medical graduates in its workforce. Many international medical graduates are on J1 visa. Perhaps restructuring the J1 program to

use the help of J1 trainees to benefit their home countries could be considered. A possible suggestion could stipulate such trainees to spend 1 year in their respective home countries and 1 year in an underserved area instead of the mandatory 3 to 3.5 years in an underserved area. Alternatively, many nephrologists who are well-established expats having left their countries can give back to their homelands by missions, tele-medicine, etc.

A successful example from Syria has been the establishment of a nephrology training program. Recently, an entity called the Syrian Board of Medical Education started such program in Northwest Syria. The program focused on providing mostly virtual medical education in areas of the country that have no access to traditional undergraduate and graduate medical education.<sup>4</sup> Actually, one nephrologist trained through this program is now practicing in the area. Although the knowledge component seems an easy online task, unfortunately, internet services are unpredictable in these areas. Besides, the theoretical knowledge has to be re-enforced by formal hands-on training through either simulation or real patients. Use of simulators in hemodialysis catheter placement or kidney biopsy has been successfully implemented throughout well-established nephrology training programs and can be a great asset for even self-practice and training in an unsafe environment where bedside experts are lacking.<sup>S2</sup>

The role of international support and help in alleviating such shortcomings cannot be stressed enough. International nephrology societies, such as the ISN, can modify their fellowship programs for fellows who cannot travel or simply create fellowships tailored

**Table 2.** Challenges and potential solutions to the nephrology workforce shortages in areas of conflict

Challenge	Proposed solutions
Lack of teachers	Provision of telemedicine, medical missions, increased funding, support of the international nephrology societies
Lack of human resources	Skill substitution or specialized internists Specialized midlevel practitioners Stipends or incentives to retain medical students and encourage them to get into nephrology specialty Other incentives include accreditation of trainees postconflict through collaboration with international bodies that can verify their training Skills-on-the-go or skills-on-demand which can be facilitated through experts from international societies
Physicians' exodus	Incentives to keep local doctors who are familiar with the local language and culture Waivers of training examination fees for trainees in conflict zones who are willing to return to their home countries
Lack of formal fellowship programs	Tele-education, modified fellowships, restructuring visa programs; global nephrology training, curriculum shifting, international societies to prioritize those in training on condition that they return to their home countries
Underutilization of PD	Crash courses by experts either locally or in nearby areas Telecourses on surgical procedures Collaboration of WHO with charity arms of industry to establish PD programs
Moral distress	NGOs to establish programs that focus on mental well-being of physicians
Dialysis shortages	Training on CKM as an option for those patients who do not want dialysis or as a choice-restricted option in areas of limited resources Establishment of kidney transplant programs
Inadequate vascular access	Nephrology fellows to be trained on interventional nephrology and placing arteriovenous fistulas
Chaos of aid/help	Collaboration among humanitarian organizations for arranged help and supervision
Safety concerns, targeting of health facilities	Reinforcing international laws for protection of health care workers and commitment to prosecution of those who violate these laws
Others	Research to identify gaps in knowledge and targeted education Establishment of academies within NGOs to focus on education and training. A successful example has been Medicine Sans Frontiers Academy <sup>S7</sup>

CKM, conservative kidney management; NGO, nongovernmental organization; PD, peritoneal dialysis; WHO, World Health Organization.

for conflict zones. These programs can be structured in a way such that fellows can be mentored by international mentors with weekly or biweekly assignments, meetings, or project tasks. Besides, visits from volunteer experts to safe or nearby areas for hand-on experience can be arranged on a periodic basis.

PD can be a great asset to ease burden of end-stage kidney disease in AoC. It is an appealing option when destruction of infrastructure, power cuts, clean water supply, and disrupted commute are major hindrances to maintenance hemodialysis.<sup>S3</sup> Unfortunately, PD is underused in AoC. Initiation of PD programs and training nephrologists is not impossible. Many acute PD programs have been established in Africa to treat acute kidney injury. The international society of PD needs to address this gap in AoCs. Many PD training course syllabuses are published online. Placing a PD catheter is a simple procedure, and many nephrologists place PD catheters themselves. Volunteer PD experts can help teach PD

catheter placement and PD fundamentals for the local nephrologists either in the affected areas or in nearby safer areas. Besides, reducing the cost of PD bags and doing only manual exchanges can facilitate more utilization of PD.

Though it may seem counterintuitive, starting kidney transplant programs might help alleviate the burden of end-stage kidney disease and create an excellent training milieu for young trainees in areas with prolonged conflicts. A good example is Gaza, which has seen sincere international efforts to build a transplant program. The mission was led by a group from the Royal Liverpool University Hospital. One of the major drawbacks that hindered the program was the need for laboratory workers to travel abroad to be trained on human leukocyte antigen typing.<sup>S4</sup>

Another area that requires special attention in AoC is training on conservative kidney management. Many patients with end-stage kidney disease do not make it to renal replacement therapy because of limited resources. Nephrology fellows can be easily trained on

pharmacologic and non-pharmacologic options to alleviate the physical and psychosocial burden of renal disease on these patients and focus on their quality of life. This does not require hands-on experience and can be easily established through online seminars.

No fruitful efforts to enhance the nephrology care of kidney patients can be achieved without the sincere efforts of the international nephrology societies. In a report by Dr. Mads Gilbert, he emphasized the exceptional resilience of the health care workers despite all the constraints and severely limited resources. This resilience and devotion should not be underestimated and should invite the international nephrology societies to plant seeds for budding nephrologists in a fertile soil.<sup>S5</sup>

## Conclusion

Medical education provides an indirect lifeline for patients in areas with prolonged armed conflict; investing in the young generation of healers reaps big gains on a societal health level. Establishing nephrology training programs in

areas of protracted conflicts can prove successful but requires the collaborative efforts of local volunteers and international humanitarian forces.

## SUPPLEMENTARY MATERIAL

[Supplementary File \(PDF\)](#)

[Supplementary References.](#)

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