Nephrol Dial Transplant (2023) 38: 56–65
https://doi.org/10.1093/ndt/gfac247
Advance Access publication date 23 August 2022

SPECIAL REPORT

Armed conflicts and kidney patients: a consensus statement from the Renal Disaster Relief Task Force of the ERA

Mehmet S. Sever[1], Raymond Vanholder[2], Valerie Luyckx[3], Kai-Uwe Eckardt[4], Mykola Kolesnyk[5], Andrzej Wiecek[6], Ewa Pawlowicz-Szlarska[7], Daniel Gallego[8], Rukshana Shroff[9], Andrej Škoberne[10], Ionut Nistor[11], Mohamed Sekkarie[12], Dmytro Ivanov[13], Edita Noruišiene[14] and Serhan Tuglular[15]; on behalf of the Renal Disaster Relief Task Force of the ERA

[1]Istanbul University, School of Medicine, Department of Nephrology, Istanbul, Turkey, [2]European Kidney Health Alliance, Brussels, Belgium; Nephrology Section, Department of Internal Medicine and, Pediatrics, University Hospital Ghent, Ghent, Belgium, [3]Department of Nephrology, University Children's Hospital, Zurich, Switzerland; Department of Paediatrics and Child, Health, University of Cape Town, Cape Town, South Africa; Renal Division, Brigham and Women's Hospital, Harvard, Medical School, Boston, MA, USA, [4]Department of Nephrology and Medical Intensive Care, Charité-Universitätsmedizin Berlin, Berlin, Germany, [5]SI Institute of Nephrology of the National Academy of Medical Sciences of Ukraine, Kyiv, Ukraine, [6]Department of Nephrology, Transplantation and Internal Medicine, Medical University of Silesia, Katowice, Poland, [7]Department of Nephrology, Hypertension and Kidney Transplantation, Medical University of Lodz, Lodz, Poland, [8]European Kidney Health Alliance, Brussels, Belgium; European Kidney Patient Federation, Wien, Austria, [9]Renal Unit, UCL Great Ormond Street Hospital and Institute of Child Health, London, UK, [10]Department of Nephrology, University Medical Centre Ljubljana, Ljubljana, Slovenia; Medical Faculty, University of Ljubljana, Ljubljana, Slovenia, [11]Department of Internal Medicine, Nephrology and Geriatrics, Grigore T Popa University of Medicine and Pharmacy, Iasi, Romania; Department of Nephrology, Dr C I Parhon University Hospital, Iasi, Romania, [12]Nephrology and Hypertension Associates, Bluefield, WV, USA, [13]Department of Nephrology and RRT Shupyk, National Health Care University, Kyiv, Ukraine, [14]European Kidney Health Alliance, Brussels, Belgium; European Dialysis and Transplant Nurses Association – European Renal Care Association and [15]Marmara University, School of Medicine, Department of Nephrology, Istanbul, Turkey

Correspondence to: Mehmet S. Sever; E-mail: mehmetsukrusever@gmail.com

ABSTRACT

During conflicts, people with kidney disease, either those remaining in the affected zones or those who are displaced, may be exposed to additional threats because of medical and logistical challenges. Acute kidney injury developing on the battlefield, in field hospitals or in higher-level hospital settings is characterized by poor outcomes. People with chronic kidney disease may experience treatment interruptions, contributing to worsening kidney function. Patients living on dialysis or with a functioning graft may experience limitations of dialysis possibilities or availability of immunosuppressive medications, increasing the risk of severe complications including death. When patients must flee, these threats are compounded by unhealthy and insecure conditions both during displacement and/or at their destination. Measures to attenuate these risks may only be partially effective. Local preparedness for overall and medical/kidney-related disaster response is essential. Due to limitations in supply, adjustments in dialysis frequency or dose, switching between hemodialysis and peritoneal dialysis and changes in immunosuppressive regimens may be required. Telemedicine (if possible) may be useful to support inexperienced local physicians in managing medical and logistical challenges. Limited treatment possibilities during warfare may necessitate referral of patients to distant higher-level hospitals, once urgent care has been initiated. Preparation for disasters should occur ahead of time. Inclusion of disaster nephrology in medical and nursing curricula and training of patients, families and others on self-care and medical practice in austere settings may enhance awareness and preparedness, support best practices adapted to the demanding circumstances and prepare non-professionals to lend support.

Keywords: conflicts, dialysis, disasters, kidney patients, wars

CONFLICTS

National or international conflicts (or wars) are disputes involving the use of armed forces between two or more parties [1]. In 2020, despite calls from the United Nations for a global ceasefire, the number of active conflicts reached a record high since World War II [2]. As of 2022, more than one billion persons are in danger of being affected by active conflicts; many of these are located in Africa, which are increasing over time

© The Author(s) 2022. Published by Oxford University Press on behalf of the ERA.
All rights reserved. For permissions, please e-mail: journals.permissions@oup.com

Downloaded from https://academic.oup.com/ndt/article/38/1/56/6674221 by Istanbul University Library user on 19 February 2023

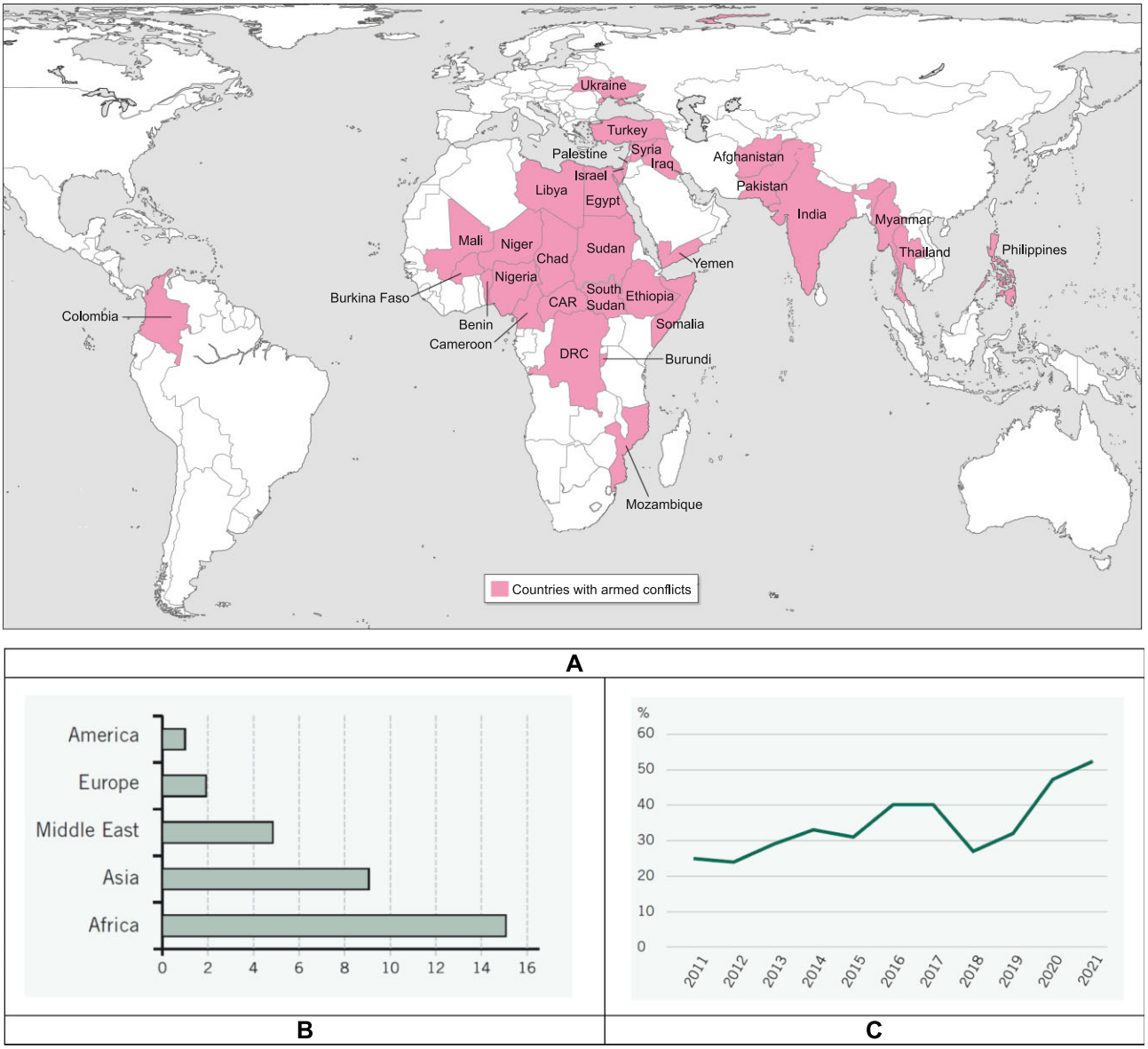


Figure 1: Ongoing armed conflicts in 2021. (**A**) Countries experiencing armed conflicts (**B**) Regional distribution of armed conflicts. (**C**) Percentage of high intensity armed conflicts (conflicts causing over 1000 fatalities per year, affecting a significant proportion of the territory and population, and involving several actors over total number of conflicts for that year) [4].

(Fig. 1) [3, 4]. These man-made disasters are characterized by damaged general infrastructure, disorganization, chaos, unhealthy and insecure environments, and danger to life among all affected people. Healthcare provision is hampered through infrastructural damage and lack of medical material. Shortages of medical personnel due to personal injuries and trauma [5], challenges in reaching their workplaces [5] and burnout [6] exacerbate these problems. Increased workload for the functioning personnel, combined with lack of knowledge in coping with war emergencies may contribute to unfavorable outcomes for patients.

KIDNEY PATIENTS DURING CONFLICTS

Vulnerable persons (e.g. the elderly, women, children, frail and chronically ill) are especially at risk during conflicts. Among the chronically ill, people living with kidney disease, in particular those with kidney failure, deserve special attention since their survival depends on functional infrastructure, and access, within hours to days, to advanced technology, specific drugs and well-trained personnel [7].

Compared with data available on the impact of natural disasters, information on the effects of conflicts on outcomes for kidney patients is even more limited. Although the mechanisms of risks to patients and risks of kidney injury may differ between wars (gunshot, bleeding, hypovolemia, exposure to exogenous nephrotoxins) and natural disasters (exposure to endogenous nephrotoxins, exposure time), many other characteristics are similar (e.g. damage to the general and healthcare infrastructure; panic, chaos and disorganization in healthcare delivery; shortages of medical material and personnel; and an unanticipated increase in the numbers of traumatic and non-traumatic patients).

Downloaded from https://academic.oup.com/ndt/article/38/1/56/6674221 by Istanbul University Library user on 19 February 2023

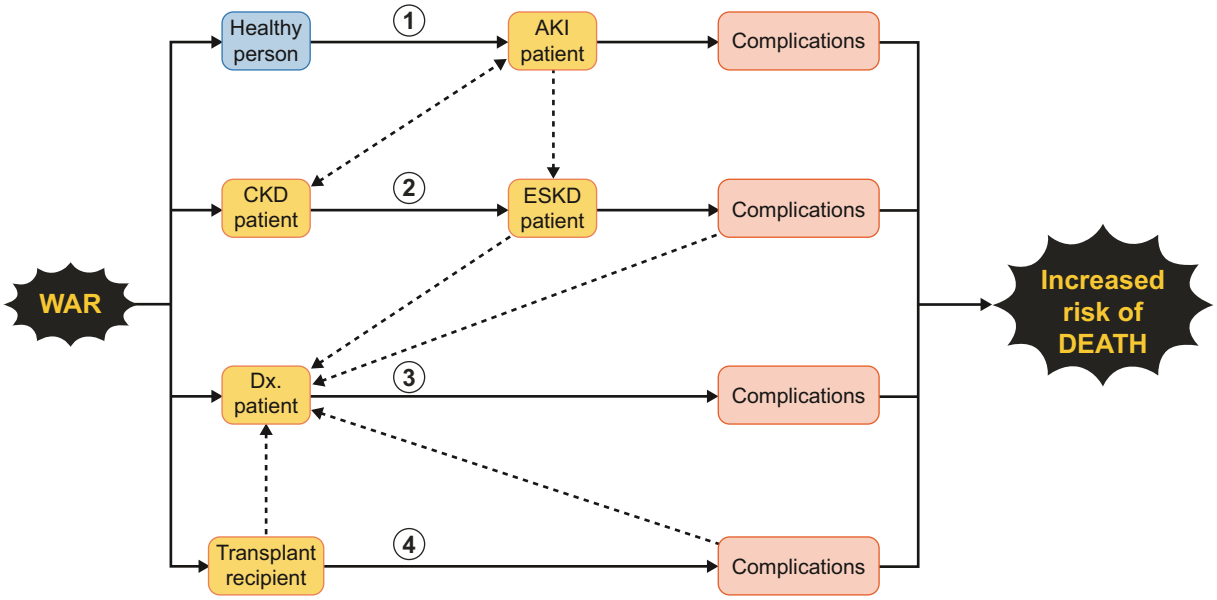


Figure 2: Effects of conflicts on kidney health. (1) Healthy persons can develop AKI. Kidney function may recover or evolve to CKD or directly to kidney failure, or die. (2) CKD patients may progress to ESKD faster than expected due to interruptions in the management of underlying primary disease; they may require dialysis, or alternatively, if they cannot receive dialysis, die. (3) Optimal dialysis often cannot be performed, which may give rise to complications that may be fatal, if they cannot be managed properly. (4) Transplant recipients may suffer from complications, resulting in graft failure and subsequent dialysis dependency, or sometimes mortality as a result of complications (see the text for details). ESKD: end-stage kidney disease; pt: patient; Dx: dialysis.

We therefore here combine data obtained during natural disasters and conflicts to provide a pragmatic approach for the mitigation of risk in individuals across the spectrum of kidney disease under austere war circumstances.

General considerations

People who develop acute kidney injury (AKI), those with chronic kidney disease (CKD) not yet requiring kidney replacement therapy, and those living with hemodialysis (HD), peritoneal dialysis (PD) or transplantation are at all increased risk of life-threatening conditions during conflicts (Fig. 2) [5, 8]. The frequent comorbidities in people with kidney disease [9], including frailty [10], mobility challenges [11], cognitive dysfunction [11] and cardiac disease [12], may also exacerbate the risk of adverse outcomes. Combined with medical threats, logistic hurdles and suboptimal healthcare, mortality is likely to be higher in those with kidney disease compared with healthy persons (Fig. 3). Risks are highest in patients requiring dialysis, because of the high degree of comorbidities and acute dependence on access to care. Considering that 10%–15% of the population suffers from some form of CKD, nearly 4–6 million Ukrainian kidney patients might have been at risk of being affected by the recent war [3].

Specific conditions

Similar to the general population, people with kidney disease may continue to live in the war-affected zones or, alternatively, may move to other regions of the affected country (internally displaced persons) or to other countries (refugees).

People with kidney disease living in war zones

Due to economic, personal, social, emotional or cultural reasons, or because of medical disabilities, some patients do not or cannot leave their homes in the affected zones, giving rise to differing risks compared with those who can leave the region.

People with AKI. Although the reported incidence varies significantly depending on the studied population [13], the true incidence of AKI during wars is unknown because of inaccurate registration due to extensive chaos and panic, poor awareness, as well as difficulties in diagnosis and logistic challenges.

Prerenal, intrinsic renal and postrenal AKI may all develop on the basis of gunshot-related injuries, bleeding, crush and other trauma, exposure to noxious gases/agents, dehydration, infections/sepsis and nephrotoxic medications [13]. The mortality rate among patients with AKI (non-dialyzed and dialyzed aggregated) was 53% during the Korean war [14]. Despite some improvement, this figure is still 22% during recent wars [15]. Many reasons—including polytrauma, more severe AKI, delay in diagnosis, use of frequent need for surgical interventions and limitation of treatment possibilities—may play a role in this unfavorable outcome [13].

Importantly, AKI may predispose patients to CKD in the long term. A retrospective analysis of 3846 subjects with AKI due to combat injuries revealed that 66% developed hypertension and the rate of CKD at 5 years was increased nearly 5-fold [16].

People with CKD. Most, if not all, people with CKD require dietary restrictions and multiple medications to manage underlying diseases and to retard the progression of CKD.

Downloaded from https://academic.oup.com/ndt/article/38/1/56/6674221 by Istanbul University Library user on 19 February 2023

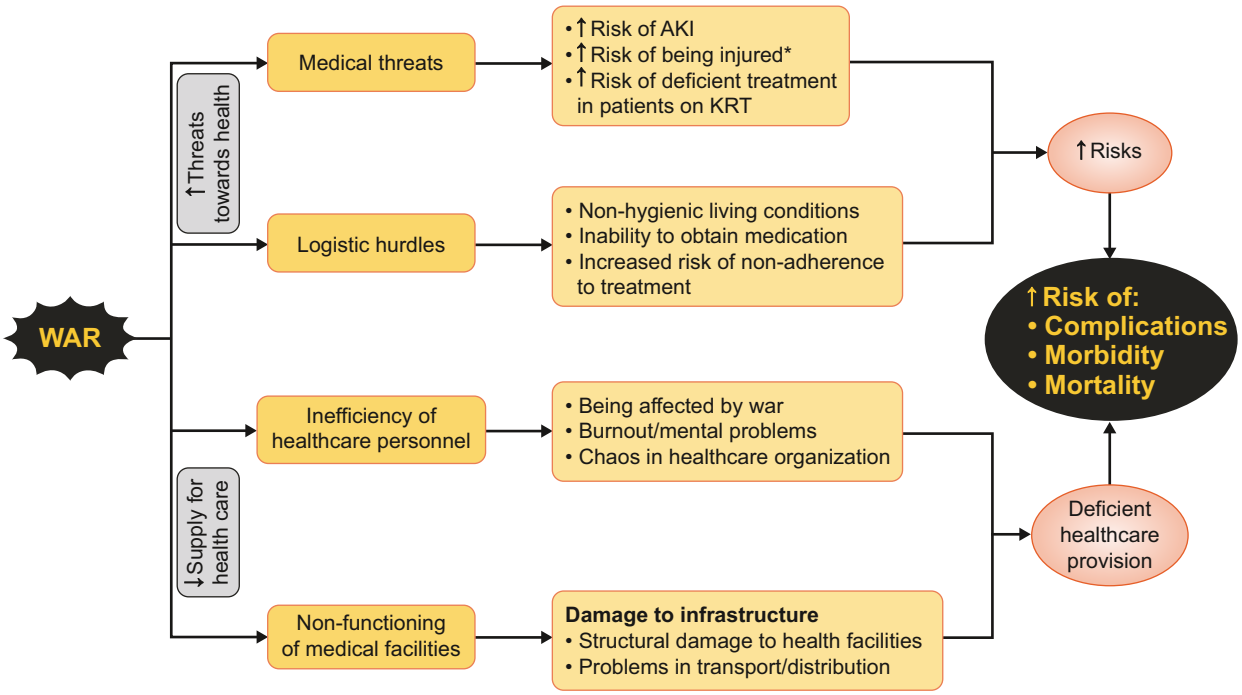


Figure 3: Mechanisms by which conflicts increase the risks of complications, morbidity and mortality in kidney patients. *Because of frailty/comorbidities. pts: patients.

Extreme stress, mental distress, non-adherence to diet, and interruptions in medical follow-up and treatment may all predispose to an accelerated decline of kidney function and increase the risk of short- and long-term complications. Following earthquakes, the circumstances of which mimic wars, worse blood pressure control at ambulatory blood pressure monitoring has been reported [17], and people with diabetes exhibited worse glycemic control [18]. Therefore, long-lasting, chronic disasters, e.g. armed conflicts (Syrian war, now in the 11th year), may have a greater insidious impact on the outcome of CKD, compared with shorter conflicts.

Patients with CKD managed with immunosuppressive treatment deserve special attention, because interruption of the treatment may cause relapse/worsening of the primary disease resulting in kidney failure. Continuing immunosuppressants, however, may create additional risk by predisposing patients to severe infections under unhygienic war conditions.

People on maintenance HD. During conflicts, underdialysis is very frequent [5]. Hemodialysis requires availability of water and energy, which often is affected in wars. Suboptimal clinical and laboratory follow-up and increased interdialytic weight gain due to non-adherence to dietary restrictions may trigger intradialytic complications. Furthermore, heavy workload and stress of dialysis personnel may predispose patients to additional complications, such as vascular access problems and higher infection rates as well as to increased mortality [5, 19].

In the Iraqi–Kuwait war the mortality rate of HD patients who remained in the conflict area was significantly higher (42%) than in patients who left the country (12.7%) [20]. This dramatic difference may reflect some selection bias, as sicker and older patients may not have been able to travel. Underdialysis due to damaged healthcare infrastructure likely also contributed to these adverse outcomes in the affected region.

People on PD. Problems in obtaining dialysis solutions, hypervolemia, leakage, exit-site infection and peritonitis due to unhygienic circumstances have been reported in PD patients during disasters [21, 22]. Dependence on relatives for exchanges in continuous ambulatory PD (CAPD), and lack of electricity for automated peritoneal dialysis (APD) may present additional challenges [20].

Transplant recipients. In conflict zones, transplantation activity decreases due to disorganization, shortage of medical facilities, personnel and medications, and also prioritization of other surgeries [23].

Interruptions of maintenance treatment may occur as well. Only 62% of the transplant recipients had stockpiled medications at their disposal when the Great East Japan Earthquake occurred, and only 44% always had their medication at hand [24]. Unhygienic conditions may trigger infections, whereas inadequate nutrition and dehydration may contribute to graft dysfunction [25]. Suboptimal follow-up may delay diagnosis and treatment of complications, which then necessitate empirical approaches [23].

Refugees with kidney disease

Overall, the number of displaced people is overwhelming, reaching to 89.3 million in 2021 [26]. The Syrian crisis was characterized by 6.9 million internally displaced people, and another 5.6 refugees after 11 years of war [27]. In the recent Ukrainian war, the number of refugees and internally displaced people have reached 4.9 and 7.1 million, respectively, at 14 June 2022 [28]. All risks and complications relevant for patients

Downloaded from https://academic.oup.com/ndt/article/38/1/56/6674221 by Istanbul University Library user on 19 February 2023

residing in war zones apply to refugees as well. Moreover, refugee patients may be faced with more unhealthy and unsecure conditions than those remaining in their residence zone, both during their displacement and in the destination countries [29]. Difficulties in navigating a foreign health system and miscommunication based on language or cultural barriers may lead to delays in care and medical mistakes, and contribute to poor outcomes [30].

Refugees with AKI. Publications on AKI among refugees are very scarce. Retrospective analysis of 130 pediatric Syrian refugee children revealed an incidence of AKI of 3.1%; however, no data were provided about AKI features and outcomes [31]. The true incidence of AKI is difficult to determine, because mild cases may go undetected.

The vast majority of war-related severe AKI is treated locally or referred to nearby, higher-level health facilities [13]; thus, intentional displacement through a patient's own initiative is exceptional. In the case of panicky displacement, however, life-threatening complications may occur due to challenges in obtaining appropriate medical care, unavailability of dialysis, and the lack of knowledge on the history and condition of patients, especially if they are treated in multiple health facilities during displacement or at destination.

Refugees with CKD. The degree of risk depends on the stage of CKD. In advanced CKD, interruption of medical care and treatment may result in sudden decompensation precipitating life-threatening complications. Asymptomatic, previously undiagnosed or stable patients with mild or moderate kidney dysfunction are less likely to be labeled as CKD. In a registry analysis across eight European countries, among 14 436 migrants who attended health clinics, only 1.5% were diagnosed with CKD [32], which is strikingly low, considering the high prevalence of hypertension and diabetes mellitus among refugees and the global population prevalence of around 10% [33]. This low prevalence may mean that especially healthier people tend to leave the affected zones while the sicker and older individuals stay behind.

Refugees depending on HD and PD. The average percentage of refugees among the maintenance dialysis patients of hosting European countries in the early twenty-first century varied between 1.5% and 7% [34, 35], and at times, the number of refugees can even exceed that of local dialysis patients [36]. The lower mortality rates (5.7%) among refugee dialysis patients as compared with their local counterparts (15%) possibly reflects selection bias favoring migration of younger and overall fitter patients [37].

Although regional or local governments, hospitals, nephrology units or patients themselves may contribute to dialysis costs, the financial burden of dialysis remains a concern in many hosting countries [35].

Refugees with kidney transplants. Three major problems in the refugee transplant patient population include inability to obtain immunosuppressive drugs, living under unhygienic conditions (crowded reception halls, shelters, camps, metro stations) and the inability to reach a transplantation center. These risks may contribute to graft and even patient loss [23].

Access to transplantation among refugees on chronic dialysis varies across host countries [38]. In a survey by the International Society of Nephrology, 57.5% of centers waitlisted refugees once they had obtained legal permission for a permanent stay; 17.4% of the centers waitlisted irrespective of official status; and 15.7% never waitlisted, but only performed living donor transplantation if refugees provided a donor and paid for the procedure themselves [35]. Kidney transplantation outcomes for refugee patients have been reported to be satisfactory [23, 39].

Importantly, desperate refugees may be tempted to purchase organs [40]. This dangerous practice may open doors to black market, organ trafficking and crime [41], which may become even more frequent with increasing migration rates.

RISK MITIGATION—SOLUTIONS

Before war

Improving the structural quality of the buildings, and preparing disaster scenarios and action plans for both overall and kidney disaster response is vital to mitigate post-disaster disorganization, panic and chaos [8, 42, 43]. Logistic planning for personnel and material includes, but is not limited to, measures to cope with sudden influx of AKI victims, and redistribution of maintenance dialysis patients and personnel from non-functioning to functioning units [44]. Organization of educational courses on disaster nephrology, and training on appropriate medical practices as well as on personal safety measures under resource-constrained conditions are essential. It is important to remember that healthcare facilities and personnel are also targeted and directly affected during wars [45].

Patient education by means of infographics, brochures, and social-, visual- and written-media is highly important to minimize war-related risks [45]. These sources should include practical suggestions, e.g. disconnecting oneself from a HD machine, self-treatment of various emergencies, and maintaining stocks of safe foods, antibiotics, antihypertensives, glucose-lowering drugs, immunosuppressants, phosphate and potassium binders and other medications that will last for at least 2 weeks (Tables 1 and 2) [24, 46].

During war

General measures are summarized in Table 2 and related references [6, 8, 19, 23, 37, 47, 48]. Among these, influx of medical help and trained external personnel is very useful [47]; however, this may sometimes be associated with drawbacks as well. Unsolicited donations may result in incompatibility between demand or capacity to use and donated supplies, and lead to unnecessary effort and expense to dispose of these. Unprepared, inexperienced or unlicensed foreign personnel entering the affected zones with the best intentions to help may slow down relief efforts, and necessitate extra efforts for their transportation, activities and housing (Table 3) [44, 48, 49]. A basic principle of assistance should be impartiality; this, however, may not always be respected, especially during civil wars [50].

Downloaded from https://academic.oup.com/ndt/article/38/1/56/6674221 by Istanbul University Library user on 19 February 2023

Table 1: Some useful references and related links for kidney patients and health professionals helping to address the medical and logistic challenges during armed conflicts.

Reference	Link
Planning for emergencies—a guide for people with kidney disease	https://www.kidney.org/atoz/content/disasterbrochurefacilities
Integration of NCD care in emergency response and preparedness	https://apps.who.int/iris/handle/10665/272964
NCDK 2016	https://www.who.int/emergencies/emergency-health-kits/non-communicable-diseases-kit-2016
Help for Ukraine	https://www.era-online.org/en/help-for-ukraine/
Recommendations for the management of crush victims in mass disasters	https://www.era-online.org/en/erbp/guidance/acute-kidney-injury/crush-recommendations/
Medical services for children with kidney disease in disasters	https://www.espn-online.org/ukraine-task-force
The ISN framework for developing dialysis programs in low-resource settings	https://www.theisn.org/wp-content/uploads/2021/03/ISN-Framework-Dialysis-Report-HIRES.pdf
Are You R.E.A.D.Y?	https://www.texasteec.org/tools/are-you-ready
Emergency preparedness	https://www.rsnhope.org/rsn-programs/kidney-disease-resources/emergency-preparedness/
Infection control for PD patients after a disaster	https://www.cdc.gov/disasters/icfordialysis.html
Emergency preparedness for dialysis facilities	https://www.cms.gov/Medicare/End-Stage-Renal-Disease/ESRDNetworkOrganizations/Downloads/EmergencyPreparednessforFacilities2.pdf
Communicating risk in public health emergencies	https://apps.who.int/iris/bitstream/handle/10665/259807/9789241550208-eng.pdf?sequence=2
Guidance for managing ethical issues in infectious disease outbreaks	https://apps.who.int/iris/bitstream/handle/10665/250580/9789241549837-eng.pdf?sequence=1
Essential steps for developing or updating a national pandemic influenza preparedness plan	https://apps.who.int/iris/bitstream/handle/10665/272253/WHO-WHE-IHM-GIP-2018.1-eng.pdf?ua=1

NCD: non-communicable diseases; NCDK: non-communicable diseases kit; ISN: International Society of Nephrology.

Specific measures can be taken to optimize preparation and intervention for patients across the entire spectrum of kidney disease.

People with AKI. Preventive measures, especially fluid infusions, should be initiated on the battlefield, in field hospitals, during transportation and at secondary/tertiary healthcare centers [13]. Point of care devices were extremely useful for the assessment of electrolyte and creatinine levels and direct therapies at the disaster scene during the Haiti earthquake [51]. Detection, rescue, triage, primary survey, first aid and transfer to field hospitals are critical steps performed on the battlefield. Interventions in the field hospitals include rehydration to prevent/treat shock, transfusion and prevention/treatment of infections in efforts to avert subsequent prerenal AKI [13]. If necessary and possible, patients should be transferred after initiation of urgent therapies (e.g. fluids, management of hyperkalemia, simple surgical management of wounds) to higher-level hospitals with dialysis possibilities [13]. If not feasible, every possibility for local dialysis treatment should be considered. If HD is unavailable, and in the absence of acute abdominal injuries, urgent initiation of PD by tunneled or stylet catheter insertion at the bedside can be life-saving despite the risk of infection [22, 52]. The same recommendations apply for treatment of AKI in the secondary/tertiary healthcare centers.

People with CKD. Optimal treatment of underlying diseases (especially diabetes and hypertension) through diet and appropriate medication is mandatory. Decisions to modify immunosuppressive medication for primary disease management should be individualized considering local circumstances and the condition of the patient.

In case of medication shortages, medications may need to be donated or purchased from industry and/or from other regions or countries. Importantly, clear information is required regarding to whom and where these medications should be delivered, in view of the usual chaos of conflicts (Table 2) [44, 49].

People on maintenance HD. Nearby armed attacks always create a dangerous situation for HD patients; therefore, they should be trained on safe self-disconnection, as staff will not always be able to disconnect all patients in time [43, 44]. Consecutive actions by staff and patients should be described in detail in algorithms and checklists (Table 1), and preferably practiced with drills.

Mismatch between dialysis demand and supply can be attenuated by reducing the number of dialysis sessions or shortening them, which can be a safe compromise for most patients, if short-term. In case of a non-functioning dialysis unit, support by other units should be planned [44]. If there is a shortage of dialysis material and personnel, help from other regions in the country or from other countries may be life-saving; however, here also, unsolicited help may create logistical problems (Table 3). If local dialysis treatment is not possible, patients should be transferred to other regions or countries [53]. If none of the above is possible, switching HD patients to acute PD is justified to avoid emergent complications [22, 54].

For each scenario, optimizing medical prevention and management of complications through use of diuretics, potassium-lowering agents, cathartics, and strict dietary and fluid restriction may be helpful [5].

People on PD. PD may be a more practical modality than HD during warfare because this obviates the need for

Downloaded from https://academic.oup.com/ndt/article/38/1/56/6674221 by Istanbul University Library user on 19 February 2023

Table 2: General measures to mitigate the impact of conflicts on kidney patients. Each row shows the commitment, and the stakeholders taking responsibility to perform that particular commitment. Each column in the right serves as a 'to-do-list' for a particular institution or individual before, during or after a disaster [6, 8, 19, 23, 37, 47, 48].

	Institutional				Individual	
Measures to be taken	1*	2*	3*	4*	5*	6*
Before disaster						
• Preparing educational materials on medical and security issues to be distributed among local societies, patients and healthcare providers[a]	+	+	+		+	
• Educating patients about the importance of strict dietary/fluid intake measures to reduce negative impact of reduced dialysis access[a]					+	+
During disaster						
• Applying guidelines and recommendations, asking for consultancy and using telemedicine to cope with emergencies and to avoid risk of malpractice		+			+	
• Asking expert help for logistical problems, e.g. provision of water and electricity, solution for road blocks		+	+	+	+	
• Referral of critically ill patients to fully equipped, higher-level, hospitals at the earliest convenience			+		+	
• Continuing treatment during transportation			+		+	
• Asking for help by authorities and NGOs by every possible means (including social media) about medical needs of the patients and also professionals, maintaining ongoing communication and updates	+	+	+	+	+	
• Taking measures to prevent burnout of personnel; if needed, seeking expert help for treatment of burnout		+		+	+	
• Carefully preparing on call schedules; substituting nephrologists by internists or general practitioners; substituting nephrology nurses and technicians by corresponding personnel active in other fields		+			+	
• Calling for personnel help from outside (other regions or countries), paying attention to the local medical licensing requirements and cultural/language issues	+	+	+	+		
After disaster						
• Being admitted to the hospitals for screening, diagnosing and treating neglected issues						+
• Evaluating past-disaster response by organizing briefing–debriefing meetings, detecting defects and making preparations for future disasters		+	+	+	+	

1* denotes international learned societies, e.g. ERA, ISN, ASN.
2* denotes national nephrology societies, national kidney foundations.
3* denotes humanitarian organizations and local representatives of humanitarian organizations.
4* denotes governmental institutions (ministry of health and other health-related institutions).
5* denotes healthcare personnel including nephrologists, general practitioners and HD nurses.
6* denotes patients and their caregivers.
[a]May apply for the measures taken 'during disasters' as well.
ERA: European Renal Association; ISN: International Society of Nephrology; ASN: American Society of Nephrology; Int.: international; Nat.: national; Ins.: institutional; Phys: physician; Pt: patient.

regular transportation under unsecure conditions and, if done manually, is independent of electricity and dedicated personnel [22]. If infrastructure is functioning, APD is even more appropriate because of a lower risk of peritonitis.

Intensive patient and family training may be needed to optimize PD practice in unhygienic conditions [22, 55]. Patients should also be trained in empirical use of antibiotics in case of suspected infection and if dedicated personnel cannot be reached. Reducing the number of PD exchanges and keeping a 2-week stock of dialysis supplies at all times are useful measures to address shortage of PD solutions.

If PD is not possible, applying diet and medical management as well as switching patients to HD should be considered for treatment of complications secondary to underdialysis.

Transplant recipients. Local operational resources should be checked and postponing transplantation should be considered if needed.

The most important problem, shortage of immunosuppressants, can be mitigated by adapting immunosuppressive regimens considering availability of medications (Table 1). No standard protocol exists for this strategy; switching between immunosuppressants or changing from triple to double regimens while increasing dosages/targeted blood levels of individual agents may be considered. Support by authorities and/or non-governmental organizations (NGOs) may be useful for obtaining drug donations or purchasing supplies [23].

Increased risk of infection under unhygienic circumstances can be minimized by paying strict attention to infection prophylaxis. Training patients on empirical usage of antibiotics (when available) is a pragmatic approach, if dedicated experts are unavailable.

Treatment of serious complications (e.g. transplant rejection) is complex. When no local experts or dedicated health facilities are available, referral at the earliest convenience to other regions or countries may be necessitated [23]. Telemedicine may be useful to overcome medical and logistic challenges for patients or healthcare providers [8]; however,

Downloaded from https://academic.oup.com/ndt/article/38/1/56/6674221 by Istanbul University Library user on 19 February 2023

Table 3: Pros and cons of medical material and personnel help during disasters [44, 48, 49].

Benefits of solicited/suitable help	Drawbacks of unsolicited/unsuitable help
Medical material	
Improve healthcare by replacement of deficient medical devices and medications	Problems in unpacking, sorting and storing of useless material
	Aggravation of already present ecologic problems when destroying unnecessary material
	Incompatibility between donated supplies (e.g. PD catheters, connectors, HD blood lines) and local needs/capacity/hardware
Medical personnel	
Extra manpower to deliver healthcare	Become disaster victims themselves due to inexperience in disaster circumstances
Moral support to local personnel	Worsening of overall chaos and disorganization
Prevent burnout of the local personnel	Overburdening of the local health professionals and administrators by inappropriate guidance and logistic support
Train local healthcare teams, which may be inexperienced in disaster conditions	

lack of computer technology/familiarity and impossibility of connecting with the internet may hamper use of this possibility.

Aftermath of war

Security and general and healthcare infrastructure are likely to improve when war ends. Many non-urgent medical problems might have been disregarded during warfare for security, logistical or economic reasons; therefore, screening, diagnosis and treatment of neglected issues should begin as soon as possible, not forgetting mental health concerns.

Unfortunately, natural and man-made disasters recur; therefore, evaluating response to the previous disaster by organizing briefing–debriefing meetings, detecting defects in disaster response and making preparations for future disasters may be useful to learn from past experience and avoid repeated mistakes.

Refugees

The measures mentioned above also apply to refugee patients; in addition, some issues deserve special attention [22, 23, 35, 56]:

(i) In case of massive displacement, evacuation of dialysis and transplant patients should be prioritized due to their high vulnerability to serious complications in the absence of treatment. Patients should not be separated from their families.
(ii) Evacuation may need to be planned in stages, with the possibility to dialyze in between stops.
(iii) Nutrition, health and hygiene during evacuations should be ensured.
(iv) In case of uncertainty about infection status, patients should be isolated until their condition is clarified.
(v) Coordinators accommodating patients with kidney disease at border points should perform triage to identify those in need of emergency intervention. Organization of dialysis or hospital admission at the earliest convenience is vital. Collection of (anonymized) data is critical to assess burden and needs, to help planning future strategies, to inform other involved organizations and to coordinate assistance in the subsequent stages.
(vi) Patients should be encouraged not to return to conflict areas, unless safety and treatment possibilities improve.

Patient education about potential evacuation procedures ahead of time may be useful to avoid panic displacement and to assure safety during the journey. Patients should also be informed about adhering to predefined dietary measures and to carry a stock of critical medications when travelling. Training of APD patients to perform manual PD exchanges, with a prescription for CAPD, is mandatory. Supplies for CAPD and APD are different and sources of supplies should be identified ahead of time.

Sustainable long-term solutions

Possibilities for patients to be granted permission to remain in a destination country may differ depending on the hosting country [41], and refugees may be accepted or rejected. In the latter case, they may return to the country of origin or transit to another (third) country. If they are accepted permanently, the same legal, social, economic and cultural rights and freedoms should be provided to refugee patients as to the citizens of the hosting country, and all necessary therapeutic options offered at the same level with achievement of full health insurance coverage [35]. However, reaching all these targets will often be gradual, complex and time-consuming.

ETHICAL CHALLENGES

Although the classical ethical principles of non-maleficence, beneficence, distributive justice and respect for autonomy also apply in war conditions, some principles of medical ethics may necessitate different approaches [57]. If basic values are contradicted by war circumstances (e.g. individual autonomy/benefit versus fair distribution of resources across a population), physicians may have to use their practical wisdom to decide about their actual duties [57].

It is a moral duty to provide dialysis care to the refugees who need it [34, 35]; however, allocation of limited resources is a great concern. Applying a utilitarian approach of maximizing benefit and saving as many lives as possible has traditionally been justified, although it was questioned at times during the recent SARS-CoV-2 pandemic [58]. If patients in need of the same treatment have similar medical and logistic drawbacks and prognoses, equality should be considered, and

Downloaded from https://academic.oup.com/ndt/article/38/1/56/6674221 by Istanbul University Library user on 19 February 2023

prioritization may be decided through random selection, such as a lottery [59].

CONCLUSIONS

During armed conflicts, people with kidney disease are at higher risk of adverse outcomes than healthy individuals. Dependence for survival upon continuous vital therapies, intact infrastructure, advanced technology and well-trained personnel make this patient population extremely vulnerable. Dire conditions in the disaster field may precipitate displacement, which results in additional problems during travel and in the new environment.

Respecting medical, logistical and also ethical rules, which may deviate significantly from routine practice, may provide opportunities for saving as many lives as possible.

DATA AVAILABILITY STATEMENT

No new data were generated or analysed in support of this research.

CONFLICT OF INTEREST STATEMENT

The results presented in this paper have not been published previously in whole or part, except in abstract format.

REFERENCES

1. Reliefweb. Glossary of humanitarian terms. 2008. https://reliefweb.int/sites/reliefweb.int/files/resources/4F99A3C28EC37D0EC12574A4002E89B4-reliefweb_aug2008.pdf (16 April 2022, date last accessed).
2. International Institute for Strategic Studies (IISS). Armed conflict survey 2021. 2022. https://www.iiss.org/publications/armed-conflict-survey/2021/armed-conflict-survey-2021 (13 June 2022, date last accessed).
3. World Population Review. Countries currently at war 2022. 2022. https://worldpopulationreview.com/country-rankings/countries-currently-at-war (13 June 2022, date last accessed).
4. Milián INR, García JU, Arestizábal PU *et al. Alert 2022! Report on conflicts, human rights and peacebuilding*. Barcelona: Icaria, 2022. https://escolapau.uab.cat/img/programas/alerta/alerta/22/alerta22i.pdf (21 July 2022, date last accessed).
5. Sekkarie M, Murad L, Al-Makki A *et al.* End-stage kidney disease in areas of armed conflicts: challenges and solutions. *Semin Nephrol* 2020;**40**:354–62. https://doi.org/10.1016/j.semnephrol.2020.06.003
6. Sever MS, Ortiz A, Maggiore U *et al.* Mass disasters and burnout in nephrology personnel: from earthquakes and hurricanes to COVID-19 pandemic. *Clin J Am Soc Nephrol* 2021;**16**:829–37. https://doi.org/10.2215/CJN.08400520
7. Vanholder R, Gallego D, Sever MS. Wars and kidney patients: a statement by the European Kidney Health Alliance related to the Russian-Ukrainian conflict. *J Nephrol* 2022;**35**:377–80. https://doi.org/10.1007/s40620-022-01301-4
8. Sever MS, Remuzzi G, Vanholder R. Disaster medicine and response: optimizing life-saving potential. *Am J Disaster Med* 2018;**13**:253–64. https://doi.org/10.5055/ajdm.2018.0305
9. Tonelli M, Lloyd A, Cheung WY *et al.* Mortality and resource use among individuals with chronic kidney disease or cancer in Alberta, Canada, 2004-2015. *JAMA Network Open* 2022;**5**:e2144713. https://doi.org/10.1001/jamanetworkopen.2021.44713
10. Kennard A, Glasgow N, Rainsford S *et al.* Frailty in chronic kidney disease: challenges in nephrology practice. A review of current literature. *Intern Med J* 2022. https://doi.org/10.1111/imj.15759
11. Zemp DD, Giannini O, Quadri P *et al.* Gait disorders in CKD patients: muscle wasting or cognitive impairment? A cross-sectional pilot study to investigate gait signatures in stage 1-5 CKD patients. *BMC Nephrol* 2022;**23**:72. https://doi.org/10.1186/s12882-022-02697-8
12. Matsushita K, Coresh J, Sang Y *et al.* Estimated glomerular filtration rate and albuminuria for prediction of cardiovascular outcomes: a collaborative meta-analysis of individual participant data. *Lancet Diabetes Endocrinol* 2015;**3**:514–25. https://doi.org/10.1016/S2213-8587(15)00040-6
13. Sever MS, Vanholder R, Lameire N. Acute kidney injury in active wars and other man-made disasters. *Semin Nephrol* 2020;**40**:341–53. https://doi.org/10.1016/j.semnephrol.2020.06.001
14. Smith LH, Jr, Post RS, Teschan PE *et al.* Post-traumatic renal insufficiency in military casualties. II. Management, use of an artificial kidney, prognosis. *Am J Med* 1955;**18**:187–98. https://doi.org/10.1016/0002-9343(55)90234-5
15. Heegard KD, Stewart IJ, Cap AP *et al.* Early acute kidney injury in military casualties. *Journal of Trauma and Acute Care Surgery* 2015;**78**:988–93. https://doi.org/10.1097/TA.0000000000000607
16. Stewart IJ, Sosnov JA, Howard JT *et al.* Retrospective analysis of long-term outcomes after combat injury: a hidden cost of war. *Circulation* 2015;**132**:2126–33. https://doi.org/10.1161/CIRCULATIONAHA.115.016950
17. Kario K, Matsuo T, Ishida T *et al.* "White coat" hypertension and the Hanshin-Awaji earthquake. *Lancet North Am Ed* 1995;**345**:1365. https://doi.org/10.1016/S0140-6736(95)92561-9
18. Sengul A, Ozer E, Salman S *et al.* Lessons learnt from influences of the Marmara earthquake on glycemic control and quality of life in people with type 1 diabetes. *Endocr J* 2004;**51**:407–14.
19. Mesic E, Aleckovic-Halilovic M, Tulumovic D *et al.* Nephrology in Bosnia and Herzegovina: impact of the 1992-95 war. *Clin Kidney J* 2018;**11**:803–9. https://doi.org/10.1093/ckj/sfy098
20. El-Reshaid K, Johny KV, Georgous M *et al.* The impact of iraqi occupation on end-stage renal disease patients in Kuwait, 1990-1991. *Nephrol Dial Transplant* 1993;**8**:7–10.
21. Ozener C, Ozdemir D, Bihorac A. The impact of the earthquake in northwestern Turkey on the continuous ambulatory peritoneal dialysis patients who were living in the earthquake zone. *Adv Perit Dial* 2000;**16**:182–5.
22. Gorbatkin C, Finkelstein FO, Kazancioglu RT. Peritoneal dialysis during active war. *Semin Nephrol* 2020;**40**:375–85. https://doi.org/10.1016/j.semnephrol.2020.06.005
23. Alasfar S, Isreb M, Kaysi S *et al.* Renal transplantation in areas of armed conflict. *Semin Nephrol* 2020;**40**:386–92. https://doi.org/10.1016/j.semnephrol.2020.06.006
24. Kadowaki M, Saito M, Amada N *et al.* Medication compliance in renal transplant patients during the Great East Japan earthquake. *Transplant Proc* 2014;**46**:610–2. https://doi.org/10.1016/j.transproceed.2013.11.039
25. Shimmura H, Kawaguchi H, Tokiwa M *et al.* Impact of the Great Eastern Japan earthquake on transplant renal function in Iwaki City, Fukushima. *Transplant Proc* 2014;**46**:613–5. https://doi.org/10.1016/j.transproceed.2013.11.044
26. UNHCR (The UN Refugee Agency). Global trends. Forced displacement in 2021. https://www.unhcr.org/62a9d1494/global-trends-report-2021 (7 July 2022, date last accessed).
27. Reliefweb. Syria factsheet (last updated: 10/05/2022). https://reliefweb.int/report/syrian-arab-republic/syria-factsheet-last-updated-10052022 (26 June 2022, date last accessed).
28. UNHCR (The UN Refugee Agency). Ukraine refugee situation: refugees fleeing Ukraine. https://data2.unhcr.org/en/situations/ukraine (14 June 2022, date last accessed).
29. Crisp J, Morris T, Refstie H. Displacement in urban areas: new challenges, new partnerships. *Disasters* 2012;**36**:S23–42. https://doi.org/10.1111/j.1467-7717.2012.01284.x
30. Sekkarie MA, Abdel-Rahman EM. Cultural challenges in the care of refugees with end-stage renal disease: what western nephrologists should know. *Nephron* 2017;**137**:85–90. https://doi.org/10.1159/000477362
31. Akbalik KM, Demircioglu KB, Col N *et al.* Kidney disease profile of Syrian refugee children. *Iran J Kidney Dis* 2017;**11**:109–14.
32. Zenner D, Mendez AR, Schillinger S *et al.* Health and illness in migrants and refugees arriving in Europe: analysis of the electronic personal health record system. *J Travel Med* 2022. https://doi.org/10.1093/jtm/taac035
33. Al-Oraibi A, Hassan O, Chattopadhyay K *et al.* The prevalence of non-communicable diseases among Syrian refugees in Syria's neighbouring

Downloaded from https://academic.oup.com/ndt/article/38/1/56/6674221 by Istanbul University Library user on 19 February 2023

host countries: a systematic review and meta-analysis. *Public Health* 2022;**205**:139–49. https://doi.org/10.1016/j.puhe.2022.01.034
34. Aoun M, Koubar SH. Impact of forced human migration on management of end-stage kidney disease in host countries. *Semin Nephrol* 2020;**40**:363–74. https://doi.org/10.1016/j.semnephrol.2020.06.004
35. Van Biesen W, Vanholder R, Vanderhaegen B *et al.* Renal replacement therapy for refugees with end-stage kidney disease: an international survey of the nephrological community. *Kidney Int Suppl* 2016;**6**:35–41. https://doi.org/10.1016/j.kisu.2016.09.001
36. Barbullushi M, Koroshi A, Tase M. Albanian contribution to the treatment of refugee renal patients from Kosovo. *Nephrol Dialysis Transplant* 2000;**15**:1261. https://doi.org/10.1093/ndt/15.8.1261
37. Gursu M, Arici M, Ates K *et al.* Hemodialysis experience of a large group of Syrian refugees in Turkey: all patients deserve effective treatment. *Kidney Blood Press Res* 2019;**44**:43–51. https://doi.org/10.1159/000498832
38. Perez-Blanco A, Lopez-Fraga M, Forsythe J *et al.* Access of non-residents to transplantation of deceased donor organs: practices and strategies in the European setting. *Transpl Int* 2021;**34**:2112–21. https://doi.org/10.1111/tri.14113
39. Sevinc M, Hasbal NB, Ozcelik G *et al.* Kidney transplantation outcomes in temporarily protected Syrian patients with end-stage renal failure in turkey. *Transplant Proc* 2019;**51**:2279–82. https://doi.org/10.1016/j.transproceed.2019.01.194
40. Smith WJ. Desperate refugees sell kidneys. 2017. https://www.nationalreview.com/corner/desperate-refugees-sell-kidneys/ (13 June 2022, date last accessed).
41. Van Biesen W, Vanholder R, Ernandez T *et al.* Caring for migrants and refugees with end-stage kidney disease in Europe. *Am J Kidney Dis* 2018;**71**:701–9. https://doi.org/10.1053/j.ajkd.2017.10.015
42. Sever MS, Lameire N, Vanholder R. Renal disaster relief: from theory to practice. *Nephrol Dialysis Transplant* 2009;**24**:1730–5. https://doi.org/10.1093/ndt/gfp094
43. Liossatou A, Golland E. Disaster preparedness and evacuation plan (DPEP) in haemodialysis units: patients' emergency self-disconnection through "Clamp and cut" procedure. 2021. https://www.edtnaerca.org/resource/edtna/files/ElectronicLibrary_Managing_5-21%20(2).pdf (13 June 2022, date last accessed).
44. Sever MS, Vanholder R, RDRTF of ISN work group on recommendations for the management of crush victims in mass disasters. Recommendation for the management of crush victims in mass disasters. *Nephrol Dialysis Transplant* 2012;**27**:i1–i67. https://doi.org/10.1093/ndt/gfs156
45. Vanholder R, De Weggheleire A, Ivanov DD *et al.* Continuing kidney care in conflicts. *Nat Rev Nephrol* 2022;**18**:479–80. https://doi.org/10.1038/s41581-022-00588-7
46. National Kidney Foundation. Planning for emergencies - a guide for people with kidney disease. https://www.kidney.org/atoz/content/disasterbrochurefacilities (13 June 2022, date last accessed).
47. Vanholder R, Sever MS, De Smet M *et al.* Intervention of the renal disaster relief task force in the 1999 Marmara, Turkey earthquake. *Kidney Int* 2001;**59**:783–91. https://doi.org/10.1046/j.1523-1755.2001.059002783.x
48. Al-Makki A, Rifai AO, Murad L *et al.* The Syrian national kidney foundation: response for the need of kidney patients during the crisis. *Avicenna J Med* 2014;**4**:54–7.
49. Lameire N, Sever MS, Van Biesen W *et al.* Role of the international and national renal organizations in natural disasters: strategies for renal rescue. *Semin Nephrol* 2020;**40**:393–407. https://doi.org/10.1016/j.semnephrol.2020.06.007
50. Isreb M, Alyousef M, Obaid N *et al.* Effect of besiegement on non-communicable diseases: haemodialysis. *Lancet North Am Ed* 2016;**388**:2350. https://doi.org/10.1016/S0140-6736(16)32129-8
51. Vanholder R, Borniche D, Claus S *et al.* When the earth trembles in the Americas: the experience of Haiti and Chile 2010. *Nephron Clin Pract* 2011;**117**:c184–97. https://doi.org/10.1159/000320200
52. Cullis B, Al-Hwiesh A, Kilonzo K *et al.* ISPD guidelines for peritoneal dialysis in acute kidney injury: 2020 update (adults). *Perit Dial Int* 2021;**41**:15–31. https://doi.org/10.1177/0896860820970834
53. Sever MS, Erek E, Vanholder R *et al.* Features of chronic hemodialysis practice after the Marmara earthquake. *J Am Soc Nephrol* 2004;**15**:1071–6. https://doi.org/10.1097/01.ASN.0000119145.40232.67
54. Gorbatkin C, Bass J, Finkelstein FO *et al.* Peritoneal dialysis in austere environments: an emergent approach to renal failure management. *West J Emerg Med* 2018;**19**:548–56. https://doi.org/10.5811/westjem.2018.3.36762
55. Sever L, Balat A. Renal crisis in children during armed conflict. *Semin Nephrol* 2020;**40**:408–20. https://doi.org/10.1016/j.semnephrol.2020.06.008
56. UNHCR (The UN Refugee Agency). Handbook for the protection of internally displaced persons. 2006. https://www.unhcr.org/protection/idps/4c2355229/handbook-protection-internally-displaced-persons.html (13 June 2022, date last accessed).
57. Arawi T. Bioethical dilemmas in conflict zones: an ethicist's perspective based on lessons learned from Gaza. *Semin Nephrol* 2020;**40**:421–8. https://doi.org/10.1016/j.semnephrol.2020.06.009
58. Jobges S, Vinay R, Luyckx VA *et al.* Recommendations on COVID-19 triage: international comparison and ethical analysis. *Bioethics* 2020;**34**:948–59. https://doi.org/10.1111/bioe.12805
59. Emanuel EJ, Persad G, Upshur R *et al.* Fair allocation of scarce medical resources in the time of Covid-19. *N Engl J Med* 2020;**382**:2049–55. https://doi.org/10.1056/NEJMsb2005114

Received: 19.7.2022; Editorial decision: 29.7.2022

Downloaded from https://academic.oup.com/ndt/article/38/1/56/6674221 by Istanbul University Library user on 19 February 2023