



Lessons learned during the war in Ukraine: a report from the Renal Disaster Relief Task Force of the ERA

Serhan Tuğlular¹, Valerie Luyckx^{2,3,4}, Raymond Vanholder^{5,6}, Andrej Skoberne^{7,8}, Andrzej Wiecek⁹, Ionut Nistor^{10,11}, Ewa Pawlowicz-Szlarska¹², Rukshana Shroff¹³, Dmytro Ivanov¹⁴, Kai-Uwe Eckardt¹⁵, Edita Noruisiene^{16,17}, Daniel Gallego^{16,18}, Olena Loboda¹⁹ and Mehmet S. Sever²⁰; on behalf of the Renal Disaster Relief Task Force of the ERA

¹Department of Nephrology, School of Medicine, Marmara University, Istanbul, Turkey, ²Department of Nephrology, University Children's Hospital, Zurich, Switzerland, ³Department of Paediatrics and Child, Health, University of Cape Town, Cape Town, South Africa, ⁴Renal Division, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA, ⁵European Kidney Health Alliance, Brussels, Belgium, ⁶Nephrology Section, Department of Internal Medicine and Pediatrics, University Hospital Ghent, Ghent, Belgium, ⁷Department of Nephrology, University Medical Centre Ljubljana, Ljubljana, Slovenia, ⁸Medical Faculty, University of Ljubljana, Ljubljana, Slovenia, ⁹Department of Nephrology, Transplantation and Internal Medicine, Medical University of Silesia, Katowice, Poland, ¹⁰Department of Internal Medicine, Nephrology and Geriatrics, Grigore T Popa University of Medicine and Pharmacy, Iasi, Romania, ¹¹Department of Nephrology, Dr C I Parhon University Hospital, Iasi, Romania, ¹²Department of Nephrology, Hypertension and Kidney Transplantation, Medical University of Lodz, Lodz, Poland, ¹³Renal Unit, UCL Great Ormond Street Hospital and Institute of Child Health, London, UK, ¹⁴Department of Nephrology and RRT Shupyk, National Health Care University, Kyiv, Ukraine, ¹⁵Department of Nephrology and Medical Intensive Care, Charité-Universitätsmedizin Berlin, Berlin, Germany, ¹⁶European Kidney Health Alliance, Brussels, Belgium, ¹⁷European Dialysis and Transplant Nurses Association–European Renal Care Association, Lithuania, ¹⁸European Kidney Patient Federation, Wien, Austria, ¹⁹Scientific Collaborator of Department of Efferent Technologies, Institute of Nephrology of NAMS of Ukraine, Kyiv, Ukraine and ²⁰Department of Nephrology, School of Medicine, Istanbul University, Istanbul, Turkey

Correspondence to: Serhan Tuğlular; E-mail: stuglular@marmara.edu.tr

ABSTRACT

People living with kidney disease are among the most vulnerable at times of natural or man-made disasters. In addition to their unpredictable course, armed conflicts impose a major threat given the disruption of infrastructure, sanitation and access to food, water and medical care. The ongoing war in Ukraine has once more demonstrated the importance of preparedness, organization, coordination and solidarity during disasters. People living with kidney disease face serious challenges given their dependence on life-sustaining treatment, irrespective of whether they remain in the war zone or are displaced internally or externally. This especially affects those requiring kidney replacement therapy, dialysis or transplantation, but also patients with other kidney diseases and the medical staff who care for them. Soon after the war started, the European Renal Association assigned a Renal Disaster Relief Task Force dedicated to support the people living with kidney disease and the nephrology community in Ukraine. This report summarizes the major challenges faced, actions taken and lessons learned by this task force. We anticipate that the experience will help to increase preparedness and

mitigate the devastating effects of armed conflicts on the kidney community in the future and propose to establish an international collaboration to extend this effort to other parts of the world facing similar challenges.

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

INTRODUCTION

Natural or man-made disasters disrupt the functioning of a society and cause widespread human, material, economic and environmental losses [1, 2]. Vulnerable people, especially the elderly, women, children, the frail and the chronically ill, are more severely affected during disasters. These groups should receive specific attention to increase their survival chances. Among these, patients in need of kidney replacement therapy (KRT) compose a small but particularly vulnerable group comprising <1% of the population [3–5]. Patients on KRT are mostly overlooked by the authorities, who are overwhelmed by the needs (i.e. security, housing, nutrition, communication, transportation, water and electricity) of the broader remaining population. Consequently, experts, national and international

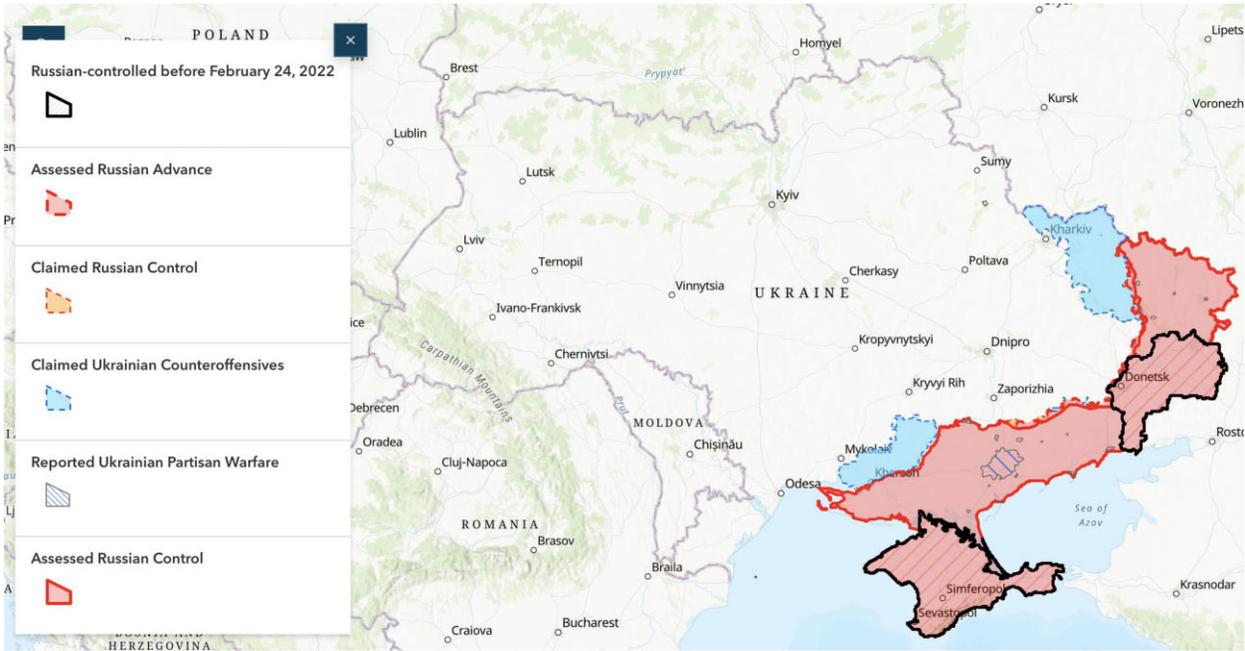


Figure 1: Russia invaded Ukraine on 24 February, but Ukrainian forces retook large areas around Kyiv in early April after Russia abandoned its push towards the capital. Areas in the west of the country, including Lviv, have seen missile attacks but no attempt by Russian forces to take and occupy ground.

Source: Institute for the Study of War and AEI's Critical Threats Project (03:00 PM, 18 January 2023).

specialty societies, the World Health Organization (WHO) and non-governmental organizations (NGOs) must shoulder the responsibility for helping these patients. Furthermore, the patients themselves and their families should be prepared for various forms of disasters and, at times, be prepared to support each other.

Armed conflicts, wherever they occur, are a major threat to public health, disrupting infrastructure, sanitation and access to food, water and medical care. One of the major differences between armed conflicts and natural disasters is that in armed conflicts, the extent and the duration are not predictable. Conflicts may last for years, necessitating a sustainable relief plan.

In this report we aim to evaluate the interventions of the Renal Disaster Relief Task Force (RDRTF) of the European Renal Association (ERA) during the war in Ukraine and to make proposals for more effective renal relief and rescue strategies for similar future catastrophes.

LINK BETWEEN DISASTERS AND KIDNEY DISEASES

The link between disasters and acute kidney injury (AKI) has been well recognized for more than a century [6, 7]. The RDRTF of the International Society of Nephrology (ISN) [8] was founded following the 1988 Armenian Spitak earthquake, when a large number of patients with crush syndrome died due to insufficient dialysis availability. Consequently, the term ‘renal disaster’ was introduced [8, 9]. The RDRTF, in close collaboration with Médecins sans Frontières (MSF), was instrumental in saving the lives of a substantial number

of AKI patients in subsequent earthquakes [10, 11]. Since then, the world has faced many natural [12–15] and man-made [16] disasters, where threats to life occur across the spectrum of patients with kidney diseases and hence the term ‘disaster nephrology’ [17] was introduced. Challenges and approaches to such disasters have been highlighted previously and strategies continue to be adapted and improved [16, 18–30].

The recent armed conflict in Ukraine drew attention once more to the importance of preparedness for such unanticipated disasters. Appropriately, the theme of World Kidney Day 2023 is ‘Kidney Health for All—Preparing for the unexpected, supporting the vulnerable!’, aiming to raise awareness about disastrous events, whether natural or man-made, international or local, and their impact on people living with kidney disease who depend on appropriate diagnostic services, treatment and care [31].

ERA IN THE UKRAINIAN CRISIS

The Ukrainian conflict and nephrological consequences

On 24 February 2022, the world was shaken by the attack of Russia on Ukraine, which triggered a massive humanitarian crisis. Action on Armed Violence reported that three hospitals were destroyed in the regions of Donetsk (Vuhledar and Mariupol) and Kyiv associated with injuries and deaths (Fig. 1) [32]. As of November 2022, nearly 7.8 million refugees fleeing Ukraine have been recorded across Europe, while an estimated 8 million people have been displaced within the country [33].

According to the Ukrainian Renal Registry, in January 2021, 11 181 patients (268 per million population) were on KRT:

6017 on haemodialysis (HD), 2700 on haemodiafiltration, 931 on peritoneal dialysis (PD) and 1533 living with a functioning kidney transplant [34].

As the leading nephrology society in Europe, the ERA was deeply concerned about the possible consequences of this attack and immediately condemned the invasion [35]. The ERA Council appointed a Renal Disaster Relief Task Force (RDRTF) dedicated to finding ways to provide help to all Ukrainian patients with kidney diseases and healthcare workers. The RDRTF was started shortly after the invasion (17 March 2022), but unfortunately did not have the chance to meet and prepare for the upcoming war beforehand. The members of the RDRTF are adult and paediatric nephrologists, representatives of the European Dialysis and Transplantation Nurses Association/European Renal Care Association (EDTNA/ERCA) and representatives of the European Kidney Patients Federation (EKPF).

Preparedness is the key to mitigate disaster-related chaos [36, 37]. The need for coordination has been emphasized previously [36, 37]. The RDRTF applied the appropriate coordination model, ensuring rapid communication between the RDRTF coordinator and the key contact people in the affected country, enabling rapid action and pragmatic decisions. The RDRTF decided to use this approach, which had previously proven successful in cases of natural disasters [36, 37] and at the first RDRTF meeting after the general overview of the situation in Ukraine, tasks were immediately assigned among the members, mainly regarding communications with representatives of Ukrainian Society of Nephrology, the Ukrainian Ministry of Health (MOH), the European Commission, pharmaceutical companies, dialysis industry representatives, The World Health Organization (WHO), NGOs in the field (e.g. MSF) and humanitarian aid organizations (e.g. Caritas and Direct Relief).

The initial aim was to collect information regarding patient numbers in Ukraine and outside, functional therapeutic capacity, urgent needs and possibilities for donations or procurement of supplies and determining how to achieve regular and safe supply delivery. The information collected was shared with the coordinator/chair of the RDRTF, who briefed the other RDRTF members through frequent mail updates as has been suggested in previous disasters.

The European Union (EU) Temporary Protection Directive [38] was activated in February 2022, ensuring free-of-charge treatment for all patients from Ukraine in EU countries. At the end of the first RDRTF meeting, the members considered an approach to prioritize the evacuation of patients on KRT to EU countries where they could be cared for. However, soon it became obvious that many patients were reluctant to leave, mostly due to feelings of insecurity and a hesitancy to be separated from their families and regular caregivers.

Representatives of the Ukrainian MOH, WHO and MSF, as well as the presidents of the adult and paediatric Ukrainian Societies of Nephrology and representatives from the dialysis industry were promptly identified and invited to participate in RDRTF meetings. This helped the RDRTF members to better understand the Ukrainian conditions and requests and how the needs in Ukraine could be met. Dialysis industry

representatives included those who operated dialysis units in Ukraine or in neighbouring countries and those providing supplies for those units.

The major conclusions were:

- Most dialysis units except three were operational, one of which was disrupted due to a bomb attack and the other two were disconnected from water and electricity service.
- Most patients in the eastern part of Ukraine were displaced to cities in western Ukraine (Lviv, Ivano-Frankivsk, Chernivci, Uzhgorod).
- Medications for CKD management, including heparin, intravenous iron, and erythropoiesis-stimulating agents (ESAs) were lacking.
- Immunosuppressive medications including, tacrolimus, mycophenolate mofetil and steroids were urgently needed.
- External human resource assistance was not requested since local and displaced Ukrainian healthcare workers continued to work.

A recent article on how the war in Ukraine affected dialysis provision sheds further light on the human suffering and organizational challenges during times of armed conflict [29, 34, 39].

Given the unpredictability of this armed conflict, the feasibility of relying on donations to sustainably meet the medical needs was limited, although some early donations were obtained. Furthermore, the WHO, NGOs and the European Commission raised funds to purchase dialysis equipment and other supplies as part of humanitarian aid. The RDRTF collected and provided updated information to key organizations such as the WHO, which was used by the RDRTF to facilitate its own advocacy on behalf of people living with kidney disease (as well as other complex non-communicable diseases) and to catalyse the provision of medical supplies through networking between the stakeholders. The safe delivery of requested materials to specific destinations proved difficult under the armed conflict conditions. A detailed account of the contributing professional societies, NGOs and humanitarian aid organizations helping Ukrainian patients with kidney diseases during the war in Ukraine is provided in Table 1.

During the initial months of the conflict, the RDRTF had weekly meetings with colleagues representing the Ukrainian nephrology community. This permitted regular updating of their needs and requests as well as informing the RDRTF members about the ongoing situation. The Ukrainian Association of Nephrologists and Transplantologists created a Ukrainian Renal Disaster Relief Committee and representatives joined the RDRTF meetings.

In addition to unavailability of specific medications, other challenges arose related to the inability to measure immunosuppressant blood levels and a lack of infrastructure and materials needed for histopathologic examinations and some simple biochemistry tests. The devaluation of the Ukrainian currency resulted in an acute increase in the cost of all medical supplies, which have thus become largely unaffordable.

Access to immunosuppressive medication for transplant patients has generally not been a problem until the present,

Table 1: Humanitarian help to Ukrainian patients with kidney diseases during the war in Ukraine and scientific societies, humanitarian organizations and industries that have contributed significantly to this mission.

Organization	Type and extent of support
ERA	<ul style="list-style-type: none"> • Appointment of a dedicated RDRTF • Regular meetings with Ukrainian colleagues, collecting requests and transmitting the information to the relevant bodies • Establishment of a stable and working relationship with Direct Relief, Caritas, the WHO • Organization of weekly 'clinical case discussions' • Creation of a website dedicated to the Ukrainian crisis, reaching out to patients with kidney diseases and the nephrology community • Free registration for the ERA annual conference for all nephrologists from Ukraine and free ERA membership for 2023 for all Ukrainian ERA members • A free day of Zoom channel for World Kidney Day 2022 and 2023 • Establishing a survey addressing the status of displaced patients on dialysis • Publication of a consensus statement on nephrological intervention during armed conflicts [29]
ESPN	<ul style="list-style-type: none"> • Regular contact with a key member of the Ukrainian Society of Pediatric Nephrology • Emergency support with medications and paediatric dialysis equipment • Free registration for the ESPN annual conference for all paediatric nephrologists from Ukraine • Publication of a position paper on the management of paediatric patients with kidney disease during disasters [40]
ASN	<ul style="list-style-type: none"> • Creation of a podcast to increase awareness • Fundraising for patients with kidney diseases
WHO	<ul style="list-style-type: none"> • Introduction to relevant stakeholders in the MOH and NGOs • Procurement of dialysis materials and medications through the MOH
Direct Relief ^a	<ul style="list-style-type: none"> • Logistic support, including HD and PD solutions/supplies/HD catheters • Intravenous fluids • Medications: phosphate binders, everolimus, intravenous iron preparations, ESAs • Other: antibiotics, antineoplastics, anticoagulants, antihypertensives, diuretics, insulin • Cystoscope for a transplant centre • Providing delivery of dialysis materials
Caritas Slovenia, Caritas Spes Ukraine and Dialysis Center Kobarid, Slovenia	
MSF (DWB)	<ul style="list-style-type: none"> • Logistic support with housing and distribution of supplies
EKHA	<ul style="list-style-type: none"> • Creating awareness of the DG Santé^b of the European Commission of the problem of patients with kidney diseases, especially destined for persons taking care of first support and triage of evacuated or displaced people • Supplies for the continuation of dialysis
Dialysis industry, FMC, BBraun Avitum, Baxter, Diaverium, Davita	
Pharmaceutical industry Chiesi, Vifor, Astellas, BBraun Avitum	<ul style="list-style-type: none"> • Immunosuppressives, intravenous iron and heparin

^aReceived donations from the ASN, ERA and Swiss Society of Nephrology.

^bParticipation in Webinars organized by the DG Santé of the European Commission, open letter to the European Commission, direct conversations with regulators and administration. ESPN: European Society of Paediatric Nephrology; FMC: Fresenius Medical Care.

but this needs regular updates based on information about the ongoing situation and the availability of medications. Until now, transplantation practice has continued in Ukraine, even under war conditions. There has not been a report of an increased incidence of infection, acute rejection or other complications among renal transplant recipients.

Following the recent missile and drone attacks on power stations and the distribution grid in Ukraine, the electric system has been brought to a crisis, leading to prolonged restrictions on electricity consumption. Since HD units rely on electricity supplies, as an alternative dialysis method, some patients were converted to PD (personal communication from Dr. Dmytro Ivanov). PD has previously been successfully applied in other war conditions as well as during natural disasters. This has been especially emphasized for paediatric patients, but it is certainly a viable option for adult patients as well [21, 40–42]. Energy supply problems also impact access to medical records and thus access to patient histories and current therapy.

Advocating for patients with kidney diseases

The joint declaration of the ISN, American Society of Nephrology (ASN) and ERA at the beginning of the war continued with further collaboration across the global kidney community. A podcast organized by the ASN generated much interest from the nephrology community and a special 'Kidney fund' was started by Direct Relief, a US-based NGO that has ample experience in providing humanitarian aid to disaster zones and armed conflict areas. This initiative enabled the RDRTF to directly focus and support provision of the necessary medications needed to the people living with kidney disease.

The RDRTF had the opportunity to participate in several meetings of the Directorate-General of Health (DG Santé) of the European Commission, with the support of the European Kidney Health Alliance (EKHA). The EKHA is an advocacy agency working to increase awareness of kidney disease at the EU level, and had already highlighted the need to not

forget patients on dialysis in support actions [43, 44]. The WHO Department of Noncommunicable Diseases anticipated the plight of those living with kidney disease, especially those requiring dialysis, and spontaneously reached out early to RDRTF members. The collaboration with the WHO was key in earmarking funds for procurement of supplies through the Ukrainian MOH and catalysing networking with organizations such as Direct Relief for direction of donations and procurement and delivery of supplies.

Case for refugee patients

Although the majority of patients on KRT preferred to stay within Ukraine in the early days, there was an increasing efflux of refugee patients to neighbouring countries over time that seemed to stabilize and was followed by a return to Ukraine as the conflict became chronic. At the beginning of September, 700 Ukrainian refugee patients on dialysis were displaced throughout Europe. Poland received the highest number of refugee dialysis patients (up to 270 patients), while Romania, Moldova, Hungary, the Czech Republic and Lithuania also hosted many refugee dialysis patients. For some patients, the displacement was further from Ukraine, mainly to Germany, Slovenia, Italy, Spain and Sweden. Currently the RDRTF is trying to map the distribution of dialysis patients to provide insights into the reasons, challenges and health impacts of displacement through a dedicated survey, the results of which are still being analysed.

Educational and advisory activities

A special portion of the ERA website [45] has been created to offer support to Ukrainian patients as well as healthcare providers. The website includes information about dialysis centres in neighbouring countries, the EU Protection Directive and information for both patients and the medical staff to reduce uncertainties and improve safety. Given that young doctors in Ukraine had to take over responsibilities for managing complex kidney care cases, a series of case discussions on adult and paediatric patients was launched to provide support to our Ukrainian colleagues. The case discussions covered basic concepts as well as complex clinical challenges. The language challenge was overcome with the help of two Ukrainian expatriate nephrologists. This weekly virtual, interactive 'Clinical Case Discussion' series has proven very popular, with up to 70 participants providing constructive suggestions supporting daily medical practice in the current war conditions.

An all-hazards model can be the key

Considering that all disasters share certain commonalities, an 'all-hazards model' (i.e. managing different hazard scenarios with a common plan for hazard mitigation and preparedness) could offer a robust foundation for effective responses. An all-hazards tool was published by the WHO, which suggests key actions that need to be considered in responding to any disaster event. This tool proposes the use of a hospital emergency checklist (i.e. communication, safety and security,

triage, surge capacity, continuity of essential services, human resources, logistics and supply management), highlighting the importance of a well-functioning command and control system [46].

For a detailed description of the nephrological actions that can be undertaken in disasters, including wars, the interested reader is referred to several review papers in the literature, including the recent article published by the RDRTF [16, 27, 29–31, 36, 37, 43, 47–53]. Possible approaches are detailed in Fig. 2.

LESSONS LEARNED AND IMPLICATIONS FOR THE FUTURE ARMED CONFLICTS

Lessons learned in other disasters can be largely extrapolated to war situations, and some new lessons were learned. During the war in Ukraine we saw the verification of most in-war situations as well.

1. Preparedness is crucial: Disasters may occur anywhere, and, because of their complex needs, preparation is vital to increase the chance of survival of patients with acute or chronic kidney disease. These preparations include medical and logistic planning in a disaster-free period.
2. The collaboration of national and international nephrology societies is essential: The RDRTF is a new organization that provided significant help and support during the recent Ukraine–Russian conflict. The collaboration of national and international nephrology societies is essential for better preparedness and more effective intervention in renal disasters, in all regions of the world, especially in developing countries, which are frequently faced with wars and suffer from major healthcare problems not only during disasters, but also in routine practice.
3. Individual actions should not be encouraged in situations of armed conflict/war: During the course of the war in Ukraine there has not been a specific request for human resources. During armed conflicts it may not be safe to travel and work on a volunteer basis, and there may be language barriers as well as legislation problems even for healthcare staff. Therefore the RDRTF suggests that individual actions should not be encouraged under such conditions and alternative methods should be considered (telehealth, case discussions, WhatsApp groups) to support the care of patients locally. On the other hand, volunteers' support in neighbouring countries for the care of refugee patients may prove to be useful.
4. Help and support of international scientific societies and other NGOs are vital: Following mass disasters, governments and authorities face many practical problems and patients with kidney diseases do not always receive the necessary attention, leaving the local medical communities with a vast workload and responsibility. The help and support of international scientific societies and other NGOs are vital to support national societies and care providers in their efforts to care for patients with kidney diseases.

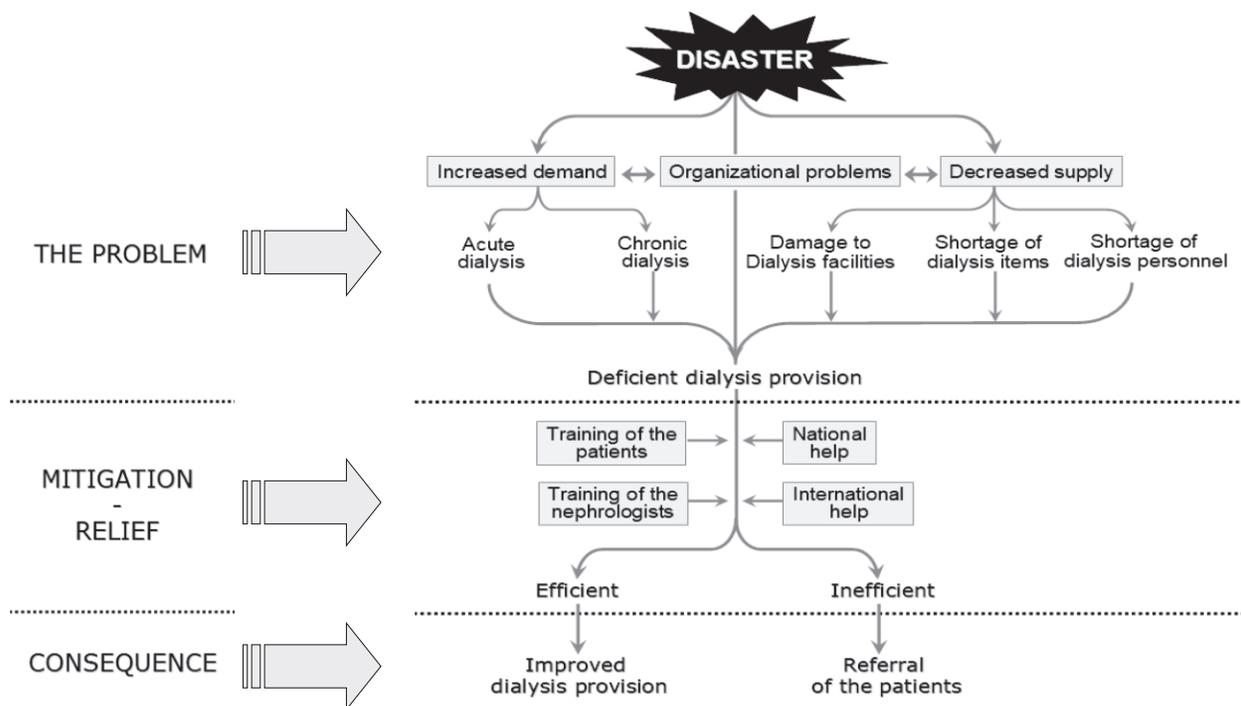


Figure 2: Problems and consequences of mitigation/relief activities during disasters. Dialysis demand may increase, mostly due to acute dialysis needs in disaster-related AKI patients. Due to damage to dialysis centres and subsequent redistribution of their patients to the functioning units, dialysis patients may overload these centres. A shortage of dialysis material and personnel, in combination with organizational problems, cause a disparity between dialysis demand and supply. Training patients may allow them to adhere strictly to dietary restrictions, thus enabling less frequent dialysis, whereas training the nephrologists may be useful to decrease dialysis dose, thus increasing dialysis availability for the remaining patients. National and international dialysis material and personnel help may be useful to respond to the need for increased dialysis services. If these interventions are not efficient enough, the only remaining option would be referral of patients to unaffected regions of the country or abroad. Interventions and an advisory role of local nephrology societies and international support task forces are instrumental for all of these mitigation and relief efforts.

5. Collaboration with the WHO and NGOs is crucial: Communication and partnership with the WHO, humanitarian aid organizations and other NGOs active in the affected country are crucial to bring the specific needs of patients with kidney diseases to the attention of these major organizations. These organizations may also already have or are able to raise specific funds for patients with kidney diseases
6. Collaboration with the highest local health authorities aligns efforts to help: The MOH is the highest authority responsible for the functioning of the healthcare system. Most NGOs, as well as the WHO and EU, will accept official requests only from the MOH. This is also important for oversight of the allocation of limited sources. The MOH is also a valuable source of credible information. Good relations must be established with the highest health authority of the affected country, especially with the members responsible for the care of dialysis and transplant patients.
7. Establishment of local RDRTFs must be encouraged: The nephrology community in each country should be encouraged to create a local RDRTF, which should be in close contact with international nephrology societies. The RDRTF should include dialysis nurses

and technicians as well as nephrologists. In a disaster-free period, local organizations should assign key contact people and substitutes to facilitate efficient intervention if a disaster does occur. These individuals should be easily reachable, prepare and update local disaster preparedness plans and organize local training programs in disaster nephrology, targeting each stakeholder (patients, physicians/nephrologists and dialysis units). Furthermore, under disaster conditions, these local RDRTF coordinators may provide valuable real-time information about the status and functionality of dialysis centres, availability of medications, major needs and requests. If a local RDRTF does not exist, it is worth considering that some countries have multiple nephrology societies and each should be contacted individually.

8. Patient organizations must be involved in disaster preparedness planning: It is crucial to include patient organizations in the process of preparing for future disasters. Their active participation will lead to a better understanding of the patients' perspectives and a better response to their needs. Patient education by any means (written, visual and social media, brochures, infographics, websites) is vital to

increase survival probability. It would also be very useful for the patients to have a printed brief medical report, including their current treatment, in case of displacement. The ERA has established a special section for patients with kidney diseases on its website. However, despite the efforts of the RDRTF, we were unable to reach the patients' associations in Ukraine. This issue must be included in the efforts for preparation.

9. Dialysis and pharmaceutical industries should be included as important stakeholders: Dialysis and pharmaceutical industries are among the stakeholders of healthcare. The industry may be able to provide information about the functionality of supply chains and of dialysis units. They may also be able to provide help and donations of essential medications, especially in the early stages of the disaster.
10. Regular updating of the medical knowledge in disaster nephrology is one of the key elements of preparedness: The occurrence of disasters is sporadic, and unapplied medical knowledge is easily forgotten, therefore disaster nephrology courses should be included in medical and nursing curricula and continuing medical education activities. Preparation and dissemination of short and pragmatic guidelines and/or translating existing guidelines is effective in decreasing the risk of error and providing the most efficient treatment, which in turn increases the survival probability of people with acute and chronic kidney disease in disasters [50].
11. Important legal information must be accessible to patients and medical staff: Important information like the legal rights to access healthcare systems in other countries, lists of dialysis centres in neighbouring countries as well as phone numbers and addresses of the closest dialysis centres in neighbouring countries, especially for displaced patients on dialysis, can be disseminated through the RDRTF and national society websites, ideally in the native language of the affected country. Disseminating important information through the most popular channels in the affected country may be important.
12. Adjustment of dialysis requirements to disaster (war) conditions may be needed: Adjustments in dialysis frequency or dose, switching from in-centre HD to PD or home HD and changes in immunosuppressive regimens should be considered in the case of shortages of medical material and personnel as well as restrictions in power supplies. If problems cannot be coped with once urgent care has been initiated, referral of the patient to a distant higher-level hospital may be lifesaving. However, patient evacuation should be attempted only after careful preparations and, if international, after an administrative agreement between countries has been made.
13. Use of telemedicine and tele-education may prove very useful: Telemedicine (if possible) may be useful to support inexperienced local physicians in managing

medical and logistical challenges. Online consultations and case discussions have been very useful in the recent Ukrainian crisis; this opportunity should also be provided in future catastrophes if local circumstances allow. During these virtual meetings, expatriate nephrologists may be helpful to overcome language barriers.

14. Special attention to ethical dilemmas is required: Ethical dilemmas may occur under disaster circumstances, especially so during armed conflicts. Corruption at many levels is a risk during all disaster conditions, including armed conflict situations. It is important to clarify communication channels pre-emptively for discussion and identify sources of assistance/advice to address such issues in real time [54].
15. Collection of scientific data is important: Although collecting scientific data during disaster conditions may be very challenging and not considered a priority, it is crucial since it may serve to shed light on similar future disaster conditions.
16. Depression and war weariness must not be overlooked: Depression and war weariness remain very important issues and are typical for both patients and the medical staff. The desire and motivation of patients to continue treatment as well as the attention and care of medical personnel towards patients both decrease over time. The tension in the society increases as the family members of many people are at the front or have already been injured or died. This fatigue and burnout syndrome has been previously described and has been once more proven during the war in Ukraine [29].

THE STEPS MOVING FORWARD DURING THE WAR IN UKRAINE

Unfortunately the war in Ukraine has, at this moment (beginning of 2023), entered a 'chronic' phase, like many other examples in the world. The end of the hostilities is totally unpredictable. Until now, the events have proved some of the previous theoretical concerns to be true: burnout syndrome increasing over time, the lack of electricity and water supplies and adjustments being made according to needs [16]. Modalities of renal replacement therapies seem to be changing out of necessity from HD to PD. In contrast to earlier in the conflict, the supplies of consumables and medical products seem to be adequate. However, requests for generators for electricity supply and batteries to run automated PD machines are increasing. Ultimately, generators for electricity production may not be a solution due to a lack of fuel to run those generators. The presence of a functioning health system, infrastructure and competent health workers before the war is extremely important in finding constructive solutions under the present conditions. Continuing communication and collaboration with all relevant stakeholders and regular updates of the current needs and conditions will be essential in the future.

CONCLUSION

People living with kidney disease have complex needs and require continued support and care during disaster circumstances to avoid life-threatening situations. Disaster mitigation and preparedness, which include organizing disaster response teams, organizing training courses, preparing and/or translating guidelines and planning of the interventions may be useful to decrease the extent of post-disaster chaos and disorganization, which in turn increases the survival probability of patients with acute and chronic kidney disease. The implementation of action plans, which are prepared in a disaster-free period, and follow-up care in the maintenance phase may be lifesaving for patients with kidney disease. Post-disaster recovery and rehabilitation activities are necessary to optimize the quality of life of the patients who survive the disaster. Debriefing meetings and timely revision of action plans may be useful to avoid mistakes in future disasters.

No place is immune to natural or man-made disasters. The RDRTF is acutely aware that the time and resources spent on supporting patients and colleagues in Ukraine is disproportionate to the support of patients and colleagues in similar (chronic) conflict situations elsewhere. This disproportionate support is not easy to justify but can be attributed to the shock of the invasion of one sovereign country by another, the occurrence of the conflict on the European territory and the physical ability of the ERA to provide support locally. This in no way means that the ERA values less the lives and challenges faced by others; however, it does highlight the necessity for the global renal community to join forces to advocate for and support patients and colleagues in conflict situations everywhere.

ACKNOWLEDGEMENTS

We are thankful to the WHO Department of Noncommunicable Diseases, Direct Relief, MSF, Caritas, Fresenius Medical Care and B Braun Avitum for their very valuable humanitarian contributions during the Ukrainian intervention of the RDRTF. The European Kidney Health Alliance is the recipient of support by the European Union in the context of the Annual Work Program 2022 on prevention of non-communicable diseases of EU4Health, topic ID EU4H-2022-PJ02, project # 101101220 PREVENTCKD.

FUNDING

None declared.

AUTHORS' CONTRIBUTIONS

S.T., R.V.H. and M.S.S. conceived the idea of this article. S.T. and M.S.S. wrote the first draft. R.V.H. and V.L. contributed to the writing of the manuscript. A.W., A.S., I.N., E.P.-S. and K.-U.E. put significant intellectual contribution to the manuscript. The paper was critically reviewed by all authors and finally approved by all authors.

DATA AVAILABILITY STATEMENT

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

CONFLICT OF INTEREST STATEMENT

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

REFERENCES

1. ReliefWeb. *Glossary of Humanitarian Terms*. <https://reliefweb.int/report/world/reliefweb-glossary-humanitarian-terms-enko>
2. *Action on Armed Violence*. https://www.asnonline.org/media/podcast.aspx?p=ASN&e=2022_04_13_IbrahimTuglularFinal.mp3
3. Sever MS, Ereke E, Vanholder R *et al*. The Marmara earthquake: epidemiological analysis of the victims with nephrological problems. *Kidney Int* 2001;**60**:1114–23. <https://doi.org/10.1046/j.1523-1755.2001.0600031114.x>
4. Kramer A, Boenink R, Stel VS *et al*. The ERA-EDTA Registry Annual Report 2018: a summary. *Clin Kidney J* 2021;**14**:107–23. <https://doi.org/10.1093/ckj/sfaa271>
5. GBD Chronic Kidney Disease Collaboration. Global, regional, and national burden of chronic kidney disease, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2020;**395**:709–33. [https://doi.org/10.1016/S0140-6736\(20\)30045-3](https://doi.org/10.1016/S0140-6736(20)30045-3)
6. Bywaters EG, Beall D. Crush injuries with impairment of renal function. *Br Med J* 1941;**1**:427–32. <https://doi.org/10.1136/bmj.1.4185.427>
7. Vanholder R, Argiles A, Jankowski J *et al*. A history of uraemic toxicity and of the European Uraemic Toxin Work Group (EUTox). *Clin Kidney J* 2021;**14**:1514–23.
8. Solez K, Bihari D, Collins AJ *et al*. International dialysis aid in earthquakes and other disasters. *Kidney Int* 1993;**44**:479–83. <https://doi.org/10.1038/ki.1993.271>
9. Collins AJ. Kidney dialysis treatment for victims of the Armenian earthquake. *N Engl J Med* 1989;**320**:1291–2. <https://doi.org/10.1056/NEJM198905113201930>
10. 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>
11. 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>
12. Gray NA, Wolley M, Liew A *et al*. Natural disasters and dialysis care in the Asia-Pacific. *Nephrology (Carlton)* 2015;**20**:873–80. <https://doi.org/10.1111/nep.12522>
13. Miller AC, Arquilla B. Chronic diseases and natural hazards: impact of disasters on diabetic, renal, and cardiac patients. *Prehosp Disaster Med* 2008;**23**:185–94. <https://doi.org/10.1017/S1049023X00005835>
14. Kopp JB, Ball LK, Cohen A *et al*. Kidney patient care in disasters: lessons from the hurricanes and earthquake of 2005. *Clin J Am Soc Nephrol* 2007;**2**:814–24. <https://doi.org/10.2215/CJN.03481006>
15. Legrand M, Bell S, Forni L *et al*. Pathophysiology of COVID-19-associated acute kidney injury. *Nat Rev Nephrol* 2021;**17**:751–64. <https://doi.org/10.1038/s41581-021-00452-0>
16. 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>
17. Sever MS, Lameire N, Van Biesen W *et al*. Disaster nephrology: a new concept for an old problem. *Clin Kidney J* 2015;**8**:300–9. <https://doi.org/10.1093/ckj/sfv024>
18. 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>

19. Crisp J, Morris T, Refstie H. Displacement in urban areas: new challenges, new partnerships. *Disasters* 2012;**36**(Suppl 1):S23–42. <https://doi.org/10.1111/j.1467-7717.2012.01284.x>
20. el-Reshaid K, Johnny 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. <https://doi.org/10.1093/oxfordjournals.ndt.a092276>
21. Gorbalkin 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>
22. Kario K, Matsuo T, Ishida T *et al*. “White coat” hypertension and the Hanshin-Awaji earthquake. *Lancet* 1995;**345**:1365. [https://doi.org/10.1016/S0140-6736\(95\)92561-9](https://doi.org/10.1016/S0140-6736(95)92561-9)
23. 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>
24. 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.
25. 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.
26. 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>
27. 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>
28. Sever MS, Vanholder R. Management of crush victims in mass disasters: highlights from recently published recommendations. *Clin J Am Soc Nephrol* 2013;**8**:328–35. <https://doi.org/10.2215/CJN.07340712>
29. Sever MS, Vanholder R, Luyckx V *et al*. Armed conflicts and kidney patients: a consensus statement from the renal disaster relief task force of the ERA. *Nephrol Dial Transplant* 2023;**38**:56–65. <https://doi.org/10.1093/ndt/gfac247>
30. 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>
31. World Kidney Day. 2023 Campaign. <https://www.worldkidneyday.org/2023-campaign/>
32. Action on Armed Violence. Explosive violence in Ukraine. <https://aoav.org.uk/category/explosive-violence-research/ukraine/>
33. Wikipedia. 2022 Ukrainian refugee crisis. <https://data2.unhcr.org/en/situations/ukraine>
34. Stepanova N. War in Ukraine: the price of dialysis patients’ survival. *J Nephrol* 2022;**35**:717–8. <https://doi.org/10.1007/s40620-022-01308-x>
35. European Renal Association, International Society of Nephrology, American Society of Nephrology. Global Kidney Organizations Appeal for Kidney Health for All War Victims. <https://www.era-online.org/wp-content/uploads/2022/11/Global-Kidney-Organizations-Appeal-for-Kidney-Health-for-All-War-Victims.pdf>
36. Sever MS, Lameire N, Vanholder R. Renal disaster relief: from theory to practice. *Nephrol Dial Transplant* 2009;**24**:1730–5. <https://doi.org/10.1093/ndt/gfp094>
37. 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>
38. European Commission. Information for people fleeing the war in Ukraine. https://ec.europa.eu/info/strategy/priorities-2019-2024/stronger-europe-world/eu-solidarity-ukraine/eu-assistance-ukraine/information-people-fleeing-war-ukraine_en
39. Stepanova N, Kolesnyk M, Mithani Z *et al*. Lifesaving care for patients with kidney failure during the war in Ukraine 2022. *Clin J Am Soc Nephrol* 2022;**17**:1079–81. <https://doi.org/10.2215/CJN.04720422>
40. Sever L, Pehlivan G, Canpolat N *et al*. Management of pediatric dialysis and kidney transplant patients after natural or man-made disasters. *Pediatr Nephrol* 2023;**38**:315–25.
41. Chionh CY, Finkelstein FO, Ronco C. Peritoneal dialysis for acute kidney injury: equations for dosing in pandemics, disasters, and beyond. *Perit Dial Int* 2021;**41**:307–12. <https://doi.org/10.1177/0896860820970066>
42. Tamura H, Kuraoka S, Hidaka Y *et al*. Pediatric peritoneal dialysis during the recent earthquakes in Japan and recommendations for future disaster preparation. *Kidney Int Rep* 2020;**5**:1061–5. <https://doi.org/10.1016/j.ekir.2020.03.028>
43. Vanholder R, Conway PT, Gallego D *et al*. The European Kidney Health Alliance (EKHA) and the Decade of the Kidney™. *Nephrol Dial Transplant* 2022. <https://doi.org/10.1093/ndt/gfac211>
44. 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>
45. European Renal Association. Help For Ukraine. <https://www.era-online.org/en/help-for-ukraine/>
46. World Health Organization Regional Office for Europe. Hospital emergency response checklist: an all-hazards tool for hospital administrators and emergency managers. <https://apps.who.int/iris/handle/10665/349374>
47. Phillips BD. Special needs populations. In: Koenig KL Schultz CH, eds. *Koenig and Schultz’s Disaster Medicine: Comprehensive Principles and Practices*. Cambridge: Cambridge University Press, 2010:113–30.
48. Rathore FA, Gosney JE, Reinhardt JD *et al*. Medical rehabilitation after natural disasters: why, when, and how? *Arch Phys Med Rehabil* 2012;**93**:1875–81. <https://doi.org/10.1016/j.apmr.2012.05.018>
49. Sever MS, Ereik 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>
50. 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 Dial Transplant* 2012;**27**(Suppl 1):i1–67. <https://doi.org/10.1093/ndt/gfs156>
51. 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>
52. Waeckerle JF. Disaster planning and response. *N Engl J Med* 1991;**324**:815–21.
53. Azuma T, Seki N, Tanabe N *et al*. Prolonged effects of participation in disaster relief operations after the Mid-Niigata earthquake on increased cardiovascular risk among local governmental staff. *J Hypertens* 2010;**28**:695–702. <https://doi.org/10.1097/HJH.0b013e328336ed70>
54. Martin DE, Fadhil RAS, Więcek A. Ethical aspects of kidney donation and transplantation for migrants. *Semin Nephrol* 2022;**42**:151271.

Received: 23.11.2022; Editorial decision: 2.3.2023