Nephrology in the Eastern and Central European region: challenges and opportunities

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The Eastern and Central European region of the International Society of Nephrology (ISN) includes 19 member countries: Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Republic of Serbia, Montenegro, Slovenia, Slovakia, and Turkey. There are marked variations in the demographic and socioeconomic characteristics of these countries, which will impact dealing with chronic kidney disease (CKD), a highly demanding issue from both economic and workforce perspectives.[1] Nine countries in the region are identified by the World Bank as high income, 9 as upper middle income, and 1 as lower middle income.[2]

The resources available for kidney care and the opportunities for high-quality clinical practice for nephrologists are improving throughout our region, although they continue to lag behind other parts of Europe. Our aim is to reflect the latest practices in Eastern and Central Europe and to depict the action that ISN can do to improve it.

Many aspects of kidney care in our region were recently evaluated in the Global Kidney Health Atlas.[3] This data from Eastern and Central Europe been extrapolated for this paper.

Additional data on aspects of kidney disease and care were collected by means of a questionnaire set up by the authors in 2017. The questionnaire included questions about the number of CKD 5D patients per million population, incidence and prevalence of renal replacement therapies (RRT), costs of RRT modalities, number of centers providing dialysis or transplantation, the number of nephrologists, educational needs of nephrologists, and the number of nurses and research facilities.

Data could have been retrieved from 10 of the 19 countries in the region by personal communication with representatives of those countries on the ISN Regional Board (see Figure 1 with the populations and economic status of these countries). One of the 10 countries is categorized by the World Bank as high income; the other 9 are upper middle income countries.[2] National income remains among the biggest factors influencing access to health care, including kidney care.

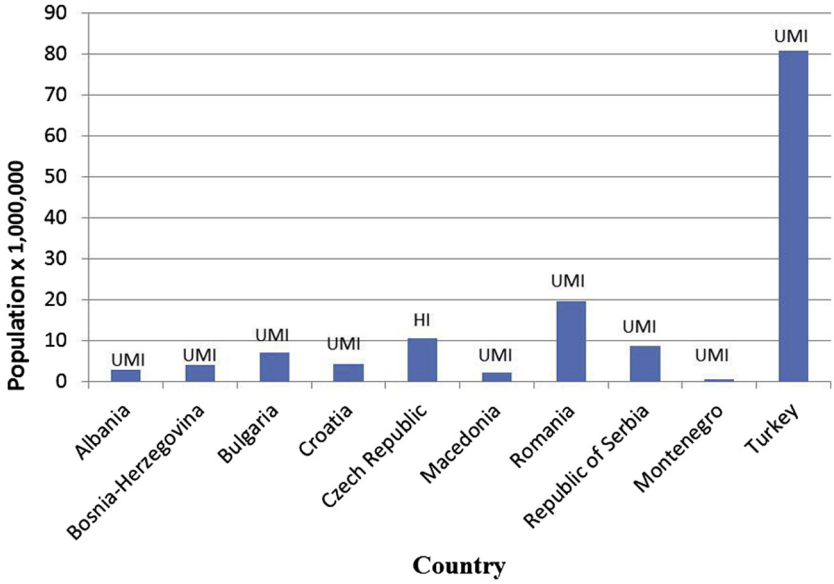

Figure 1 | Population of countries in Eastern and Central European region of the International Society of Nephrology providing novel information for this report displayed by population and showing national income as assigned by the World Bank. Data from the World Bank, The Data Blog: New country classifications by income level: 2017–2018, available at: blogs.worldbank.org/opendata/new-country-classifications-income-level-2017-2018. Accessed February 3, 2018. HI, high income (gross national income [GNI] per capita ≥$12,235 or more); UMI, upper middle income (GNI per capita $3956–$12,235).

Etiology of CKD

The data of the 10 countries (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Macedonia, Romania, Republic of Serbia, Montenegro, and Turkey) derived from our survey on the etiologies of CKD requiring RRT are shown in Figure 2. Major etiologies for CKD are diabetes mellitus (24%), hypertension and vascular disease (23%), and glomerulonephritis (14%). These do not differ widely from proportions seen in other world regions.[3]

The impact of Balkan endemic nephropathy. Balkan endemic nephropathy is a chronic interstitial renal disease with an associated high risk of urothelial tumors. It is endemic mainly in agricultural regions along the River Danube, and it is now known that a major causative factor is contamination of the food chain with aristolochic acid.[4] It was not identified among the major causes of CKD in our survey (Figure 2), possibly because it may be identified under "unknown" or "miscellaneous" causes in our survey.

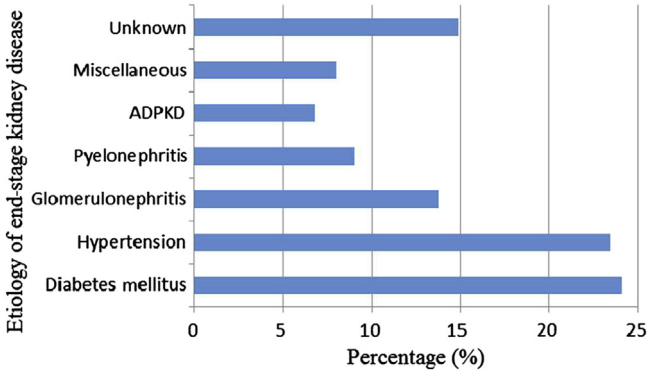

Figure 2 | Mean prevalence (%) in Eastern and Central Europe of various etiologies of end-stage kidney disease. Ten countries (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Macedonia, Romania, Republic of Serbia, Montenegro, and Turkey) have provided data to the survey. ADPKD, autosomal dominant polycystic kidney disease.

Incidence and prevalence of RRT

Data of the 10 countries in the Eastern and Central Europe (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Macedonia, Romania, Republic of Serbia, Montenegro, and Turkey) show wide variation in the incidence and prevalence of RRT. The mean incidence is 198.3 (range 97.4–654) per million population. The mean prevalence of end-stage kidney disease (ESKD) requiring RRT is 934.1 (range 358–1052) per million population. The prevalence of the 3 main RRT modalities is shown in Table 1 and compared with the United Kingdom in Figure 3. RRT began early in our region (e.g., first hemodialysis [HD] in the Republic of Serbia started in 1962,[5] and first renal transplantation took place in Czech Republic in 1966[6]), but the expansion of RRT was restricted by economic and political circumstances for many years. Since the early 1990s, there has been consistent growth in RRT, although the overall prevalence in most of these countries still lags significantly behind the United Kingdom and other Western European countries.

RRT modalities

The distribution of RRT modalities in the 10 countries in the Eastern and Central Europe providing data to our survey are HD 72.6% (range 50%–85%), peritoneal dialysis 4.2% (range 1.0%–15.8%), and kidney transplantation 24.6% (range 11.4%–46.6%) (Figure 3). In addition to the overall lower

Table 1 | The prevalence of renal replacement therapy per million population of the countries in Eastern and Central Europe

Country	Hemodialysis patients per million population	Peritoneal dialysis patients per million population	Patients with renal transplantation per million population
Albania	348	16	86
Bosnia-Herzegovina	638	72	260
Bulgaria	514	21	85
Croatia	488	28	451
Czech Republic	601	34	447
Macedonia	669	16	109
Romania	643	24	86
Republic of Serbia	623	72	104
Montenegro	243	5	110
Turkey	709	37	177

Data for Eastern and Central Europe were retrieved from the unpublished data received directly from the responsible physicians of the 10 countries.

prevalence of RRT in the 10 countries of Eastern and Central Europe involved in the survey compared with the United Kingdom, variations in use of RRT modality are also marked. HD was in the first order in eastern and central European countries while renal transplantation was more common in the United Kingdom, the data of which was retrieved from the European Renal Association—European Dialysis and Transplant Association registry.

Dialysis modalities. The limited uptake of home-based therapies, including both peritoneal dialysis and home HD, may be explained by private sector investments in in-center HD, which is seen as more profitable, as well as by a lack of patient preference for peritoneal dialysis treatment. Another reason for the relative scarcity of home HD is that most of the countries are small and the distance to the nearest HD unit could be as low as 20 to 30 km, encouraging a trend toward in-center HD.

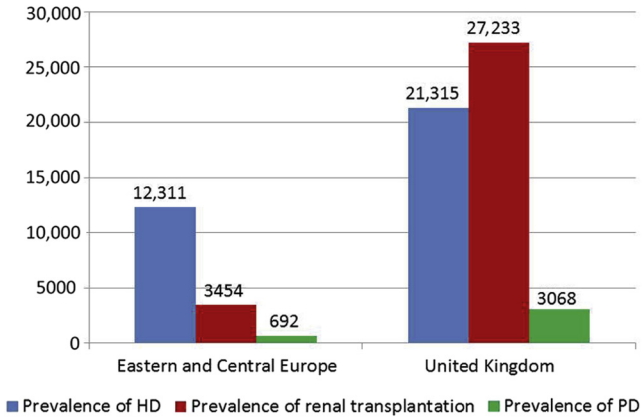

Figure 3 | Prevalence of renal replacement therapy modalities per million patients in 2016: comparison between Eastern and Central European region and United Kingdom (UK). Data of Eastern and Central Europe were retrieved from the unpublished data received directly from the responsible physician of the 10 countries (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Macedonia, Romania, Republic of Serbia, Montenegro, and Turkey) that provided to the survey. Data of the UK were retrieved from the European Renal Association—European Dialysis and Transplant Association (ERA-EDTA) registry. HD, hemodialysis; PD, peritoneal dialysis.

Financial factors are known to have a significant impact on the use of RRT in all parts of the world. The treatment for ESKD patients has a big impact on the economy as well. According to the health care coverage, the mean cost per session of HD per week is 110 Euro (€) (range 54–250) or 16,500 (range 8,100–37,500) € annually; the mean cost of peritoneal dialysis per day is 17 (range 9–27) € or 24,820 (range 13,140–39,420) € annually in the 10 countries of Eastern and Central Europe that provided data. A partial explanation for these variations may be the range of labor costs for dialysis personnel.

The commercial sector invests significantly in our region, providing HD treatment centers. The mean numbers of private dialysis centers and state supported centers for HD are 59.6 (range 0–332) and 89.4 (range 3–528), respectively.

Transplantation. Transplantation is a markedly lower RRT type in our region compared with most of West Europe.[3] Both deceased donor and living donor programs have only expanded slowly. The lack of appropriate organization (national or hospital transplant coordinators), public awareness, education and motivation for organ donation, as well as the small number of well-trained, skilled, and competent procurement and transplantation teams as prerequisites for a successful deceased donation may have prevented its widespread use in the region. Following the South-Eastern Europe Health Network meeting, which was held in Croatia in May 2011, this country became a pioneer in legislative changes and set an example for the whole region. Croatia remains the role model for the region with the most successful deceased donation program worldwide, successfully providing support for development of deceased organ donation and transplant programs under the guidance of the Regional Health Development Centre on Organ Donation and Transplant Medicine.[7] Moldova and Macedonia also had big efforts on initiating their living and deceased donor programs following the South-Eastern Europe Health Network meeting.[7] Renal transplantation has procedure costs around 10,700 (range 7,500–23,000) €.

Registries

Of the 19 countries in our region, 90% have now established registries for systematic collection of data on people receiving RRT, including dialysis and transplantation.[3] However, registries collecting data on those with CKD not receiving RRT, and on acute kidney injury are few. There are 4 registries for acute kidney injury, 2 registries for CKD, 15 registries for HD, and 14 registries for transplantation patients within the boundaries of Eastern and Central Europe according to the data of Global Kidney Health Atlas.[3] This lack of epidemiological data limits opportunities to advocate to healthy funders and policy makers for increased resources to care for those with kidney disease who do not require RRT. ISN could

Table 2 | Geographic origin of respondents, with numbers of refugees on dialysis, by country

Country	Number of centers	Number of refugees on dialysis in preceding 4 months
Albania	2	2
Bulgaria	2	0
Croatia	2	0
Czech Republic	6	0
Estonia	1	0
Hungary	1	1
Lithuania	6	0
Macedonia	2	2
Poland	2	0
Romania	12	1
Serbia	2	8
Slovenia	4	1
Turkey	23	121

Data from van Biesen W, Vanderhaegen B, Lameire N, 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.[8]

encourage the implementation of all registries related to kidney care in Eastern and Central European countries.

Health care professionals in kidney care

Nephrologists. The Global Kidney Health Atlas[3] provides additional data about the available resources to care for people with kidney disease. Our region reported a high density (16.33 per million population) of nephrologists according to the data of our survey. But there is wide variation in nephrologist density among countries in the region, ranging from 6.30 to 63.04 per million population.

Nephrology training. Duration of specialist postgraduate training in nephrology is also an important parameter that influences the number of doctors available to deal with the substantial numbers of people with CKD who need care. Within our region, time for specialization requirement is highly variable, ranging between 3 and 7 years; Turkey requires the longest duration of training.

Other health care professionals. Another issue that is critical for high-quality patient care is the number of nurses in the field. Total number of nurses in nephrology care differs among the countries from 71 to 8000; hence the number of RRT patients per nurse in the 10 countries providing data to our survey varies from 3.4 to 6 with Bulgaria having the most number of nurses per CKD patient.

Other issues

The ongoing warfare situation and the population movement in Syria and elsewhere in the Middle East have had a big impact on RRT patients' services in our region. Since the status of refugees are a big concern, ISN surveyed dialysis centers in 2016 to find out the number of refugees in need of RRT and whether this was causing financial problems.[8] According to this survey (Table 2), the number of refugees undergoing RRT in the region varied from 0 (Bulgaria and Croatia) to 121 (Turkey).[8] Recently, Gürsu *et al.*[9] showed that Turkey, only during 2016, had taken care of 345 refugee chronic HD patients because of the country's close proximity to the warfare.

Conclusion

In conclusion, data on ESKD care in our region indicate improvements toward the rates observed in the high-income countries. Although major CKD etiologies are similar, there are a rather high proportion of unknown causes of ESKD. Concerning the treatment of ESKD, use of RRT is increasing significantly. But it is notable that HD is the dominant dialysis modality with limited expansion of home-based modalities. Kidney transplantation is still lagging far behind the numbers achieved in the high-income countries. In our region, further development of transplantation must be a high priority. Moreover, the numbers of health care providers other than nephrologists are significantly less than in the high-income countries; therefore the job opportunities and education for these groups should be taken into consideration in priority by ISN and local authorities.

DISCLOSURE

All the authors declared no competing interests.

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REFERENCES

1. Liyanage T, Ninomiya T, Jha V, et al. Worldwide access to treatment for end-stage kidney disease: a systematic review. *Lancet.* 2015;385:1975–1982.
2. The World Bank. Countries and economies. Available at: https://data.worldbank.org/country/. Accessed February 3, 2018.
3. International Society of Nephrology. ISN Global Kidney Health Atlas. Cranford, NJ: International Society of Nephrology.
4. Pavlovic NM. Balkan endemic nephropathy—current status and future perspectives. *Clin Kidney J.* 2013;6:257–265.
5. Ing TS, Rahman MA, Kjellstrand CM, eds. Dialysis: History, Development and Promise. Singapore: World Scientific; 2012:587–597.
6. Pokorná E, Bachleda P, Dedochová J, et al. [An overview of the results of renal transplantation in the Czech Republic]. *Vnitr Lek.* 2011;57:645–649 [in Czech].
7. Spasovski G, Busic M, Delmonico F. Improvement in kidney transplantation in the Balkans after the Istanbul Declaration: where do we stand today? *Clin Kidney J.* 2016;9:172–175.
8. van Biesen W, Vanderhaegen B, Lameire N, 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.
9. Gürsu M, Arici M, Ateş K, et al. Hemodialysis experience of 345 Syrian refugees in Turkey: a registry analysis compared with the Turkish population. *Turk Nephrol Dial Transpl.* 2017;26:40.