



# Renal replacment therapy in Croatia

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# Potential conflict of interest declaration



The content of the following speech is the result of efforts to achieve the maximum degree of impartiality and independence.

As a speaker, I hereby affirm that there are **no conflicts of interest** concerning the content of the following speech that are the result of employment, an advisory function, or financial contributions for research projects, lectures or any other activity.

# Croatia ( Hrvatska, Kroatien)



<b>Population</b>	
• 2017 estimate	4,154,200 <sup>[2]</sup> (129th)
• 2011 census	4,284,889 <sup>[3]</sup> (128th)
• Density	75.8/km <sup>2</sup> (196.3/sq mi) (126th)
<b>GDP (PPP)</b>	
• Total	2017 estimate \$100.006 billion <sup>[4]</sup> (84th)
• Per capita	\$24,053 <sup>[4]</sup> (56th)
<b>GDP (nominal)</b>	
• Total	2017 estimate \$51.945 billion <sup>[4]</sup> (81st)
• Per capita	\$12,405 <sup>[4]</sup> (57th)

<https://en.wikipedia.org/wiki/Croatia>

# History of renal replacement therapy in Croatia



The first Dogliotti-Battrezzati-Taddei type artificial kidney of the Sušak Hospital

First haemodialysis in Susak Hospital , Rijeka 1962.

First peritoneal dialysis, Zagreb 1968.

First kidney transplant , Rijeka 1971.

## **Dialysis patients: vulnerable group of patients**

*Kidney International* (2010) **77**, 72; doi:10.1038/ki.2009.361

Drasko Pavlovic et al.

There were 31 dialysis units in Croatia in 27 cities providing care for 1819 patients during 1991. When the war started, eight dialysis units with 402 patients had to be evacuated; among them two centers were completely destroyed. Most patients were evacuated without any medical records and a majority of them arrived in Zagreb, the capital of Croatia. As the war escalated, some of the patients were transferred to smaller towns, far from the frontline. In spite of many problems, all patients were treated properly and most of them did not miss the dialysis sessions. This was achieved thanks to the immense efforts of the medical staff and humanitarian aid from all over the world.

# Aluminum intoxication (1996)



More than 10 dialysis patients died.

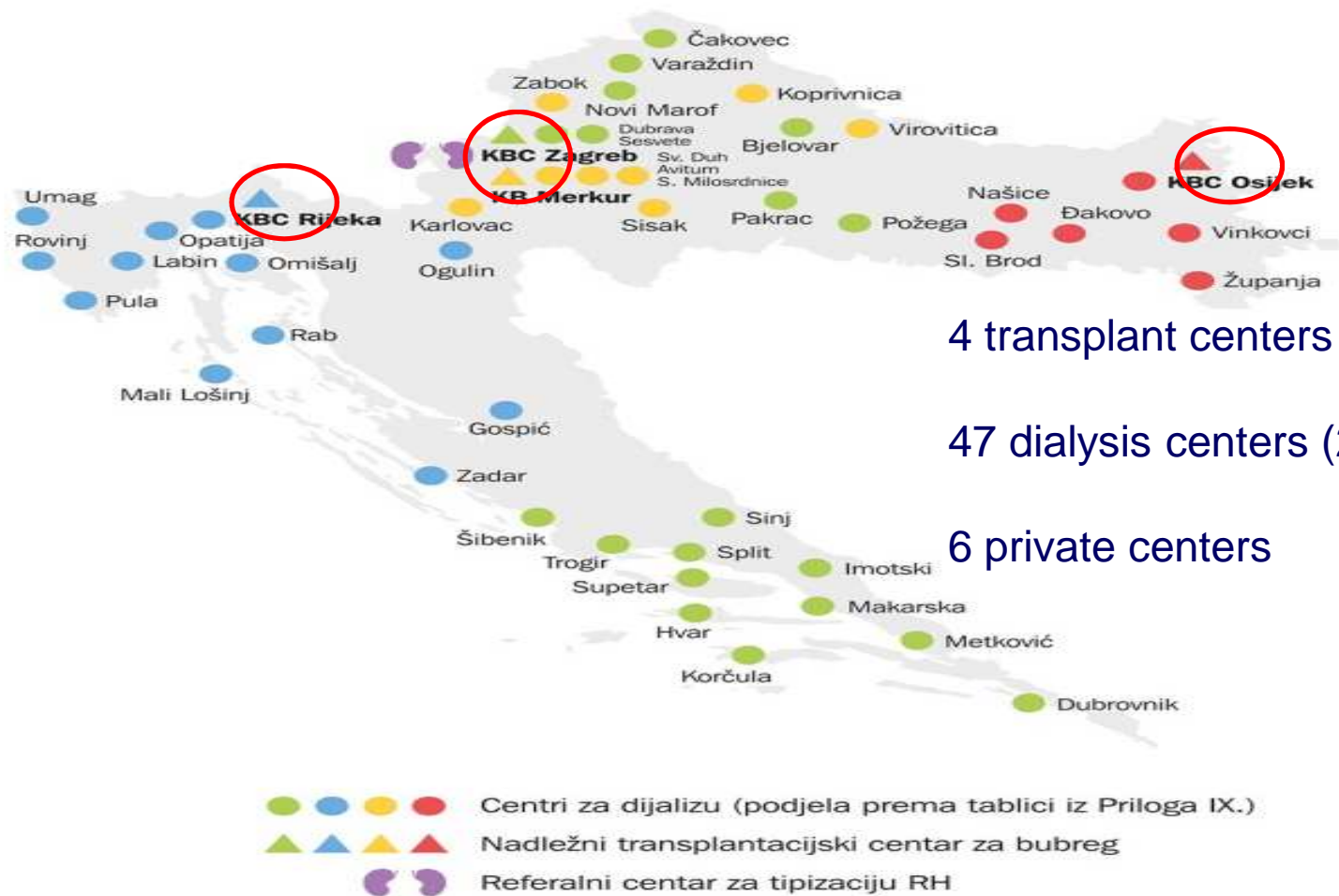
There was a problem with the water supply from the occupied part of Croatia



**Croatian Society of Nephrology, Dialysis, and Transplantation**  
**Croatian Medical Association**

**Croatian Registry of Renal Replacement Therapy - CRRRT**

## Dialysis and transplant centers in Croatia



4 transplant centers

47 dialysis centers (28 in hospital centers)

6 private centers

Home haemodialysis patients - only one patient, on RRT > 40 years



# Croatian Registry for Renal Replacement Therapy

2014.

## prevalence

31.12. 2001.

number of patients

- haemodialysis 2303 79% 520 pmp
- CAPD 166 6% 37 pmp
- functioning transplant 444 15% 101 pmp

**RRT 2913 657 pmp**

	broj bolesnika	razdioba	prevalencija
• hemodijaliza	2051	50.0 %	479 pmp
• peritonejska dijaliza	117	2.8 %	27 pmp
• funkcionirajući transplantat	1934	48.2 %	451 pmp
<b>NBF</b>	<b>4102</b>		<b>957 pmp</b>

pmp (per million population) prema popisu stanovništva Hrvatske iz 2011. godine (4,285 mil)

HRNBF 2014

annual increase in 2001.



CRRRT

	number of pts	
<b>RRT</b>	<b>+5,7%</b>	<b>(+158)</b>
• dialysis	<b>+5,2%</b>	<b>(+121)</b>
- haemodialysis	<b>+ 3,6 %</b>	<b>(+80)</b>
- CAPD	<b>+ 32,8%</b>	<b>(+41)</b>
• transplanted	<b>+9,0%</b>	<b>(+37)</b>

## Nadomještanje bubrežne funkcije (NBF) u Hrvatskoj – stanje 31.12. 2014.

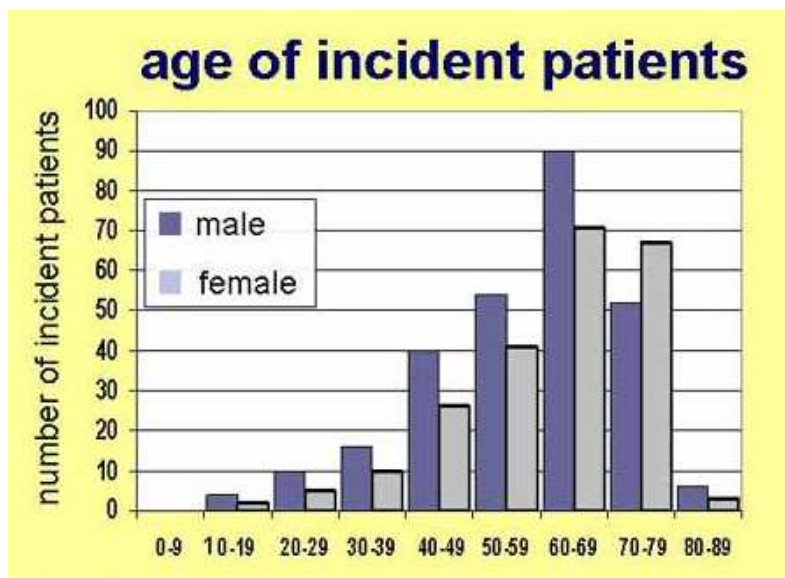


HRNBF

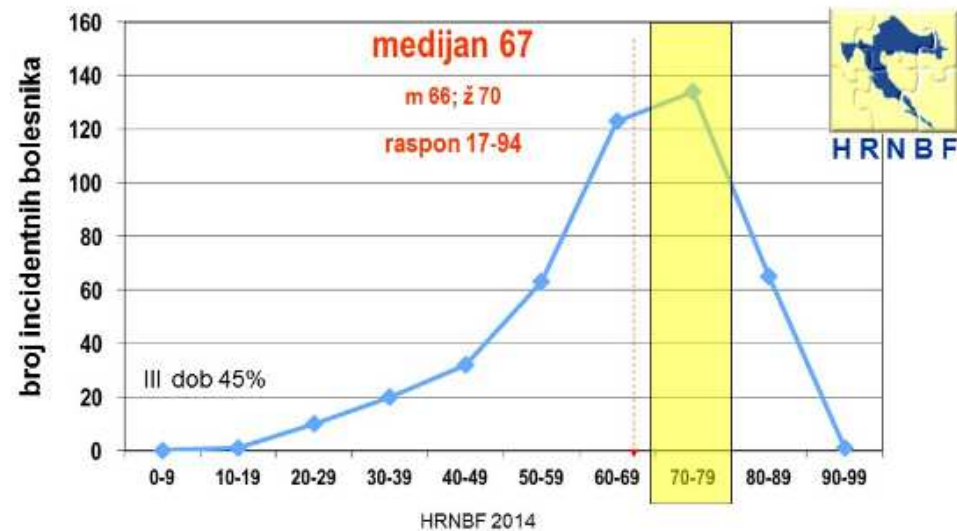
	broj bolesnika	Δ 2013 prema 2014
• hemodijaliza	2051	- 235
• peritonejska dijaliza	117	- 43
• funkcionirajući transplantat	1934	+ 95
<b>NBF</b>	<b>4102</b>	<b>- 183</b>

## Croatian Registry for Renal Replacement Therapy

2001.



2014.



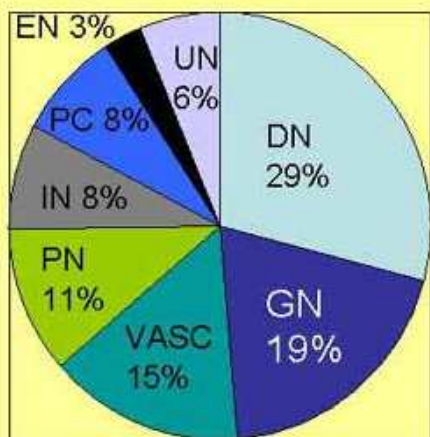
## Croatian Registry for Renal Replacement Therapy

2001.

primary renal disease in  
incident patients



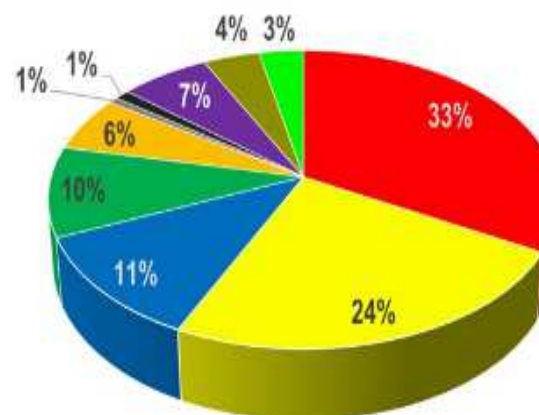
CRRRT



DN = diabetic nephropathy  
GN = glomerulonephritis  
VASC = vascular kidney disease  
PN = pyelonephritis  
IN = interstitial nephritis  
PC = polycystic kidney disease  
EN = endemic nephropathy  
UN = unknown

2014.

Osnovna bubrežna bolest  
novih na NBF 2014 godine



■ DN dijabetička nefropatija  
■ VB vaskularna bolest  
■ GN glomerulonefritis  
■ PN pijelonefritis  
■ PC policistična BB  
■ IN intersticijski nefritis  
■ EN endemska nefropatija  
■ OT ostalo  
■ NP nepoznato

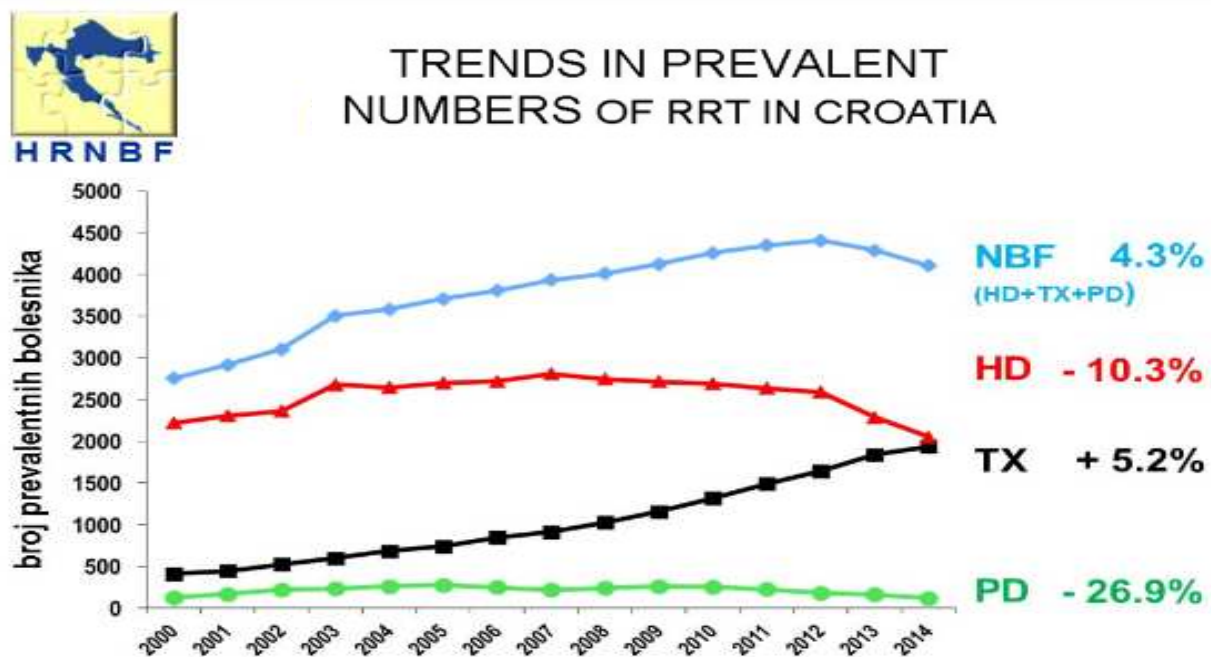
# Survival on RRT

incident patients from day 91, adjusted for age,  
gender, and primary renal disease

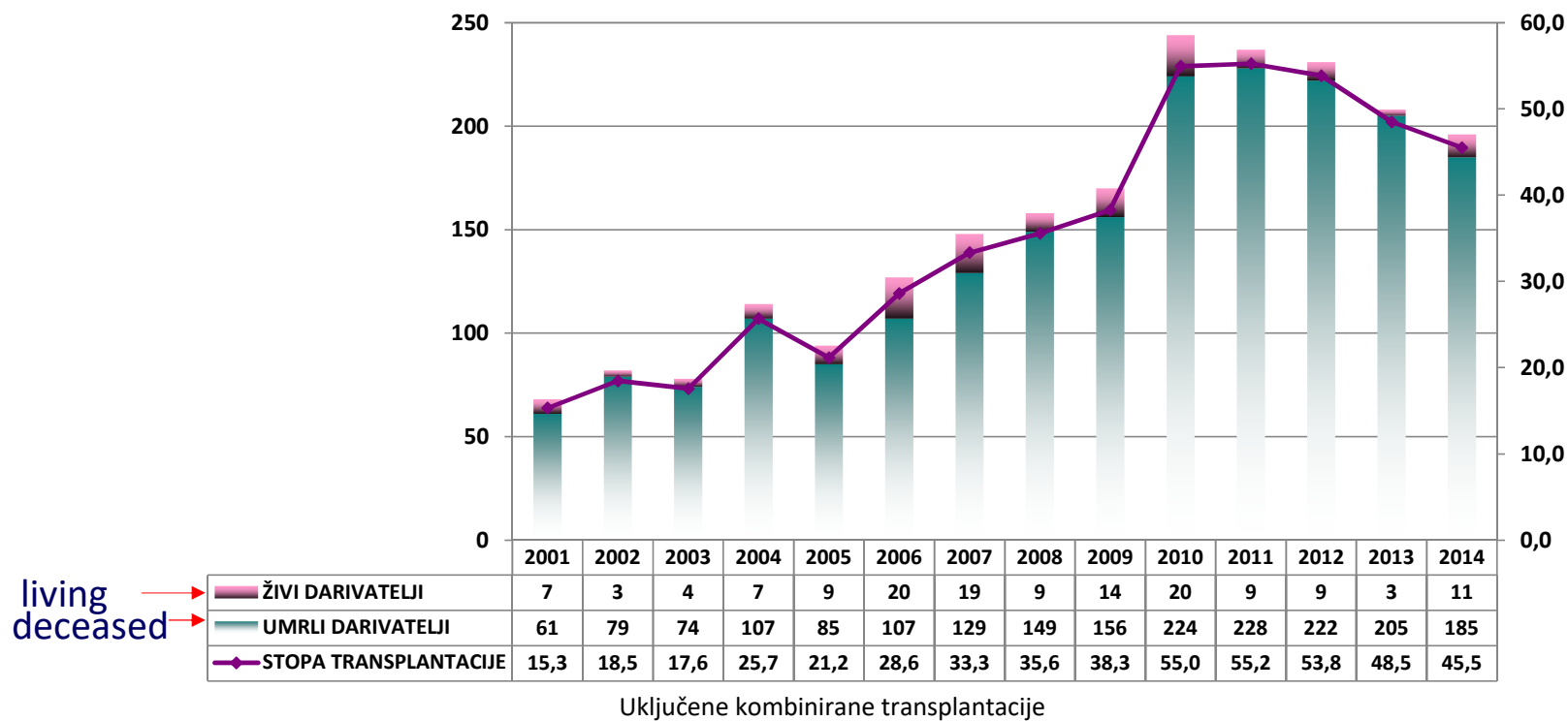
	1-year	2-year	5-year
<b>CRRRT</b>			
cohort 2000-2003	89,0% (CI 88,5-89,5)	79,3% (CI 78,9-79,7)	54,3% (CI 53,9-54,7)
cohort 2003-2007	89,3% (CI 88,7-89,9)	80,5% (CI 80,2-80,8)	57,5% (CI 57,1-57,9)
cohort 2008-2012	90,3% (CI 89,5-90,8)	82,9% (CI 82,6-83,2)	
<b>ERA-EDTA REGISTRY</b>			
cohort 2001-2005	89,3% (CI 89,1-89,5)	80,5% (CI 80,2-80,8)	58,2% (CI 57,8-58,6)
cohort 2004-2008	90,0% (CI 89,8-90,2)	81,9% (CI 81,1-81,8)	



## Croatian Registry for Renal Replacement Therapy



## Kidney transplants in Croatia 2001-2014 (living and deceased donors)



## Number of deceased donors 2000-2014.



No deceased donors between 1991.-1995. !

## Yearly Statistics Overview Eurotransplant, 2015



### Transplants (deceased donor) in 2015, by transplant country

kidney, pancreas (only)		A	B	D	H	HR	NL	SLO	Non-ET	Total
2015	kidney	325	445	1451	287	200	442	58		3208
2015	pancreas	2		8			3			13
2015	pancreas islets		57				10			67
2015	pancreas + kidney	25	9	93	13	8	22	5		175

## Yearly Statistics Overview Eurotransplant, 2015

### Active waiting list (at year-end) 2015, by country

		A	B	D	H	HR	NL	SLO	Total
2015	kidney	608	813	7530	744	111	544	50	10400
2015	heart	49	110	773	41	24	101	42	1140
2015	lung	72	102	396			176		746
2015	liver	61	172	1233	104	62	109	18	1759
2015	pancreas	1	30	37	2		21	1	92
2015	pancreas + kidney	13	37	207	11	13	31	8	320



## Yearly Statistics Overview Eurotransplant, 2016



### Transplants (deceased donor) in 2016, by transplant country

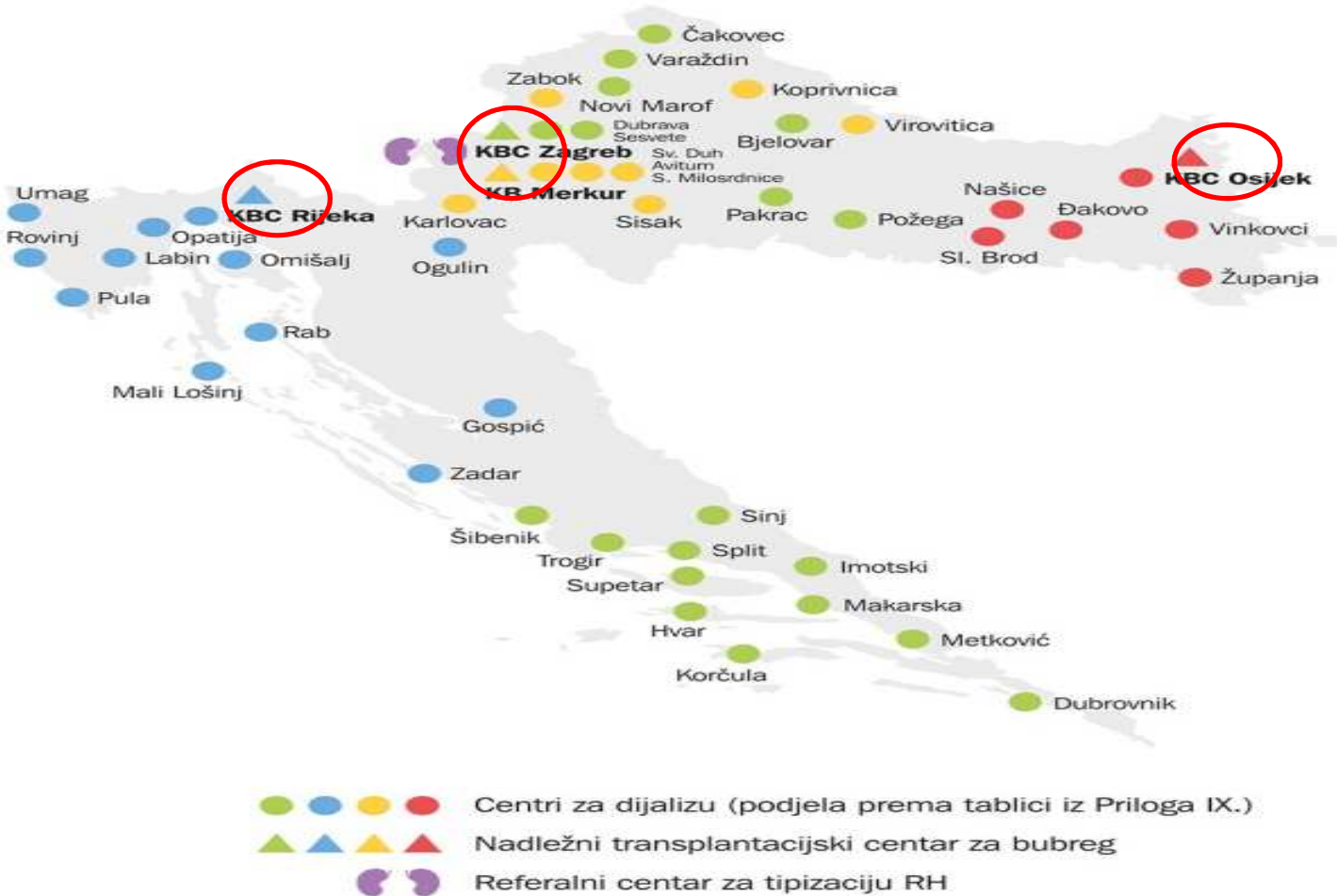
kidney, pancreas (only)		A	B	D	H	HR	NL	SLO	Non-ET	Total
2016	kidney	336	427	1391	297	176	406	39	2	3074
2016	pancreas	2		10			5			17
2016	pancreas islets		32				4			36
2016	pancreas + kidney	24	11	85	6	7	19	5		157

## Yearly Statistics Overview Eurotransplant, 2016

### Active waiting list (at year-end) 2016, by country

		A	B	D	H	HR	NL	SLO	Total
2016	kidney	574	742	7598	749	171	595	47	10476
2016	heart	51	113	702	48	34	99	50	1097
2016	lung	89	120	380			193		782
2016	liver	47	151	1125	113	61	122	17	1636
2016	pancreas	1	33	31	2	1	26	2	96
2016	pancreas + kidney	8	30	240	21	13	32	3	347

## Dialysis and transplant centers in Croatia





# Dialysis in Croatia Today



- Haemodialysis and peritoneal dialysis is completely covered by the Croatian Health Insurance Fund
- Haemodialysis: 125 Euros, Haemodiafiltration: 135 Euros  
ESA and all regular biochemistry is included in the price
- CAPD (majority of pts are on APD): the price for one week is slightly less than three haemodialysis (350 Euros)

# Heamodialysis

- The majority of patients are on dialysis for 4 hours 3 times per week (very few patients are 2 or 4 times per week, also a few patients are > 5 hours 3 times per week. Everyday dialysis is not performed)
- Synthetic membranes are used in the majority of patients, some use substituted cellulose (cellulose triacetate)
- Low and high flux membranes are available
- Haemodiafiltration is used for 10-15% of pts

# Croatian guidelines

(i.e.commentary of guidelines )

## **PREPORUKE ZA PRAĆENJE, PREVENCIJU I LIJEČENJE PROTEINSKO-ENERGIJSKE POTHRANJENOSTI U BOLESNIKA S KRONIČNOM BUBREŽNOM BOLESTI**

**CROATIAN GUIDELINES FOR SCREENING, PREVENTION AND TREATMENT  
OF PROTEIN-ENERGY WASTING IN CHRONIC KIDNEY DISEASE PATIENTS**

NIKOLINA BAŠIĆ-JUKIĆ, JOSIPA RADIĆ, DRAGAN KLARIĆ, MARKO JAKIĆ,  
BOŽIDAR VUJIČIĆ, MARIJANA GULIN, ŽELJKO KRZNARIĆ, EVA PAVIĆ, PETAR KES,  
BOJAN JELAKOVIĆ, SANJIN RAČKI\*

## **SMJERNICE ZA PREVENCIJU, PRAĆENJE I LIJEČENJE POREMEĆAJA KOŠTANO-MINERALNOG METABOLIZMA U BOLESNIKA S KRONIČNOM BUBREŽNOM BOLESTI**

**GUIDELINES FOR THE PREVENTION, MONITORING AND THERAPY  
OF CHRONIC KIDNEY DISEASE-METABOLIC BONE DISEASE  
IN PATIENTS WITH CHRONIC KIDNEY DISEASE**

NIKOLINA BAŠIĆ-JUKIĆ, DRAŠKO PAVLOVIĆ, RUŽICA ŠMALCELJ, HRVOJKA TOMIĆ-BRZAC,  
LIDIJA ORLIĆ, JOSIPA RADIĆ, BOŽIDAR VUJIČIĆ, VESNA LOVČIĆ, EVA PAVIĆ, DRAGAN KLARIĆ,  
MARIJANA GULIN, GOCE SPASOVSKI, DRAGAN LJUTIĆ, DAVORIN ĐANIĆ, DRAGO PRGOMET,  
HALIMA RESIĆ, MARINA RATKOVIĆ, PETAR KES, SANJIN RAČKI\*

## **LIJEČENJE ANEMIJE U KRONIČNOJ BUBREŽNOJ BOLESTI – STAV HRVATSKOG DRUŠTVA ZA NEFROLOGIJU, DIJALIZU I TRANSPLANTACIJU I OSVRT NA PREPORUKE KDIGO I ERBP**

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Ingrid Prkačin<sup>5</sup>, Josipa Radić<sup>3</sup>, Božidar Vujičić<sup>1</sup>, Ivan Bubić<sup>1</sup>, Marko Jakić<sup>6</sup>, Žarko  
Belavić<sup>7</sup>, Siniša Šefer<sup>8</sup>, Mario Pehar<sup>9</sup>, Dragan Klarić<sup>10</sup>, Marijana Gulin<sup>11</sup> u ime  
Hrvatskog društva za nefrologiju, dijalizu i transplantaciju

# Anaemia

- ESA reimbursement only if Hb is  $< 90$  g/L
- Biosimilars 31%

# CKD MBD

- Phosphate binders: calcium carbonate, sevelamer carbonate and calcium acetate/magnesium carbonate
- Vitamin D: calcitriol, alfacalcidol (approved only in case of hypocalcaemia), paricalcitol (reimbursement in CKD 4-5D)
- Calcimimetics: sinacalcet ( hospital limit)
- PTX : < 1% pts/year



# Acute kidney injury

- All forms of haemodialysis: intermittent or continuous are available in university hospitals (clinical centres) and large general hospitals
- In the majority of other hospitals there is intermittent haemodialysis



Department of Nephrology and Dialysis  
Sestre Milosrdnice University Hospital

Part of Internal clinic

Dialysis Unit : 70-75 pts

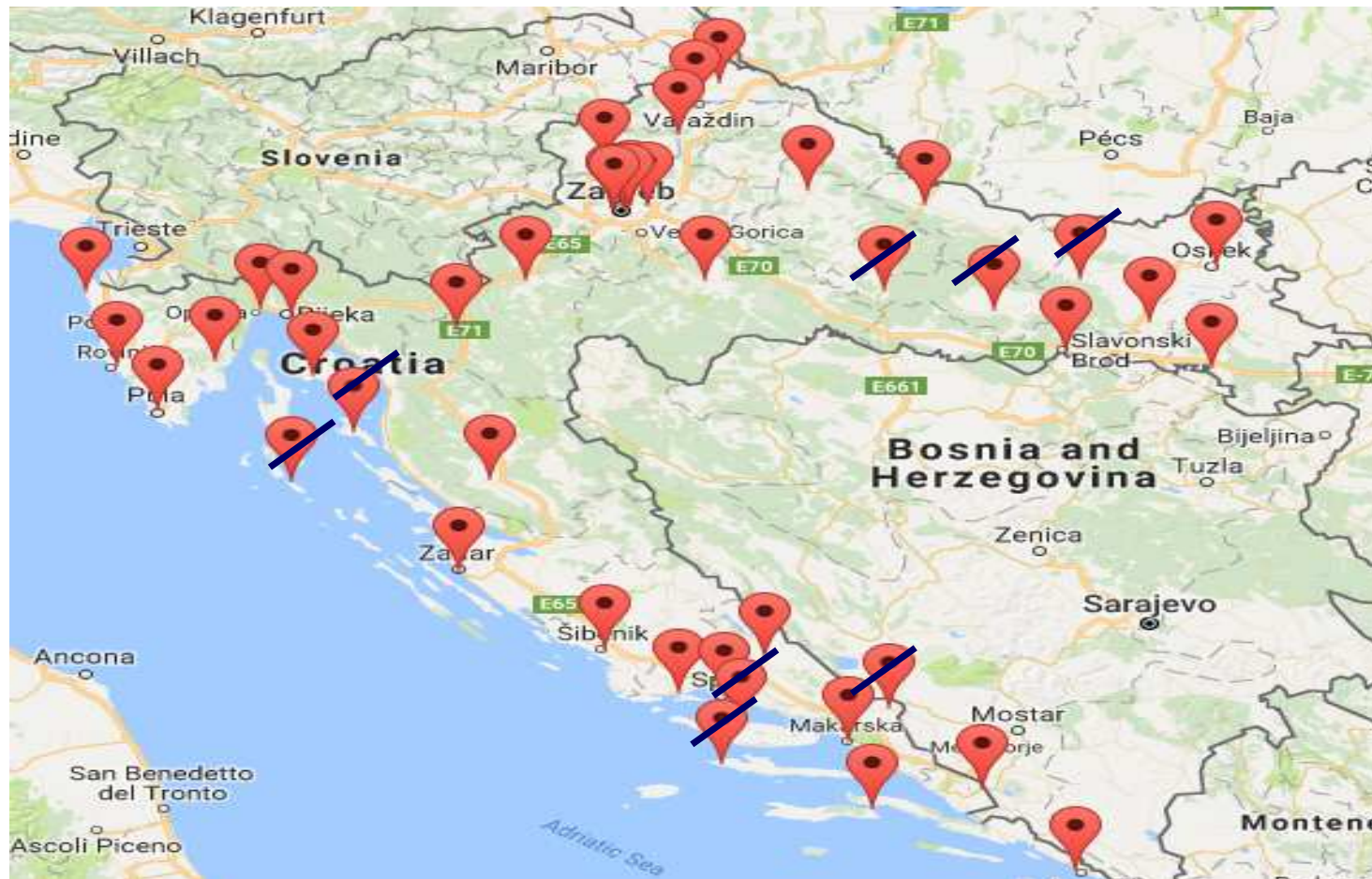
Nephrology Department: 15 beds

Outpatient clinic ( 16 PD pts)

## Department:

- 7 nephrologist ( 4 in 2004. ) , 3 young doctors
- Dialysis unit: 3 shifts ( one nephrologist on duty, during night and during Sunday on call ) – all form of haemodialysis
- 2004. 70 pts 4-5 with tunneled catheters, 2016. 19 pts
- Outpatient clinic: PD, predialysis education

# Problems in Croatian dialysis (nephrology): Lack of nephrologists



No registry since 2014.



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