Etiology and prognosis of chronic kidney disease in children: Roma ethnicity and other risk factors

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Chapter 2

Data sources, measures and statistical analyses

This chapter presents an overview of the data sources, measures and statistical analyses used within this thesis.

2.1 Samples and procedures

Several samples were used in this thesis as presented in Table 2.1, indicating the chapters for which they were used. To a certain extent these samples overlapped as all of them consisted of dialyzed and transplanted children as well as lower stages CKD (1-4 CKD) children from a tertiary center for pediatric nephrology in Kosice, Slovakia, although the sample sizes differ as well as the period covered. Additionally in Chapter 3, all pediatric patients from the other parts of Slovakia were included, and in Chapter 4 patients in care of nephrologist for adults (from all Fresenius Nephrology Care centers in Slovakia) were analyzed.

Table 2.1 Basic characteristics of the research samples

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Chapter	3	4	5	6	7
Sample size	83	1407	921	47	17
Period covered	2003-2009	2005-2008	2010	1993-2011	2008-2014
Sample description*					
Who:	All ESRD (RRT) children	a) All dialyzed children and b) all dialyzed adults	All active records	All children with solitary functioning kidney	All ESRD children with available ECHO measurements
From:	whole country	a) whole country b) all Fresenius nephrology centers in the country	a tertiary nephrology center covering the region of Eastern Slovakia	followed at a tertiary nephrology center covering the region of Eastern Slovakia	followed at a tertiary nephrology center covering the region of Eastern Slovakia
Age, years±SD (range)	12.0 (0-18)	59.8±14.7	11.3±6.3	11.8±5.2	11.3±3.6

***All samples are described in detail in the related Chapters**
ESRD: end-stage renal disease; RRT: renal replacement therapy; ECHO: echocargiography

2.2 Measures

In the various chapters of this thesis, variables were used on sociodemographic background and on clinical characteristics of the patients.

2.2.1 Sociodemographic background

These included age, gender and ethnicity. Age was treated as continual variable while ethnicity was categorized into majority and Roma based on the self-identification of the patient or his/her parent/guardian, the decision of the physician and in case of a mismatch the decisive decision of the head nurse.

2.2.2 Clinical characteristics

Medical determinants were retrieved from medical files. These included the diagnosed primary renal disease (PRD), type of dialysis treatment (peritoneal dialysis or hemodialysis) and type of transplantation (from living or deceased donor) and clinical measurements like blood pressure as well as laboratory findings (serum creatinine and albuminuria). Estimated glomerular filtration rate (eGFR) (in milliliters per minute per ideal body surface area) was calculated using the Schwartz formula (Chapter 6 and 7) (Schwartz et al. 1976). Chronic kidney disease (CKD) stages from 1 to 5 as well as severity of albuminuria were classified as recommended by the Kidney Disease Improving Global Outcome (KDIGO) guidelines (Figure 2.1; Kidney Disease: Improving Global Outcomes 2013). Incidence and prevalence of renal injury and ESRD/RRT as well as mortality of the patients were calculated.

Figure 2.1 Classification of chronic kidney disease

Prognosis of CKD by GFR and albuminuria category

Prognosis of CKD by GFR and Albuminuria Categories: KDIGO 2012				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30-300 mg/g 3-30 mg/mmol	>300 mg/g >30 mg/mmol
GFR categories (ml/min/ 1.73 m²) Description and range	G1	Normal or high	≥90			
	G2	Mildly decreased	60-89			
	G3a	Mildly to moderately decreased	45-59			
	G3b	Moderately to severely decreased	30-44			
	G4	Severely decreased	15-29			
	G5	Kidney failure	<15			

Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red, very high risk.

2.3 Statistical analyses

Several statistical methods were used in this thesis to analyze data and all of them were performed using the statistical software package IBM SPSS for Windows, version 16.0 and 20.0 (IBM, Chicago, Illinois, USA) or SAS 9.2 (SAS Institute Inc., Cary, North Carolina, USA). A detailed description of the statistical analyses used to explore the research questions are addressed in the individual chapters of this thesis.

The chi-square test and the T-test were used to assess the statistical significance of the differences between groups of categorical and continual variables respectively. Kaplan-Meier analysis was used to describe renal injury-free survival. Furthermore, the Chi-square and Fisher tests of proportions were used to determine differences in shares among different populations. For specific purposes we used the Poisson regression and Z-statistics (Fleiss 1981).

References

1. Fleiss JL (1981) Statistical methods for rates and proportions. Chapter 2. John Wiley and Sons, New York
2. Kidney Disease: Improving Global Outcomes (2013) Improving Global Outcomes clinical practice guidelines for the Evaluation and Management of Chronic Kidney Disease. Kidney Int 3:1-150
3. Schwartz GJ, Haycock GB, Edelmann CM,Jr, Spitzer A (1976) A simple estimate of glomerular filtration rate in children derived from body length and plasma creatinine. Pediatrics 58:259-263