Assessing Clinical and Economic Burden of Renal Replacement Therapy Patients with Diabetes in South Korea

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Subin LEE[1] Ahyoung Kim[*2] and Hankil Lee[*1,2,3]

[1] Department of Biohealth Regulatory Science, Graduate School of Ajou University, South Korea
[2]College of Pharmacy, Ajou University, South Korea
[3]Research Institute of Pharmaceutical Science and Technology (RIPST), Ajou University

(Presenting author: tnqls736@ajou.ac.kr; Corresponding author: ahyoungkim@ajou.ac.kr, hankil@ajou.ac.kr)

KEYWORDS Chronic Kidney Disease (CKD); Renal Replacement Therapy (RRT); Diabetes; Economic Burden; Real-world data

BACKGROUND

Chronic Kidney Disease (CKD)

- The worsening of chronic kidney disease (**CKD**) leads to an increase in renal replacement therapies (**RRT**), which pose significant clinical and economic burdens.
- Due to the ageing population and increased chronic diseases such as diabetes and hypertension, the **prevalence rates and disease burden** of CKD have **considerably increased** over the past decade.

Renal Replacement Therapy (RRT)

- Treatment used to manage and replace the vital functions of the kidney.
- **RRT is used for** patients with severe kidney disease or kidney failure, a condition known as **end-stage renal disease (ESRD)**.
- The number of patients receiving RRT is increasing due to factors such as the rise in chronic kidney diseases, Aging Population, population growth, improved accessibility to medical systems

Diabetes

- Blood vessels are damaged due to the disease. This damage affects the kidney filtration system, making DN a progressive kidney disease that can ultimately lead to End-Stage Renal Disease (ESRD).

OBJECTIVES

Using the 2018 National Patient Sample (HIRA-NPS), Adopting a **prevalence-based approach**, we compared the clinical **characteristics, healthcare resource utilization**, and **medical expenditures** by RRT with diabetes.

METHODS

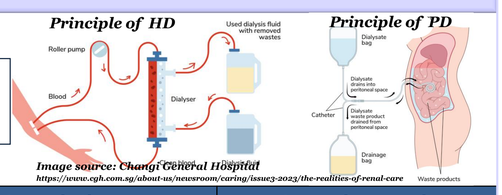
Data: HIRA-NPS Data

건강보험심사평가원 HEALTH INSURANCE REVIEW & ASSESSMENT SERVICE https://www.hira.or.kr/main.do

- *Korean Health Insurance Review and Assessment Service-National Patient Sample from 2018 (HIRA-NPS 2018).*
- ***HIRA data*** is the Korean National Representative Data that **covers 97% of the overall South Korean population**.
- *HIRA-NPS dataset*: 3% of the HIRA data (approximately 1.45 million) patients.

Definition of variables

- Diabetes was classified using ICD-10 codes.
- RRT was classified using procedure codes.



Diabetes
E100,E101,E106,E108,E109,E110,E111,E116,E118, E119,E120,E121,E126,E128,E129,E130,E131,E136, E138,E139,E140, E141,E146,E148,E149

RRT

Description	Procedure code
Hemodialysis (HD)	O7020, O7021, O9991
Peritoneal Dialysis (PD)	O7076, O7077
Kidney Transplantation (KT)	R3280

- Hemodialysis (**HD**) involves the use of a machine to filter the patient's blood.
- Peritoneal dialysis(**PD**) uses the patient's peritoneum as a natural filter.
- Kidney transplantation(**KT**) involves surgically replacing a failed kidney with a healthy kidney from a living or deceased donor.
- The **economic burden** was calculated based on the per-person average of healthcare reimbursement costs from the claims data

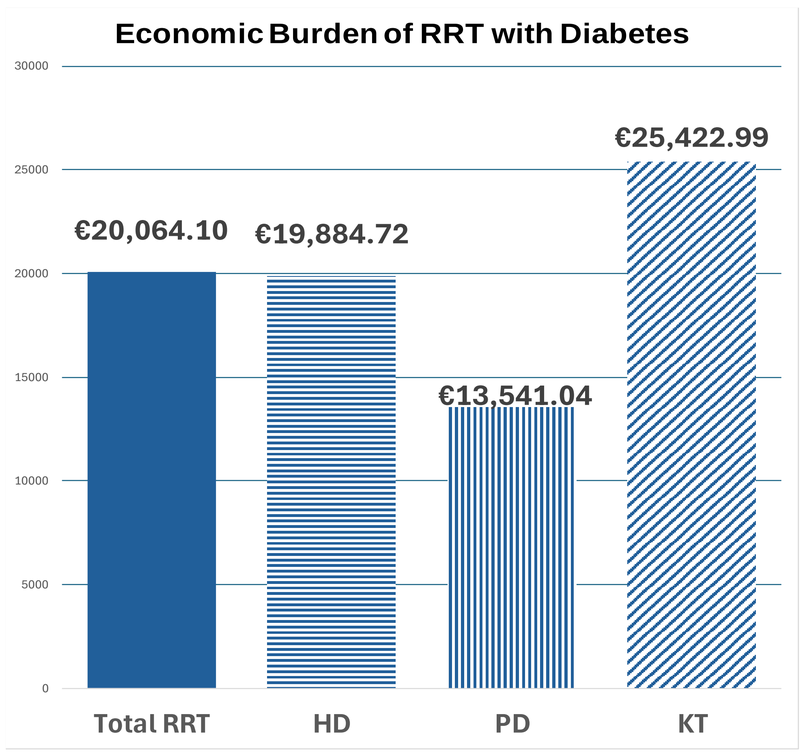
RESULTS

Flow chart

CKD n= 6,571
Non-RRT n= 4,345
RRT n= 2,226
Non-Diabetes n= 1,000
RRT & Diabetes n= 1,226

In the claims data, CKD patients were defined using ICD-10 codes. Among 6,571 patients who received at least one of the subcodes of N18 (N18.1-N18.5), 2,226 underwent an RRT procedure. Of these 2,226 patients, **1,226** had an ICD-10 code for diabetes.

Economic Burden of RRT with Diabetes in Korea



- The annual average medical expenditure for RRT patients with diabetes was €20,064.
- The medical expenditure for HD, the treatment with the highest patient utilization, is €19,885.
- KT had the highest treatment costs (€25,423),

€	Total RRT		HD		PD		KT	
mean(SD)	20,064	8,668	19,885	8,596	13,541	1,144	25,423	9,164
median(IQR)	19,641	7,606	19,577	7,438	13,541	1,618	25,174	11,321

Clinical Characteristics of RRT with Diabetes patients

		Total RRT		HD (96.41%)		PD (0.16%)		KT (3.43%)		HD, PD, KT p-value
		n	(%)	n	(%)	n	(%)	n	(%)	
		1,226	(100)	1,182	(100)	2	(100)	42	(100)	
Sex										0.940
	Men	761	(62.07)	734	(62.1)	1	(50)	26	(61.9)	
	Women	465	(37.33)	448	(37.9)	1	(50)	16	(38.1)	
Age										<.0001
	~49	163	(13.29)	151	(12.77)	0	(0)	12	(28.57)	
	50-59	273	(22.27)	252	(21.32)	0	(0)	21	(50)	
	60-69	362	(29.53)	352	(29.78)	2	(100)	8	(19.05)	
	70~	428	(34.91)	427	(36.13)	0	(0)	1	(2.38)	
Admission		811	(66.15)	770	(65.14)	2	(100)	39	(92.86)	
	Frequency of admission, cases	3.96		4.04		1		2.54		0.049
	Admission days, days	54.75		56.17		5		29.21		0.120
Outpatient visit		1114	(90.86)	1071	(90.61)	2	(100)	41	(97.62)	
	Frequency of outpatient visit, cases	101.3		103.78		15.5		40.51		<.0001
Type of health security program										0.131
	National Health Insurance	967	(78.87)	927	(78.43)	2	(100)	38	(90.48)	
	Medical aid	259	(21.13)	255	(21.57)	0	(0)	4	(9.52)	
CCI weight, means(SD)		2.29	(1.55)	2.28	(1.56)	2	(0)	2.4	(1.04)	0.850
CCI										
	hypertension	1,173	(95.68)	1130	(95.6)	2	(100)	41	(97.62)	0.684
	hyperlipidaemia	1,001	(81.65)	963	(81.47)	1	(50)	37	(88.1)	0.263
	Pulmonary	489	(39.89)	473	(40.02)	1	(50)	15	(35.71)	0.832
	Liver	440	(35.89)	429	(36.29)	0	(0)	11	(26.19)	0.247
	Peripheral Vascular Disease	106	(8.65)	103	(8.71)	0	(0)	3	(7.14)	0.860
	Congestive Heart Failure	37	(3.02)	37	(3.13)	0	(0)	0	(0)	0.492
	Myocardial Infarction	28	(2.28)	27	(2.28)	0	(0)	1	(2.38)	0.976
	LiverSevere	20	(1.63)	20	(1.69)	0	(0)	0	(0)	0.698
	Paraplegia	7	(0.57)	7	(0.59)	0	(0)	0	(0)	0.877
	Cancer	7	(0.57)	7	(0.59)	0	(0)	0	(0)	0.877
	Cerebruvascular Disease	1	(0.08)	1	(0.08)	0	(0)	0	(0)	0.964
	Peptic Ulcer Disease	1	(0.08)	1	(0.08)	0	(0)	0	(0)	0.964

*Pulmonary; Chronic pulmonary disease, Liver; mild liver disease,Liver severe; moderate or severe liver disease, Paraplegia; hemiplegia or paraplegia, Cancer; meta solid tumor

- Approximately 96.41% of patients who received RRT underwent HD.
- The distribution of RRT patients increased with age, with 34.9% being over 70 years old and 29.5% in their 60s. 62.1% of the patients were male.
- Over 80% of RRT patients had hyperlipidemia, and over 90% had hypertension.
- Approximately two-thirds of the patients had been hospitalized, with an average about four hospitalizations annually and an average length of stay of 54.8 days.
- HD had the highest frequency of outpatient visits (103.78).

CONCLUSIONS

- **The clinical and economic burden of RRT patients with comorbid diabetes was estimated to be substantial.**
- **Since the patients are elderly and have other chronic diseases, integrated management is necessary.**
- **Future research should investigate the incremental impact of comorbid chronic diseases on medical expenditure in RRT patients.**

CONFLICT OF INTEREST

All authors declare that they have no conflicts of interest.

ACKNOWLEDGEMENT

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