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Suboptimal Cancer Screening in Kidney Transplantation Recipients: A Nationwide Population-Based Analysis

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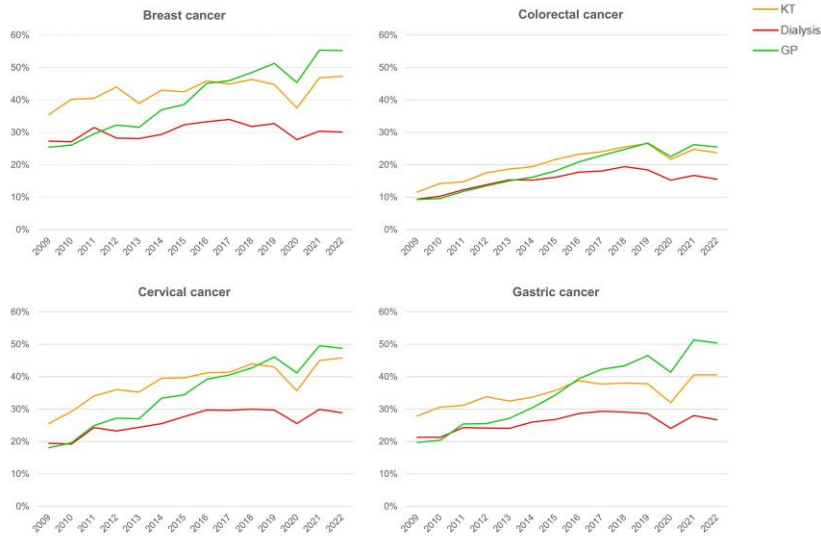
Objectives : Real-world data on post-transplant cancer screening adherence among kidney transplant (KT) recipients are limited. We aimed to compare the cancer screening rates of KT recipients with dialysis patients and the general population (GP).

Methods : Using the Korean National Health Insurance Service database, we identified individuals who underwent national cancer screening (2002–2022). Screening eligibility followed national guidelines: biennial mammography (women ≥ 40 years), biennial gastroduodenoscopy (≥ 40 years), annual fecal occult blood test (≥ 50 years), and biennial Pap smear (women ≥ 20 years). We excluded individuals with malignancy within 3 years before or 180 days after KT or dialysis. After a 3-year washout (2006–2008), 1:1 exact matching was performed using age, sex, index year, dialysis duration, and comorbidities, with the KT group as the reference.

Results : We identified 408,510 participants: 19,876 KT, 106,919 dialysis, and 281,715 from the GP. KT recipients were older than the GP but younger than dialysis patients and had the lowest proportion of male. After matching, each group included 17,476 participants with similar age and sex distributions. Overall, national cancer screening rates increased over time primarily driven by the GP, whereas the increase was relatively slower in KT recipients. Despite the upward trend, the maximum screening rate remained below 60%. Among cancer types, colorectal cancer screening rate was lowest, while breast cancer had the highest. Dialysis patients consistently exhibited the lowest participation across all cancer types. In recent years, KT recipients showed similar or lower cancer screening rates than the GP across all cancer types, particularly for gastric cancer.

Conclusions : Despite free national screening program, overall cancer screening uptake remained suboptimal. Dialysis patients consistently had the lowest participation across all cancer types. In recent years, KT recipients showed similar or lower cancer screening rates than the GP across all cancer types, particularly for gastric cancer.

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a) Before matching

Variable	KT	Dialysis	General population	p-value
N, total	19,878	106,919	281,715	-
Age at index date (years)	48.0 (18.9%)	59.0 (15.6%)	42.0 (15.6%)	<0.001
Sex, Male, n (%)	11,817 (59.5%)	68,191 (63.8%)	202,213 (71.8%)	<0.001
Year of index date, n (%)				<0.001
2005-2009	4,088 (20.5%)	25,113 (23.5%)	102,411 (36.5%)	
2010-2012	3,858 (19.4%)	23,299 (21.7%)	51,713 (18.4%)	
2013-2015	3,361 (16.9%)	16,374 (15.3%)	25,086 (8.9%)	
2016-2018	3,306 (16.6%)	18,130 (17.0%)	19,843 (7.1%)	
2019-2022	4,765 (23.9%)	20,083 (18.7%)	21,262 (7.6%)	
Pre-existing malignancy history, n (%)	52 (0.3%)	498 (0.5%)	-	<0.001
Prior history of immunosuppressant therapy, n (%)	5,840 (29.4%)	27,520 (25.7%)	-	<0.001
Deinstitution, n (%)	3,017 (15.2%)	-	-	<0.001
Induction immunosuppressant, n (%)	15,389 (76.9%)	-	-	<0.001
Hemoglobin				
Dialysis duration (year)				<0.001
< 1	11,224 (56.5%)	60,914 (57.0%)	-	
1-3	3,925 (19.7%)	28,939 (27.3%)	-	
4-6	2,261 (11.4%)	11,609 (10.9%)	-	
7-9	1,491 (7.5%)	4,287 (4.0%)	-	
≥ 10	662 (3.3%)	1,310 (1.2%)	-	
Income percentiles, n (%)				<0.001
1-4*	2,627 (13.2%)	16,419 (15.4%)	50,111 (17.8%)	
5-8*	2,293 (11.5%)	15,042 (14.1%)	56,190 (19.9%)	
9-12*	2,961 (14.9%)	17,521 (16.4%)	60,602 (21.5%)	
13-16*	3,397 (17.1%)	19,290 (18.0%)	54,681 (19.3%)	
17-20*	5,268 (26.5%)	19,272 (18.0%)	51,494 (18.3%)	
Insurance type, n (%)				<0.001
Medical aid	2,488 (12.5%)	17,648 (16.5%)	1,276 (4.5%)	
Social health insurance	17,465 (87.5%)	89,856 (83.3%)	279,390 (98.8%)	
Place of residence, n (%)				<0.001
Urban	8,718 (43.9%)	44,871 (41.8%)	124,798 (44.3%)	
Rural	11,153 (56.1%)	62,213 (58.2%)	156,916 (55.7%)	
Comorbidity, n (%)				
Hypertension	19,545 (98.3%)	99,718 (93.3%)	30,868 (11.0%)	<0.001
Diabetes mellitus	11,842 (59.6%)	79,897 (74.9%)	12,323 (4.4%)	<0.001
Chronic lung disease	9,226 (46.4%)	49,721 (46.5%)	121 (0.0%)	<0.001
Chronic liver disease	4,532 (22.8%)	23,528 (22.0%)	91 (0.0%)	<0.001
Median F/U duration (years, IQR)				
From 1 st kidney failure	7.6 [3.8;12.3]	3.3 [1.4; 6.3]	-	<0.001

b) After matching

Variable	KT	Dialysis	General population	p-value
N, total	17,476	17,476	17,476	-
Age at index date (years)	50.0 (16.2;7.0)	50.0 (16.2;7.0)	50.0 (16.2;7.0)	0.154
Sex, Male, n (%)	10,450 (59.8%)	10,450 (59.8%)	10,450 (59.8%)	>0.999
Year of index date, n (%)				>0.999
2005-2009	2,021 (16.7%)	2,021 (16.7%)	2,021 (16.7%)	
2010-2012	3,349 (19.2%)	3,349 (19.2%)	3,349 (19.2%)	
2013-2015	3,050 (17.5%)	3,050 (17.5%)	3,050 (17.5%)	
2016-2018	3,694 (21.1%)	3,694 (21.1%)	3,694 (21.1%)	
2019-2022	4,462 (25.5%)	4,462 (25.5%)	4,462 (25.5%)	
Pre-existing malignancy history, n (%)	49 (0.3%)	49 (0.3%)	-	0.079
Prior history of immunosuppressant therapy, n (%)	5,306 (30.4%)	4,289 (24.5%)	-	<0.001
Deinstitution, n (%)	2,877 (16.5%)	-	-	<0.001
Induction immunosuppressant, n (%)	13,669 (78.3%)	-	-	<0.001
Hemoglobin				
Dialysis duration (year)				>0.999
< 1	9,932 (56.9%)	9,932 (56.9%)	-	
1-3	3,383 (19.3%)	3,383 (19.3%)	-	
4-6	2,306 (13.2%)	2,306 (13.2%)	-	
7-9	1,205 (6.9%)	1,205 (6.9%)	-	
≥ 10	450 (2.6%)	450 (2.6%)	-	
Income percentiles, n (%)				<0.001
1-4*	2,253 (12.9%)	2,788 (16.0%)	3,725 (21.3%)	
5-8*	2,021 (11.6%)	2,662 (15.2%)	3,523 (20.2%)	
9-12*	2,609 (14.9%)	2,969 (16.9%)	3,609 (20.7%)	
13-16*	3,470 (19.8%)	2,914 (16.7%)	2,981 (17.1%)	
17-20*	4,733 (27.1%)	2,512 (14.4%)	2,864 (16.4%)	
Insurance type, n (%)				<0.001
Medical aid	2,076 (11.9%)	3,408 (19.5%)	511 (2.9%)	
Social health insurance	15,400 (88.2%)	14,068 (80.5%)	16,914 (96.8%)	
Place of residence, n (%)				<0.001
Urban	7,667 (43.9%)	7,379 (42.2%)	8,191 (46.9%)	
Rural	9,809 (56.1%)	10,091 (57.8%)	9,278 (53.1%)	
Comorbidity, n (%)				
Hypertension	17,223 (98.6%)	17,223 (98.6%)	3,599 (20.6%)	<0.001
Diabetes mellitus	10,936 (62.6%)	6,536 (37.4%)	1,506 (8.6%)	<0.001
Chronic lung disease	4,326 (24.8%)	6,739 (38.6%)	4 (0.0%)	<0.001
Chronic liver disease	4,326 (24.8%)	3,512 (20.1%)	1 (0.0%)	<0.001
Median F/U duration (years, IQR)				
From 1 st kidney failure	7.0 [3.6;11.4]	4.6 [2.1; 8.4]	-	<0.001