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M E D I C I N E

(PD49-10) Nephrology Referral Patterns For Nephrectomy Patients With Renal Cancer

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Introduction

- Surgery remains a common treatment modality for kidney cancer
- The development or progression of chronic kidney disease (CKD) is a known consequence of renal cancer surgery
- 2017 AUA guidelines
 - Suggests nephrologist involvement in the care of patients at high risk for significantly reduced kidney function after nephrectomy
- Data are limited regarding practice patterns and patient benefit surrounding nephrology referral rates before and after nephrectomy
 - From CKD literature, evidence that referral could mitigate CKD progression, reduce need for kidney transplantation, inpatient intervention, and mortality

Objectives

- To examine **nephrology referral rates** amongst renal cancer nephrectomy patients
 - In relation to CKD development
- To assess **predictors of nephrology referral**
- To study **associations between nephrology referral and survival**

Methods: Data & Classification

- **Database:** SEER-Medicare
- **Inclusion Criteria:**
 - RCC
 - ≥ 66 years old
 - surgery between 2000-2014
- **Referral Classification**

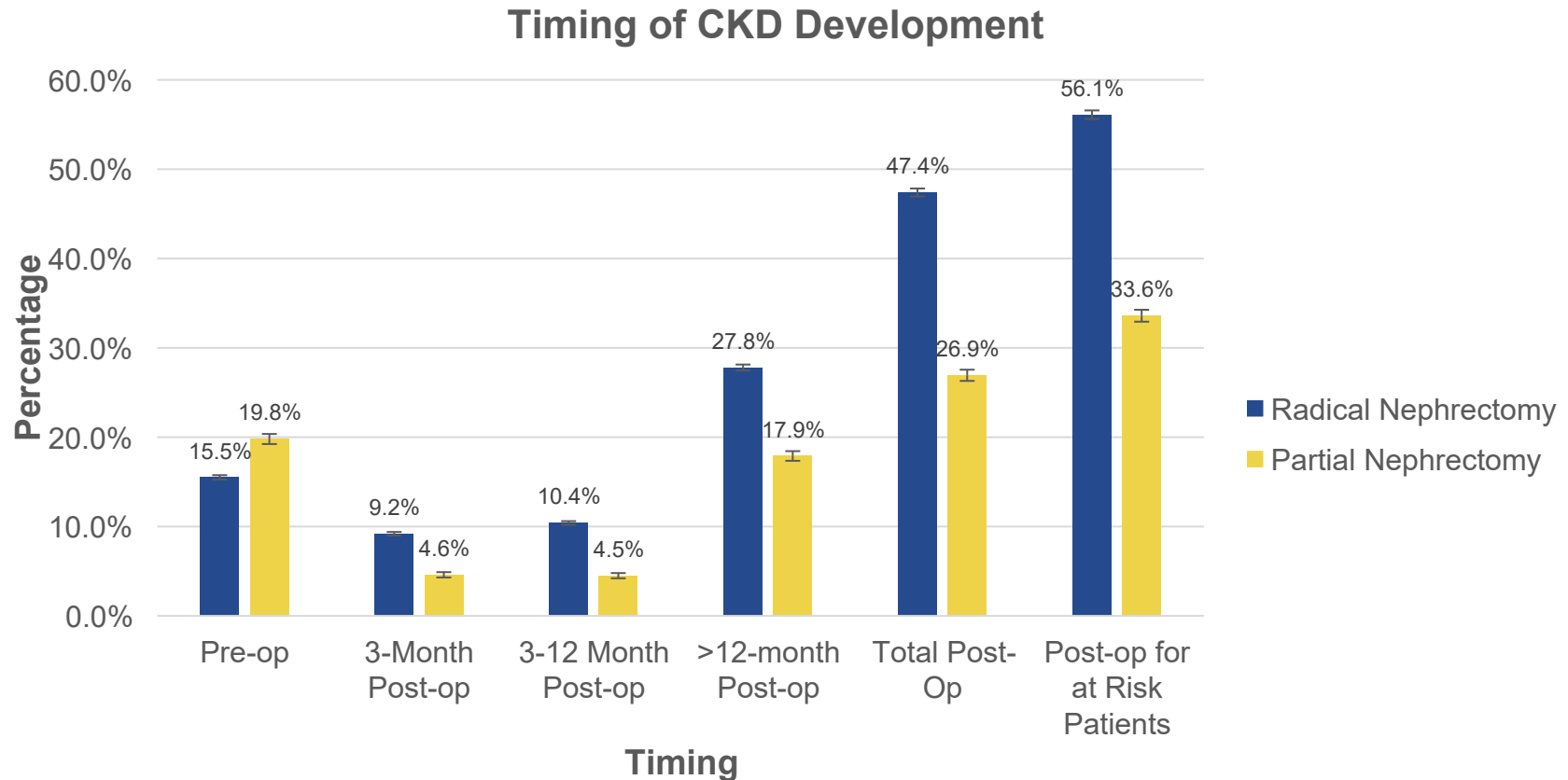
First nephrology claim:

 - **Established nephrologist:** > 6 months prior to nephrectomy
 - **Pre-operative Referral:** within 6 months prior to nephrectomy
 - **3-month, 12-month, or Late Post-operative referral:** within 3 months, 3-12 months, or >12 months after nephrectomy
- **CKD Status**
 - ICD codes from billing data
 - Operationalized as pre-op CKD, 3-month, 12-month, and late post-op CKD
 - Stage variable: 0-2, ≥ 3

Methods: Analysis

- Referral patterns and timing were identified by CKD disease status and surgery type (N=25,641)
- Logistic regression
 - Predictive patient factors
- Cox proportional hazard regression
 - Survival analysis

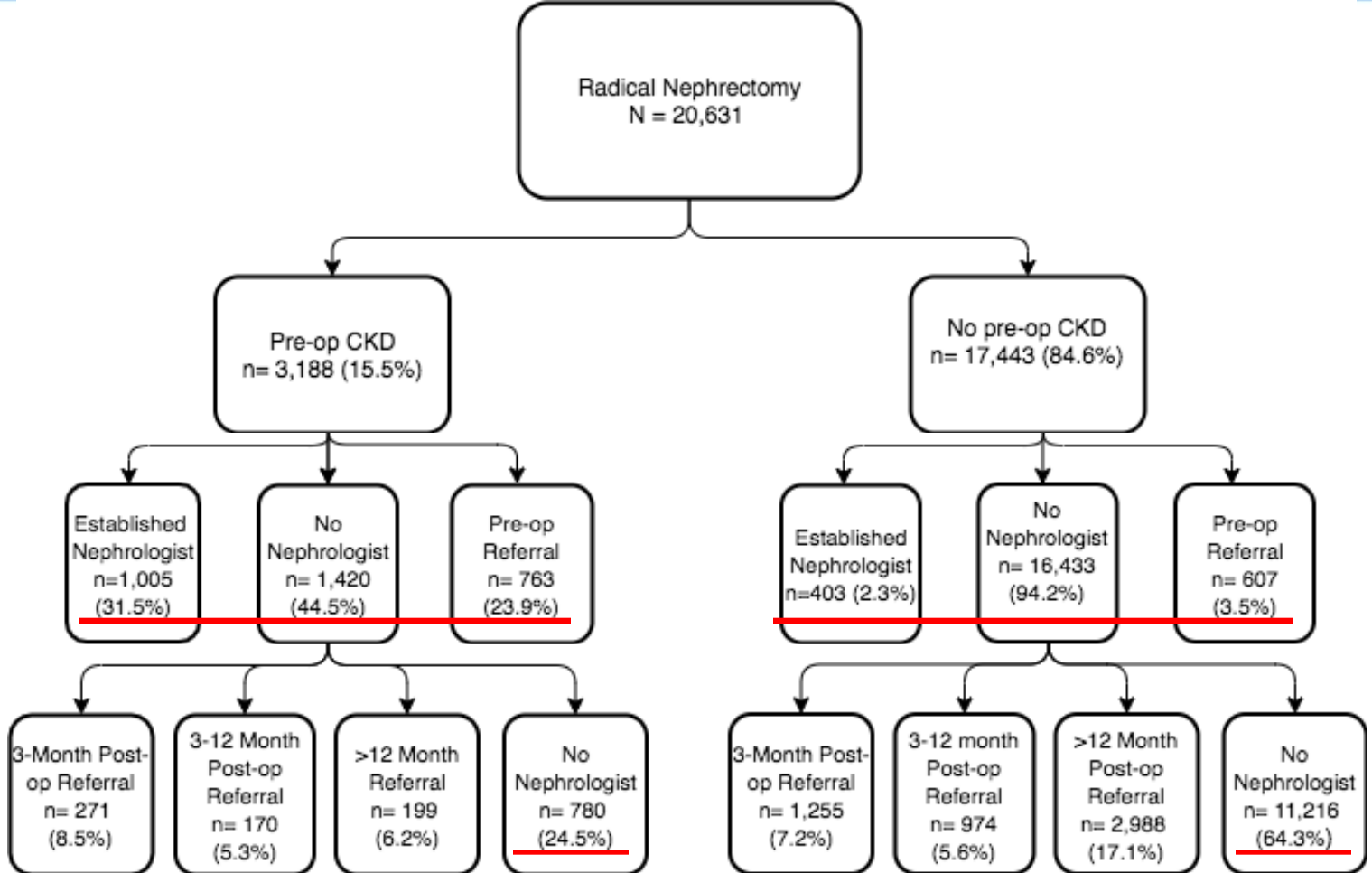
Results: Timing of CKD Development



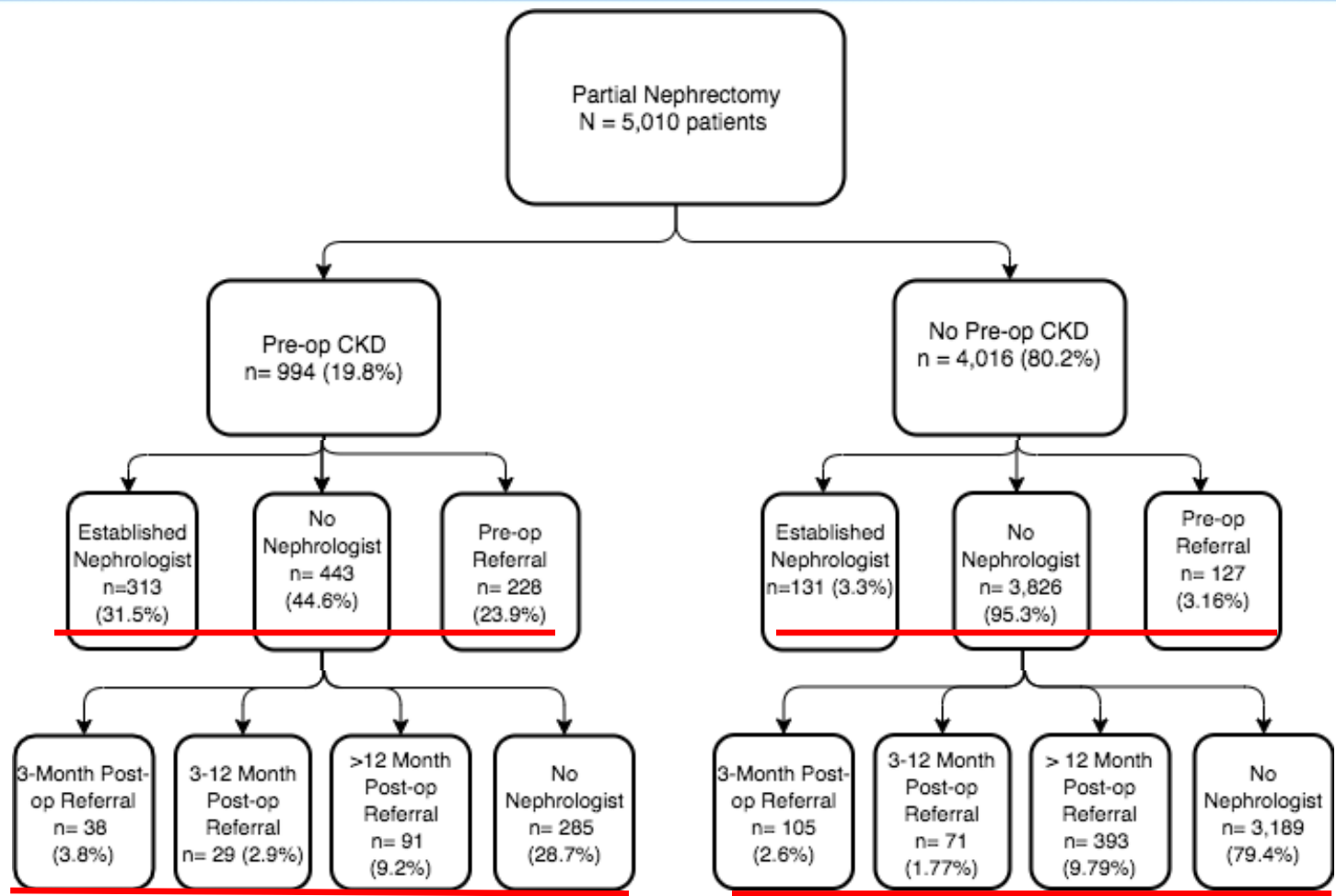
Radical nephrectomy: median follow-up of 26.1 months

Partial nephrectomy: median follow-up of 40.4 months

Results: Role of Nephrology Pre & Post-Op Radical Nephrectomy



Results: Role of Nephrology Pre & Post-Op Partial Nephrectomy



Results: Predictors of Referral

Pre-Op CKD

Predictors of Referral in Patients with Pre-Operative Chronic Kidney Disease

	Pre-op Referral	3-Month Post-op Referral	12-Month Post-op Referral
Dementia	0.350*		
Diabetes	1.194	1.098	1.756**
Diabetes with Complications	1.345*		0.918
CEVD (Cerebrovascular Disease)		1.472*	
AMI (Acute Myocardial Infarction)			0.492
PUD (Peptic Ulcer Disease)			2.183*
Residence (REF: Big Metro)			
Metro	1.165	1.173	1.254
Urban	1.646**	0.582	1.513
Less Urban	1.096	2.182**	1.713
Rural	1.288	0.820	0.190
Age at diagnosis (years)	0.985		
Pre-Operative CKD Stages 3-5 (REF: Stages 0-2)	5.599***		
Female (REF Male)		0.532***	
Tumor Size ≥ 7 cm		1.277	
Radical Nephrectomy (REF Partial)		2.393***	2.132**
3-Month Post-Operative CKD Stages 3-5 (REF: Stages 0-2)		9.816***	
12-Month Post-Operative CKD Stages 3-5 (REF: Stages 0-2)			15.77***
Observations	2362	1497	1265

Exponentiated coefficients

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

- More severe diabetes was associated with earlier referral
- PUD was associated with 12-month post-op referral
 - Known association with CKD
- Earlier referrals were associated with urban-rural residence
- Tumor size not associated
- Radical nephrectomy not associated with pre-op referral
 - Associated strongly with post-op referral

Results: Predictors of Referral

Post-Op CKD

Predictors of Referral in Patients without Pre-Operative Chronic Kidney Disease

	Pre-op Referral	3-Month Post-op Referral	12-Month Post-op Referral
CHF (Congestive Heart Failure)	1.512**	1.100	1.049
PVD (Peripheral Vascular Disease)	1.110	1.183	1.051
Dementia		1.242	
Diabetes	1.073	1.226*	1.571**
Diabetes with Complications	1.734**	1.559**	1.135
CEVD (Cerebrovascular Disease)	1.484**	1.198	1.093
COPD (Chronic Obstructive Pulmonary Disease)	1.200	1.243*	
AMI (Acute Myocardial Infarction)			1.219
PUD (Peptic Ulcer Disease)	1.898**	1.527*	
Moderate to Severe Liver Disease		3.158*	
Residence (REF: Big Metro)			
Metro	0.725**		
Urban	1.019	0.582	1.513
Less Urban	0.778	2.182**	1.713
Rural	0.681	0.820	0.190
Age at diagnosis (years)	1.021**		
Black Race (REF: White)	1.572**		
Female (REF: Male)			0.864
Tumor Size ≥ 7 cm	1.205	1.128	0.973
Radical Nephrectomy (REF Partial)		2.428***	2.512***
3-Month Post-Operative CKD Stages 3-5 (REF: Stages 0-2)		37.56***	
12-Month Post-Operative CKD Stages 3-5 (REF: Stages 0-2)			35.64***
Observations	12272	11864	10909

Exponentiated coefficients

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

- More severe diabetes was associated with earlier referral
- Additional comorbidities and epidemiological risk factors associated with earlier referral
- Earlier referrals were associated with urban-rural residence
- Tumor size not associated
- Radical nephrectomy not associated with pre-op referral
 - Associated strongly with post-op referral

Results: Survival Analysis

Pre-operative Referral

- Pre-operative nephrology referral had *no significant effect* on overall survival
 - Patients with pre-op CKD
 - Unadjusted Model: HR: 1.02, P=0.814
 - Adjusted Model: 1.01, P=0.901
 - Patients without pre-op CKD
 - Unadjusted Model: HR: 1.16, P=0.061
 - Adjusted Model: HR: 1.12, P=0.161.

Conclusions

- Many patients who are not referred pre-op eventually are referred post-op
- Referral choices correlate with *some* guidelines
 - Diabetes, advanced stage CKD
 - Tumor size, age, and sex largely not referral predictors
- Radical nephrectomy positively predicted 3 and 12-month post-operative referral
 - Not associated with pre-op referral
 - Not in guidelines
- No survival benefit for pre-op referral
 - Referred patients may represent a higher risk subset
 - Other patients who may benefit appear under-referred
- Future directions:
 - evaluate impact of guidelines on practice patterns

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