# Underdiagnosis of Chronic Kidney Disease (CKD) in the Nursing Home Population

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# Objectives

- Learn: Criteria for diagnosis of Chronic Kidney Disease (CKD)
- Recognize: Age is one of the five major risk factors for CKD
- Appreciate: CKD is underdiagnosed amongst the elderly
- Understand: CKD increases risk for adverse outcomes

# What is CKD?

Structural and/or functional kidney damage for ≥3 months

Functional CKD = estimated glomerular filtration rate (eGFR) <60

Severity of CKD = classified into stages

| CKD Stage | Description | GFR (mL/min/1.73 $m^2$) |
|---|---|---|
| 1 | Kidney damage with normal or ↑ GFR | ≥90 |
| 2 | Kidney damage with mild ↓ GFR | 60-89 |
| 3 | Moderate ↓ GFR | 30-59 |
| 4 | Severe ↓ GFR | 15-29 |
| 5 | End Stage Renal Disease (ESRD) | <15 or dialysis |

National Kidney Foundation. Am J Kidney Dis 2002;39(2 suppl 1):S1-266.

# Why is recognition of CKD important?

- Prevalence
  - ~20 million Americans with CKD

National Kidney Foundation. Am J Kidney Dis 2002;39(2 suppl 1):S1-266

- Mortality: independent risk factor
- Morbidity
  - Cardiac events
  - CKD progression
    - Dialysis-dependence
    - Medical complications in virtually every organ system

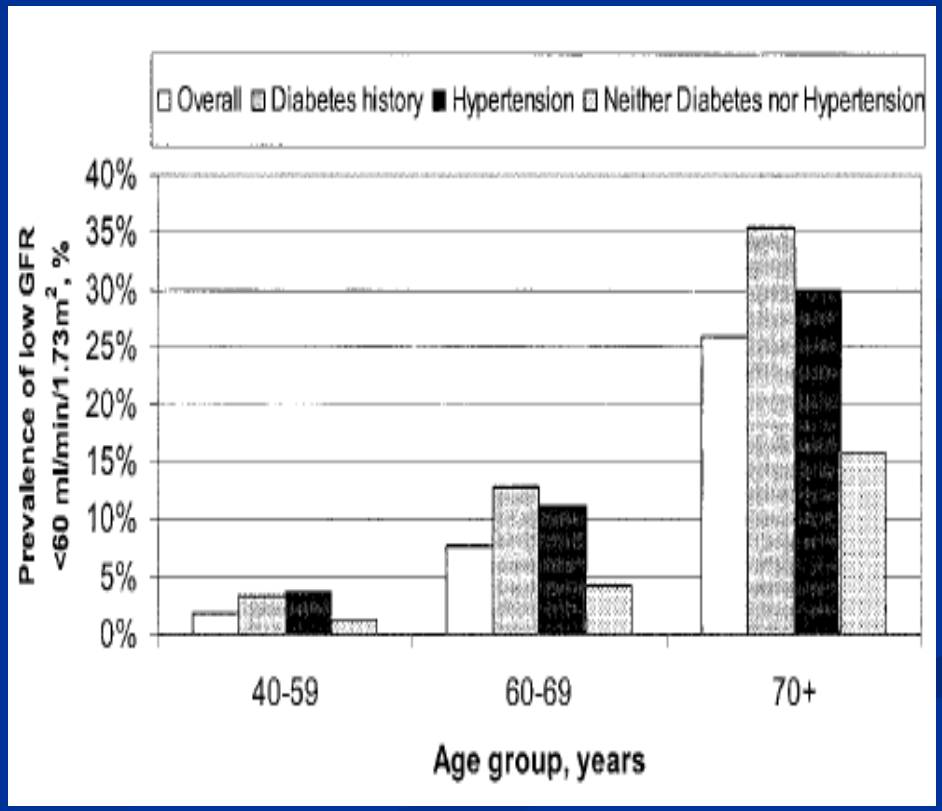
# Why are we focusing on the elderly?

- Age ≥ 60 is one of the five major risk factors for CKD

Johnson CA et al. Am Fam Physician 2004;70: 869-76.

| | GFR<60 (%) | |
|---|---|---|
| | 88-94 | 99-04 |
| All | 6.0 | 8.4 |
| 20-39 | 0.3 | 0.8 |
| 40-59 | 2.8 | 4.4 |
| 60+ | 20.8 | 27.7 |
| Male | 5.0 | 7.2 |
| Female | 6.8 | 9.4 |
| Non-Hispanic White | 6.2 | 8.8 |
| Non-Hispanic African | 5.3 | 7.2 |
| Other Race | 4.6 | 6.0 |
| DM | 10.5 | 13.5 |
| HTN | 8.8 | 11.8 |

United States Renal Data System, 2007




Coresh J et al. Am J Kidney Dis 2003;41:1-12.

# Why are we focusing on the elderly?

- Is CKD *especially* underdiagnosed in the elderly ?
  - Reliance by physicians on serum creatinine rather than estimated GFR…

| Age | Gender | Race | SCr (mg/gL) | eGFR (mL/min/1.73 $m^2$) | CKD Stage |
|---|---|---|---|---|---|
| 20 | M | W | **1.3** | 75 | **2** |
| 70 | M | W | **1.3** | 58 | **3** |
| 20 | F | B | **1.3** | 67 | **2** |
| 70 | F | B | **1.3** | 52 | **3** |

B = black; W = all ethnic groups other than black; SCr = serum creatinine

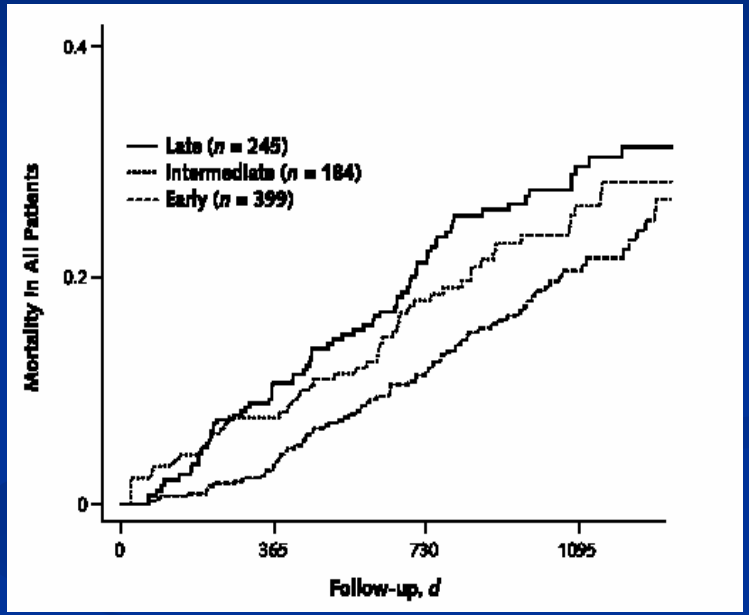
# Early referral to Nephrologists… **Is Uncommon!!!**

- Lowers mortality after initiation of dialysis

- % of CKD patients who see nephrologist within 1 year of beginning dialysis:

38%

United States Renal Data System, 2007.




Kinchen KS et al. Ann Intern Med 2002;137:479-486.

# Why don't CKD patients see nephrologists?

- Underrecognition of CKD
- Lack of education on benefits of Nephrology referral
- "Therapeutic nihilism"

# Underdiagnosis of Chronic Kidney Disease in the Nursing Home

- Retrospective chart review of all elderly long-term residents of a 672-bed nursing home
- Inclusion Criteria:
  - Residing at Cold Spring Hills for at least 6 months
  - Medical records included at least two serum creatinine levels drawn at least 90 days apart from each other.

# Methods

- **Clinical Diagnosis**
  - Documentation of CKD in the monthly MD notes over past 6 months
- **Laboratory Diagnosis**
  - Two most recent serum creatinine values ≥90 days apart recorded
  - Glomerular filtration rates (GFRs) calculated via Modified Diet in Renal Disease (MDRD) and Cockcroft-Gault formulas
  - CKD defined as GFR <60ml/min/1.73 $m^2$

# Equations for Estimating GFR

## Modified Diet in Renal Disease (MDRD) Equation:

$$eGFR = 186.3 \times \text{Serum creatinine}^{-1.154} \times \text{Age}^{-0.203}$$

$$\times 0.742 \text{ (if female)} \times 1.210 \text{ (if African American)}$$

## Cockcroft-Gault Equation:

$$eGFR = \frac{(140 - \text{Age}) \times \text{Weight (kg)}}{72 \times \text{Serum creatinine}} \times 0.85 \text{ if female}$$

GFR= in mL/min/1.73m$^2$

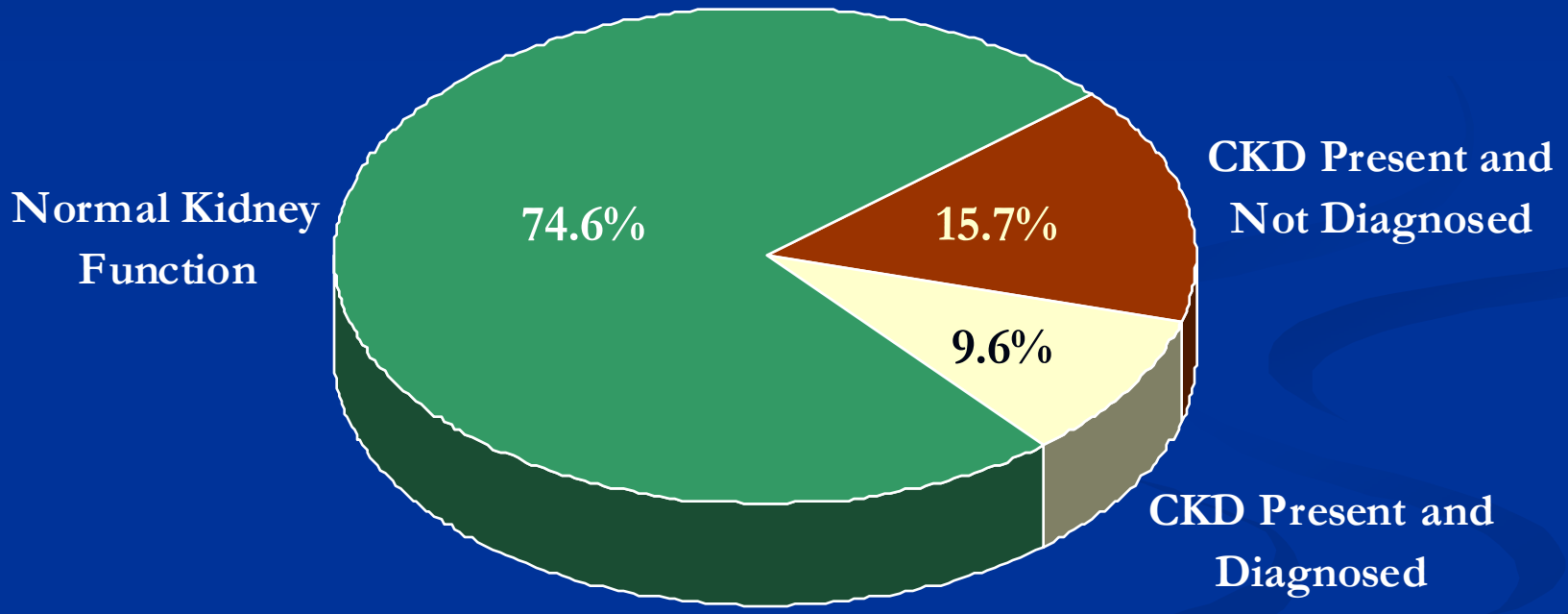
Levey et al. Ann Intern Med. 2003;139:137-147.

# Results

- 280 subjects
  - 70% women, 30% men
- Average age: 83.1 years

# Prevalence of CKD in an Elderly Institutionalized Population

## (MDRD Criteria, n=280)




62.0% of CKD patients are undiagnosed !

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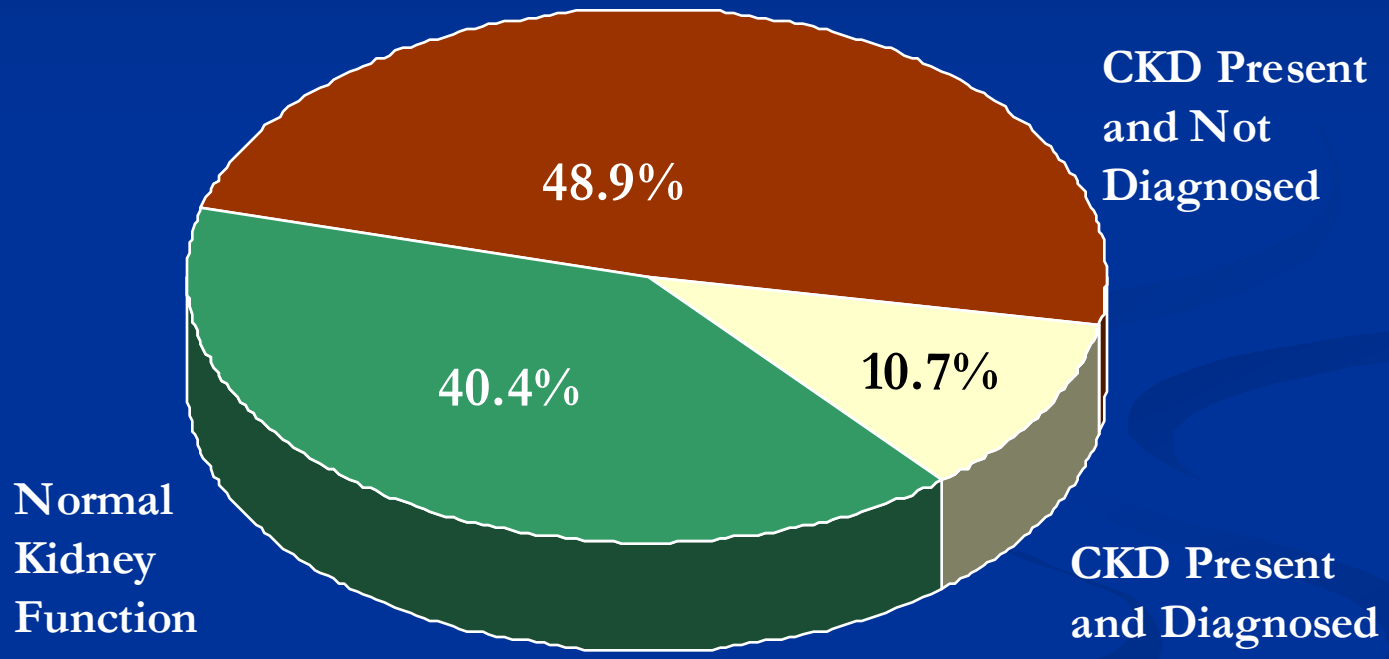


82.0% of CKD patients are undiagnosed !

# Limitations

- Single-center study
- Nursing home population ≠ Elderly population

# Conclusions

- CKD is underdetected within the elderly nursing home population

- Further studies are required to:
  - identify variables accounting for low identification rates
  - devise strategies to facilitate recognition and treatment of CKD in elderly patients