HEALTH DISPARITIES AND ESTIMATION OF GFR IN CKD: AN UPDATE FOR PHARMACISTS

Katie Cardone, PharmD, BCACP, FNKF, FASN, FCCP

Associate Professor of Pharmacy Practice

Albany College of Pharmacy and Health Sciences

DISCLOSURES

- Consultant for Glaxo Smith Kline
- Spouse works for Fresenius
- Sub-investigator on Merck RCT

OBJECTIVES

1. Describe health and healthcare disparities in the U.S. relevant to CKD.
2. Distinguish between social and physiological determinants of health.
3. Explain the rationale for removing race from eGFR calculations.
4. Use the CKD-EPI equation to evaluate pharmacotherapy among people with CKD.
5. Identify steps to close care gaps among people with CKD.

CKD IS A PUBLIC HEALTH CONCERN

CKD is associated with significant mortality and morbidity

- Increased risk of CV events
- May lead to need for kidney transplant or dialysis

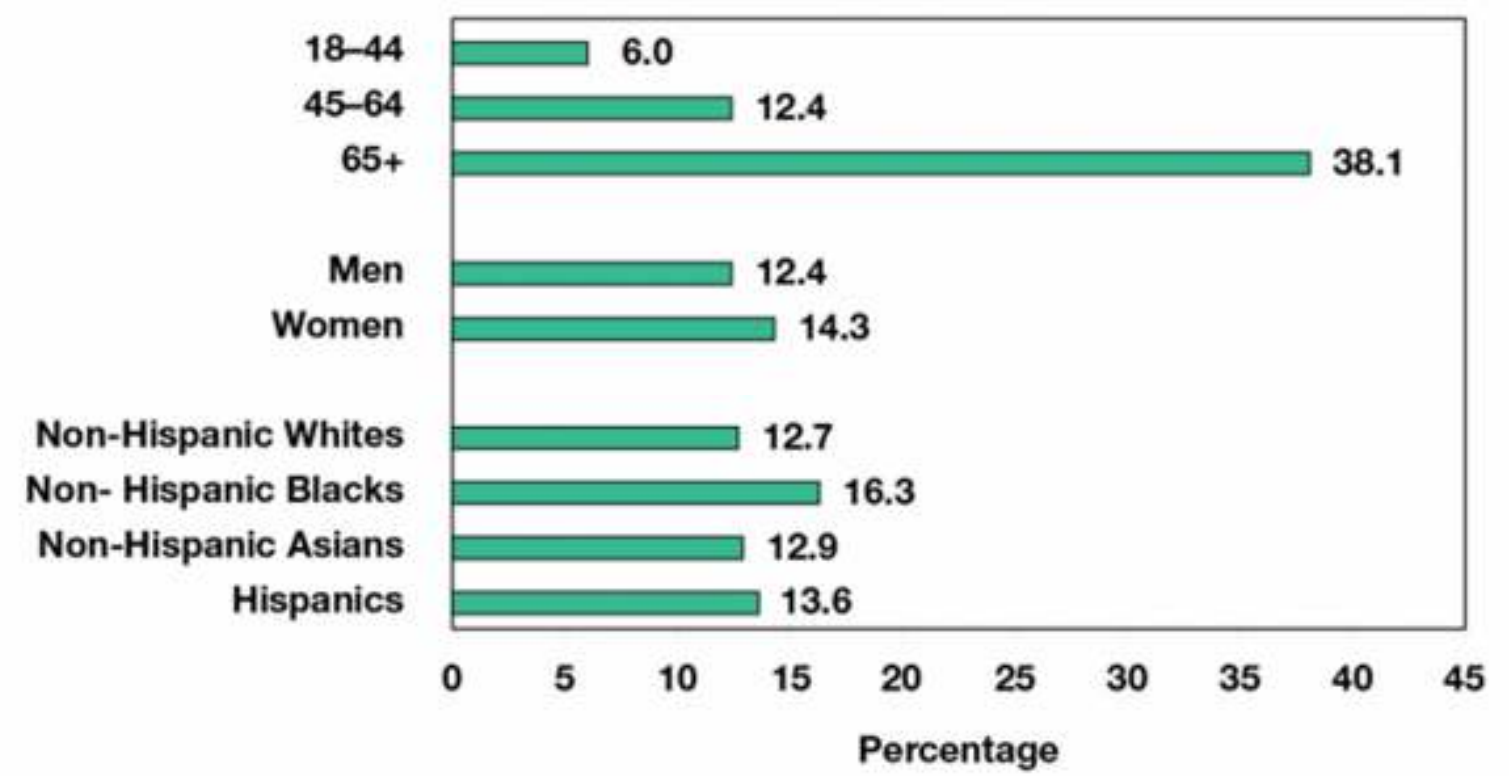
Healthy People 2030

- Goal: Reduce the burden of chronic kidney disease and related complications.
  - 14 objectives related to CKD

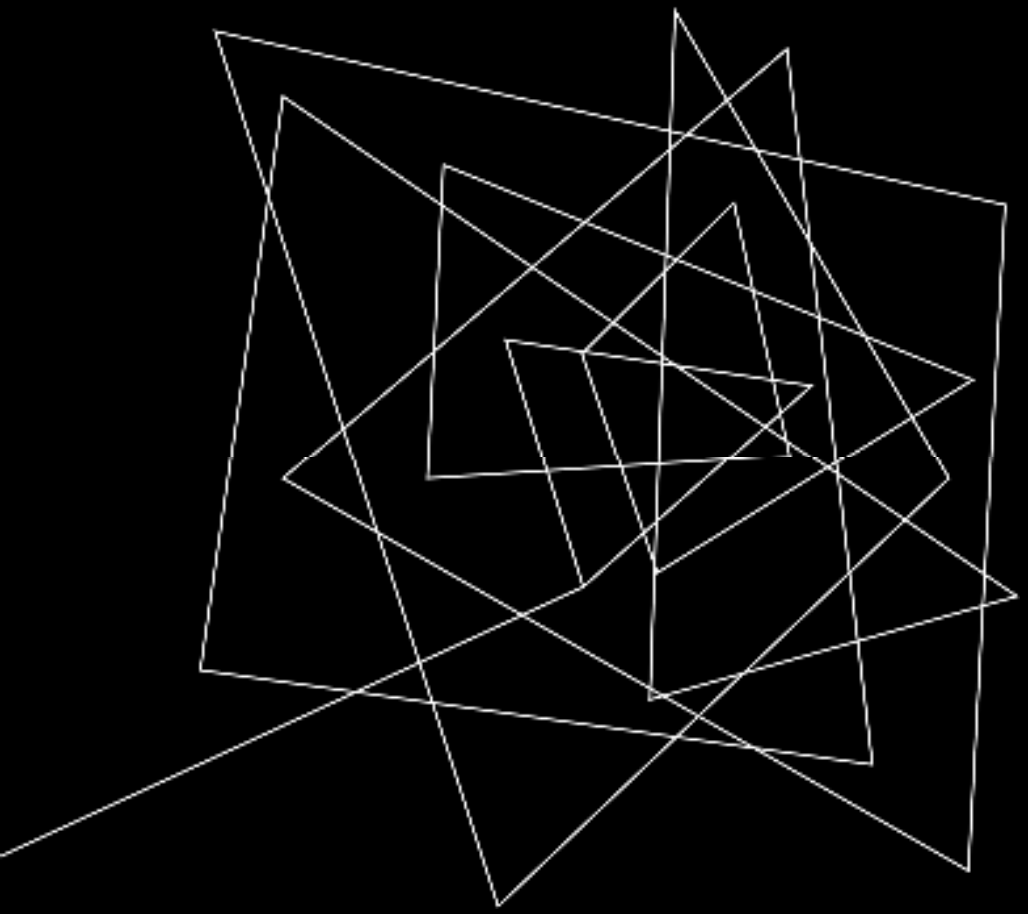
Healthy People 2030. https://health.gov/healthypeople/objectives-and-data/browse-objectives/chronic-kidney-disease

Centers for Disease Control and Prevention. *Chronic Kidney Disease in the United States, 2021*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2021.

CKD IS A PUBLIC HEALTH CONCERN



Centers for Disease Control and Prevention. *Chronic Kidney Disease in the United States, 2021*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2021.



WHAT IS CKD?

What is the definition of CKD

How is it diagnosed?

How is it staged?

CHRONIC KIDNEY DISEASE (CKD)

"CKD is defined as abnormalities of kidney structure or function, present for >3 months, with implications for health and CKD is classified based on cause, GFR category, and albuminuria category (CGA)."

KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. Kidney Int Suppl 2013;3.

CKD STAGING (KDIGO): GFR CATEGORIES

Category	Definition	GFR
*G1	normal or increased GFR	>90
*G2	Mildly decreased	60-89
G3a	Mild to moderately decreased	45-59
G3b	Moderately to severely decreased	30-44
G4	Severe decrease GFR	15-29
G5	Kidney failure	<15 / dialysis

***Kidney damage must be present for G1 and G2.**

KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. Kidney Int Suppl 2013;3.

CKD STAGING (KDIGO): ALBUMINURIA CATEGORIES

Category	Definition	ACR (mg/g) or AER (mg/24h)	Protein Reagent Strip
A1	Normal to mildly increased	<30	Negative to Trace
A2	Moderately increased "microalbuminuria"	30-300	Trace to +
A3	Severely Increased "albuminuria"	>300	+ or Greater

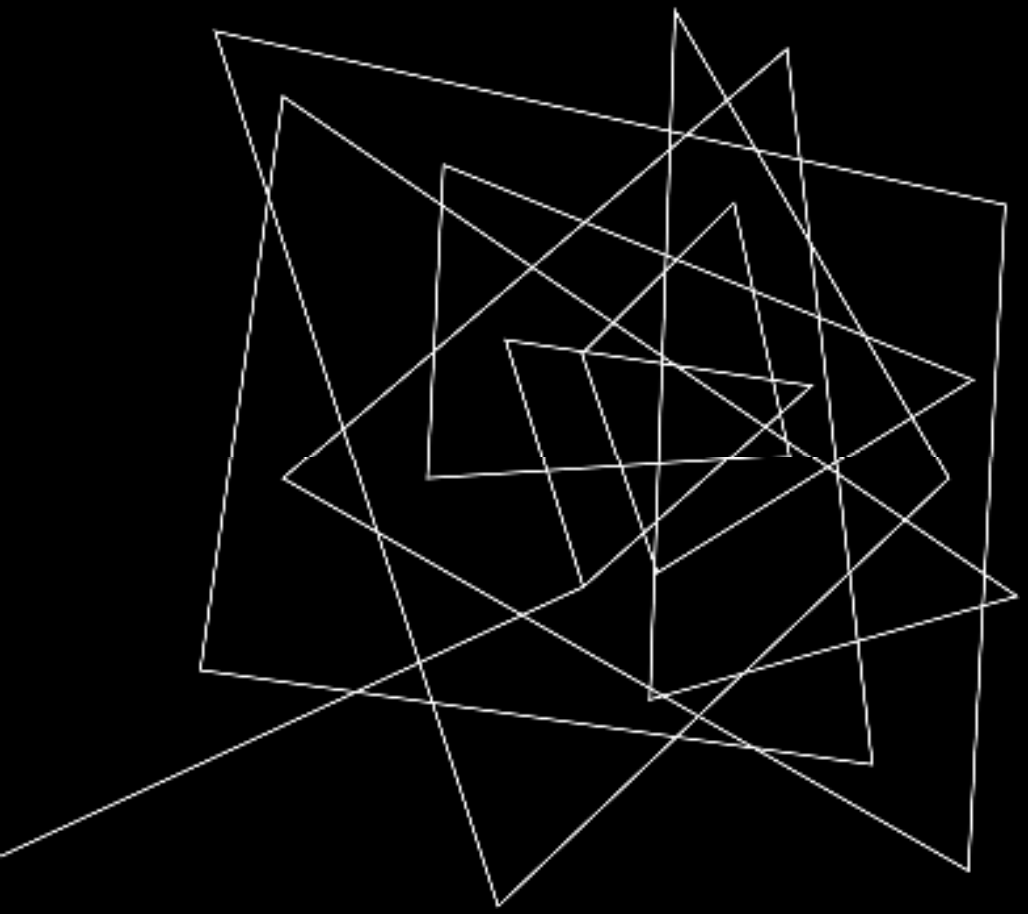
KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. Kidney Int Suppl 2013;3.

Prognosis of CKD by GFR and Albuminuria Categories: KDIGO 2012

GFR categories (ml/min/ 1.73 m²) Description and range				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
	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.

KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. Kidney Int Suppl 2013;3.



HOW DO WE DETERMINE GFR?

ASSESSING KIDNEY FUNCTION: CREATININE-BASED METHODS

- SCr

- Measured Creatinine Clearance

  24-hour urine collection

$$CL_{Cr} = \frac{U_{Cr} \times V}{S_{Cr} \times t}$$

- Equations
  - Cockroft-Gault
  - Modification of Diet in Renal Disease (MDRD)
  - CKD-EPI
  - Many others!

COCKROFT – GAULT EQUATION

$$CL_{Cr} = \frac{(140 - age)TBW}{S_{Cr} \times 72} \times 0.85 \; if \; female$$

TBW= Total/Actual Body Weight

Units: CrCl *ml/min*; weight *kg*; age *years*; SCr *mg/dL*

Cockroft, Gault. Nephron 1976.

CG EQUATION ABSTRACT

"A formula has been developed to predict creatinine clearance (C_{cr}) from serum creatinine (S_{cr}) in adult males: Ccr = (140 – age) (wt kg)/72 × S_{cr}(mg/100ml) (15% less in females). Derivation included the relationship found between age and 24-hour creatinine excretion/kg in 249 patients aged 18–92…."

Cockroft, Gault. Nephron 1976.

CASE EXAMPLES

Patient A

- 63 y.o. man
- 5’10” 70 kg
- SCr 3.3 mg/dL

Patient B

- 46 y.o. woman
- 5’3” 62 kg
- SCr 1.2 mg/dL

CASE EXAMPLE: PATIENT A

- 63 y.o. man
- 5’10” 70 kg
- SCr 3.3 mg/dL

$$CrCl = \frac{(140 - 63) \times 70}{3.3 \times 72} = 22.7\ m\,L/m\,in$$

CASE EXAMPLE: **PATIENT B**

- 46 y.o. woman
- 5’3” 62 kg
- SCr 1.2 mg/dL

$$CrCl = \frac{(140 - 46) \times 62 \times 0.85}{1.2 \times 72} = 57.3\ m\,L/m\,in$$

MDRD STUDY

- Cross-sectional study looking at GFR, creatinine clearance, SCr, and demographics in patients CKD.

- n=1628 patients
  - Training sample n=1070
  - Validation sample n=558

- Compared measured GFR (Iothalamate) to measured CrCl

- Used regression modeling to identify factors affecting GFR and develop prediction equation

Levey AS, et al. Ann Intern Med. 1999 Mar 16;130(6):461-70.

MDRD EQUATION

$$GFR = 170 \times P_{Cr}^{-0.999} \times age^{-0.176} \times 0.762\ if\ female \times 1.180\ if\ black \times SUN^{-0.17} \times Alb^{0.318}$$

"At any given GFR, the serum creatinine concentration is significantly higher in men than in women and in black persons than in white persons (P<0.001)."

Levey AS, et al. Ann Intern Med. 1999 Mar 16;130(6):461-70.

CASE EXAMPLE: PATIENT A

- 63 y.o. man
- 5’10” 70 kg
- SCr 3.3 mg/dL

<u>MDRD results</u>

- eGFR = 23 mL/min/1.73m^2 (Black)
- eGFR = 19 mL/min/1.73m^2 (Non-Black)

CASE EXAMPLE: **PATIENT B**

- 46 y.o. woman
- 5’3” 62 kg
- SCr 1.2 mg/dL

MDRD results

- eGFR = 59 mL/min/1.73m^2 (Black)
- eGFR = 48 mL/min/1.73m^2 (Non-Black)

THE RACE COEFFICIENT IN GFR EQUATIONS

Both the MDRD and the CKD-EPI (2009) equations include a race coefficient

NHANES and MDRD study data showed higher SCr concentrations in Black study participants compared to White participants with the same measured GFR.

Levey AS, et al. Ann Intern Med. 1999 Mar 16;130(6):461-70.

Levey AS et al. Ann Intern Med. 2009; 150:604612.

Jones CA et al. Am J Kidney Dis 1998;32:992-9.

CKD-EPI EQUATION (2009)

- Cross-sectional study

- Training sample from 10 studies with measured GFR (iothalamate) n=8254)
- Validation sample from 16 studies (n=3896)

- Improves accuracy by ~4% compared with MDRD, more accurate at normal GFRs.

Levey AS et al. Ann Intern Med. 2009; 150:604612.

CKD-EPI EQUATION (2009)

$$GFR = 141 \times \min(Scr/\kappa, 1)^{\alpha} \times \max(Scr/\kappa, 1)^{-1.209} \times 0.993^{Age} \times 1.018[\text{if female}] \times 1.159[\text{if black}]$$

$\kappa = 0.7$ if female
$\kappa = 0.9$ if male

$\alpha = -0.329$ if female
$\alpha = -0.411$ if male

min = The minimum of Scr/κ or 1
max = The maximum of Scr/κ or 1

Scr = serum creatinine (mg/dL)

KDIGO 2012 CKD Guideline recommendation that the CKD-EPI (2009) be used to report eGFR.

Levey AS et al. Ann Intern Med. 2009; 150:604612.

CASE EXAMPLE: PATIENT A

- 63 y.o. man
- 5’10” 70 kg
- SCr 3.3 mg/dL

<u>CKD-EPI (2009)</u>

- eGFR = 22 mL/min/1.73m^2 (Black)
- eGFR = 19 mL/min/1.73m^2 (Non-Black)

CASE EXAMPLE: **PATIENT B**

- 46 y.o. woman
- 5’3” 62 kg
- SCr 1.2 mg/dL

CKD-EPI (2009)

- eGFR = 63 mL/min/1.73m^2 (Black)
- eGFR = 54 mL/min/1.73m^2 (Non-Black)

CKD-EPI CYSTATIN C (2012)

- Cystatin C is an endogenous filtration marker, not affected by muscle mass or diet
- Is available in some labs as an alternative to SCr in assessing eGFR

- CKD-EPIcys
  - Similar in accuracy to CKD-EPIcr (2009)
  - Contains no race coefficient

- CKD-EPIcr-cys is more accurate than either alone
  - Contains race coefficient

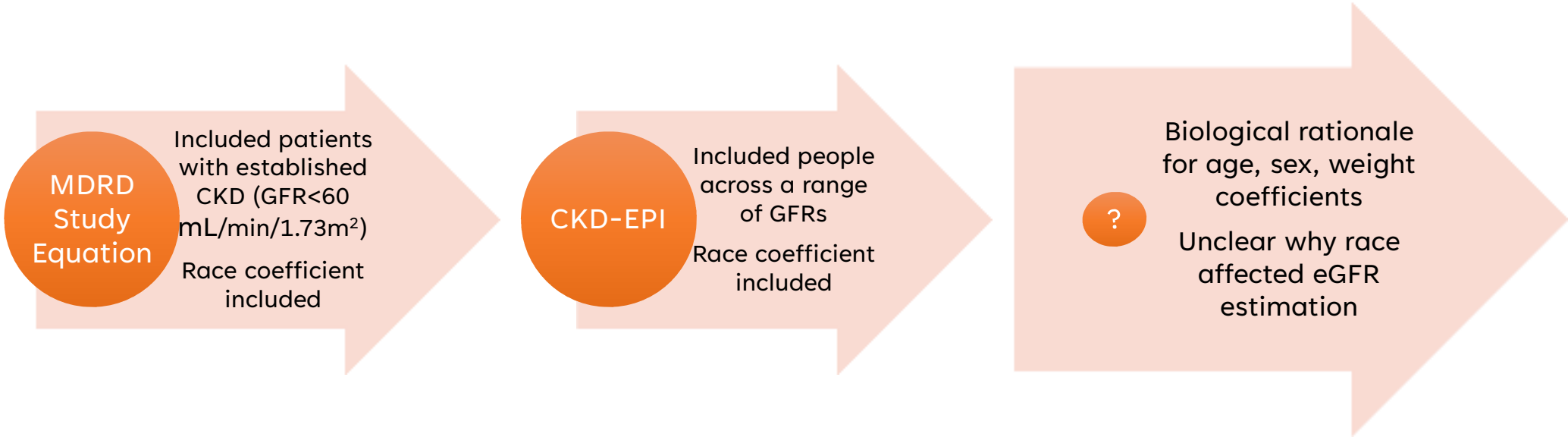
CASE EXAMPLE: **PATIENT B**

- 46 y.o. woman
- 5’3” 62 kg
- SCr 1.2 mg/dL
- Cystatin C 1.2 mg/L

Equation	Black	Non-Black
CKD-EPIcr (2009)	63	54
CKD-EPIcys (2012)	60	60
CKD-EPIcr-cys (2012)	60	56

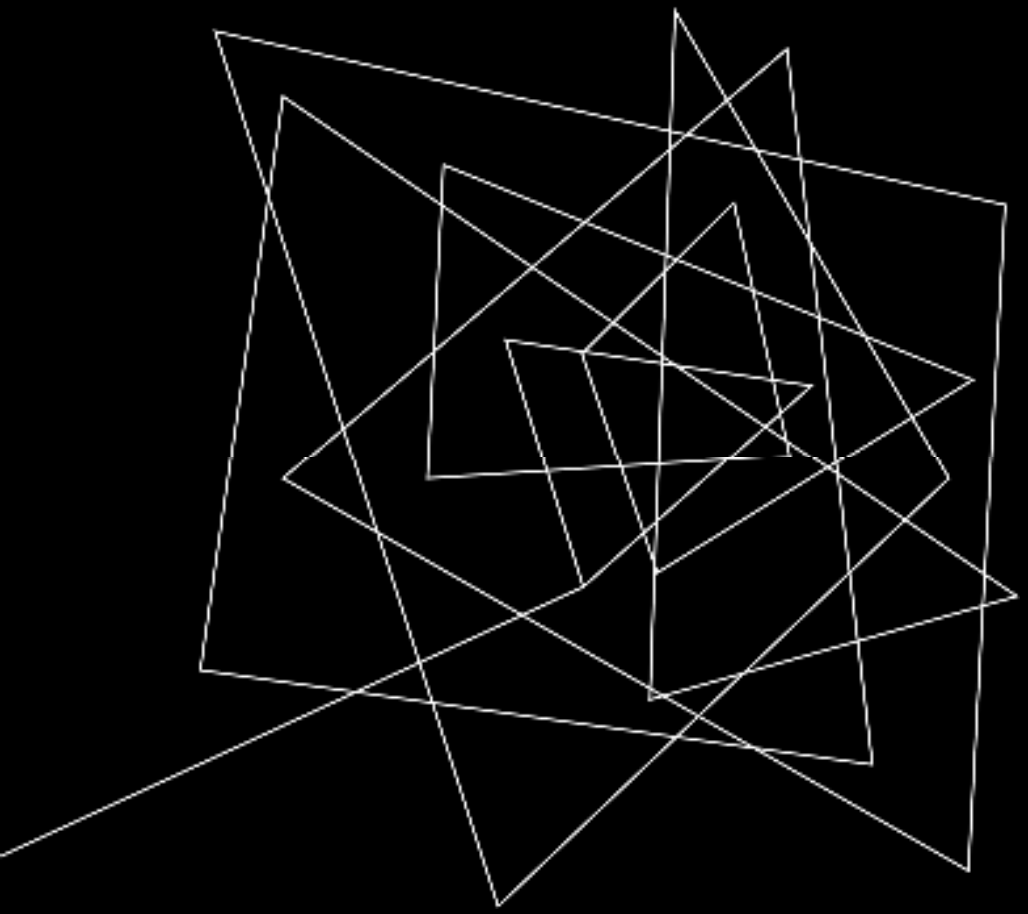
mL/min/1.73m^2

EQUATIONS TO ESTIMATE GFR



Race is a social category; captures diverse ancestral backgrounds, social determinants of health, other factors

Delgado et al. Am J Kidney Dis 2021;78:103-15.



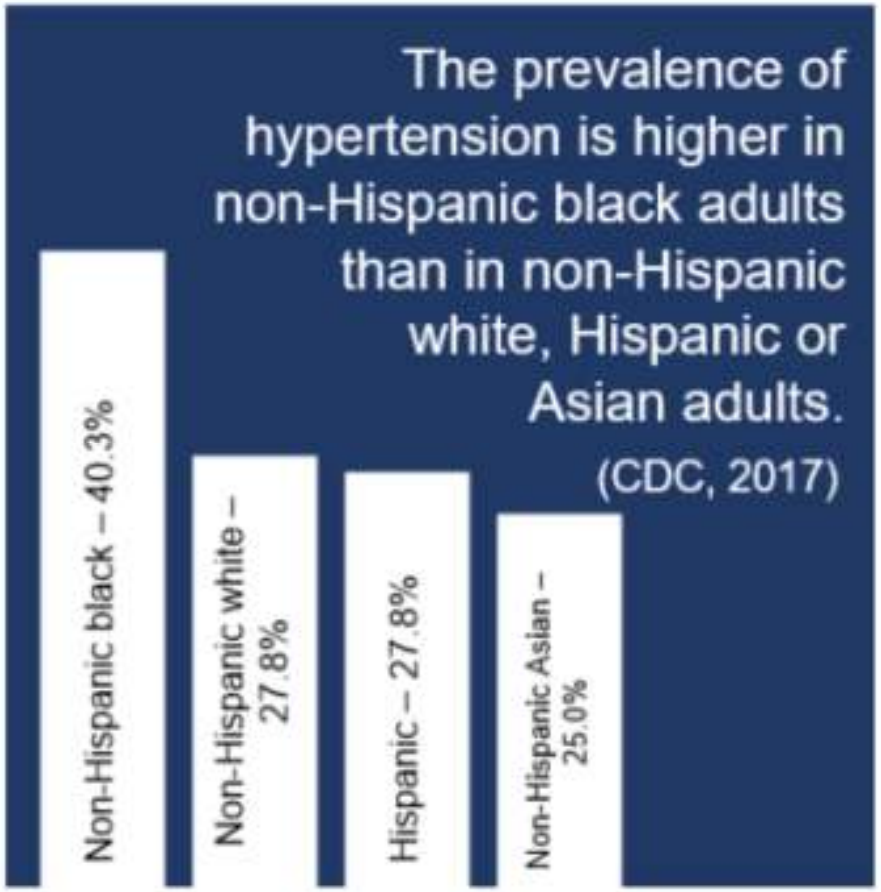
DISPARITIES AND CARE GAPS

DISPARITIES AND CARE GAPS IN CKD

- Care Gap: Discrepancy between best practice and actual treatment

- Disparities: "*preventable differences in the burden of disease, injury, violence, or opportunities to achieve optimal health that are experienced by socially disadvantaged populations*" – CDC,

CDC. https://www.cdc.gov/healthyyouth/disparities/index.htm



CMS. Chronic Kidney Disease Disparities: Educational Guide for Primary Care. 2021. https://www.cms.gov/files/document/chronic-kidney-disease-disparities-educational-guide-primary-care.pdf Accessed 3/13/2023.

American Indians/Alaskan Natives (15.1%), non-Hispanic blacks (12.7%), and Hispanics (12.1%) have higher rates of diabetes than Asian Americans (8.0%) or non-Hispanic Whites (7.4%).

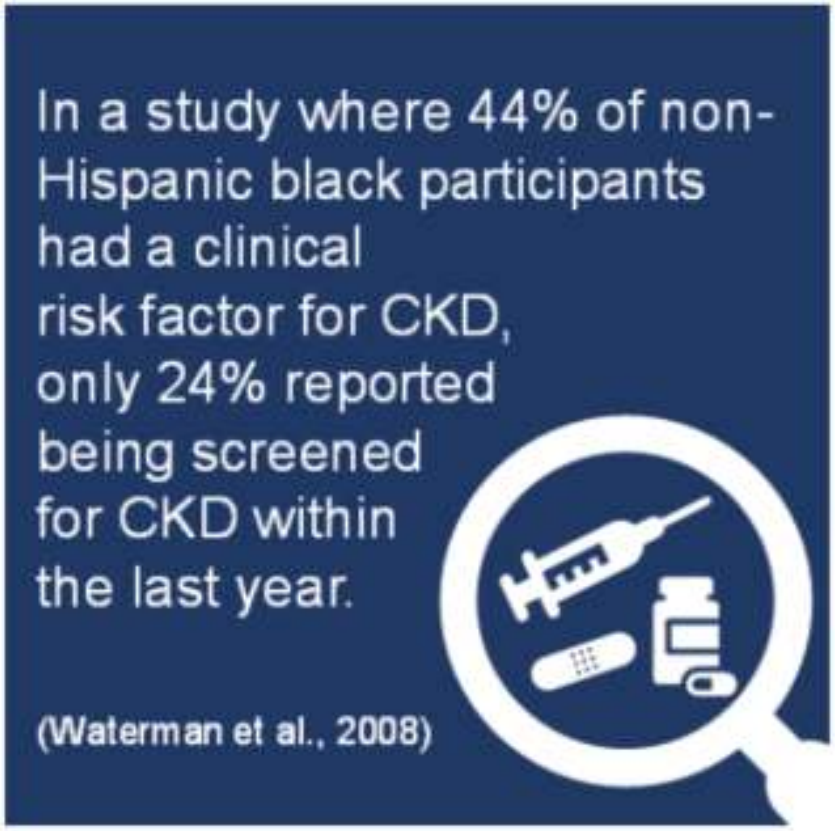
(ADA, 2018)

CMS. Chronic Kidney Disease Disparities: Educational Guide for Primary Care. 2021. https://www.cms.gov/files/document/chronic-kidney-disease-disparities-educational-guide-primary-care.pdf Accessed 3/13/2023.

PHARMACOTHERAPY CARE GAPS IN DKD

Recommendation	Implementation Rate	Implications
UACR testing	10-40%	Decreased Diagnosis, Prescribing, Monitoring
ACEi/ARB	25-40%	CKD progression, Kidney failure, CV risk
SGLT2i	13%	CKD progression, Kidney failure, CV risk, Mortality
GLP-1 RA	17%	CV risk

Adapted from Tuttle et al. Clin J Am Soc Nephrol 2022 Jul;17(7):1092-1103.

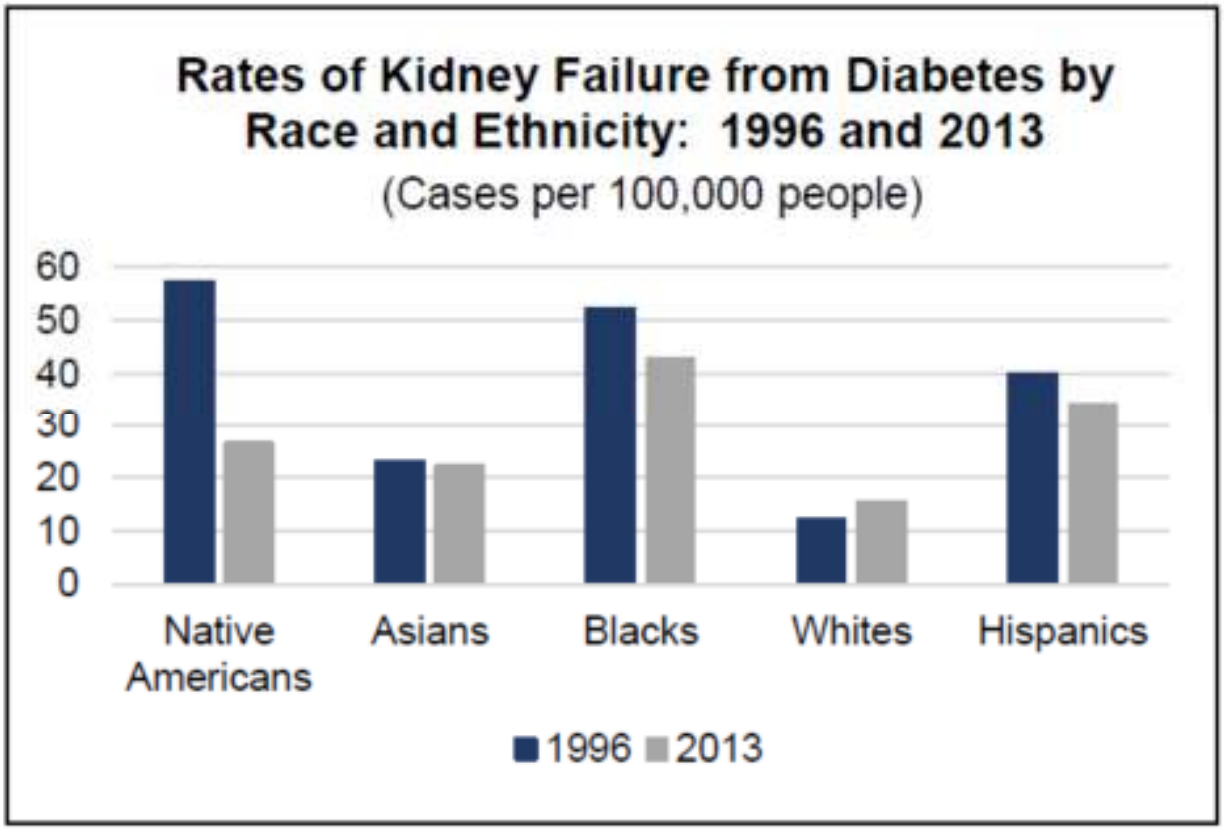


CMS. Chronic Kidney Disease Disparities: Educational Guide for Primary Care. 2021. https://www.cms.gov/files/document/chronic-kidney-disease-disparities-educational-guide-primary-care.pdf Accessed 3/13/2023.

DISPARITIES EXIST IN SGLT2I USE IN T2D

- Use increased over 5-year study period (2015-2019)
- Racial, ethnic, gender, and socioeconomic inequities identified
- Black race, female, and lower socioeconomic status associated with lower rates of SGLT2i use

Eberly et al. JAMA Netw Open. 2021;4(4):e216139.



CMS. Chronic Kidney Disease Disparities: Educational Guide for Primary Care. 2021. https://www.cms.gov/files/document/chronic-kidney-disease-disparities-educational-guide-primary-care.pdf Accessed 3/13/2023.

Many health outcomes can be predicted by county.

People living in areas with lower life expectancy less likely to:

- Receive information about kidney transplant
- See a nephrologist
- Have an AV fistula for vascular access.

Location Matters!

Proximity to a pharmacy significantly affects medication access

Distance to a grocery store affects likelihood of developing kidney failure in people with CKD

Dwyer-Lindgren et al. JAMA Intern Med. 2017;177(7):1003-1011.

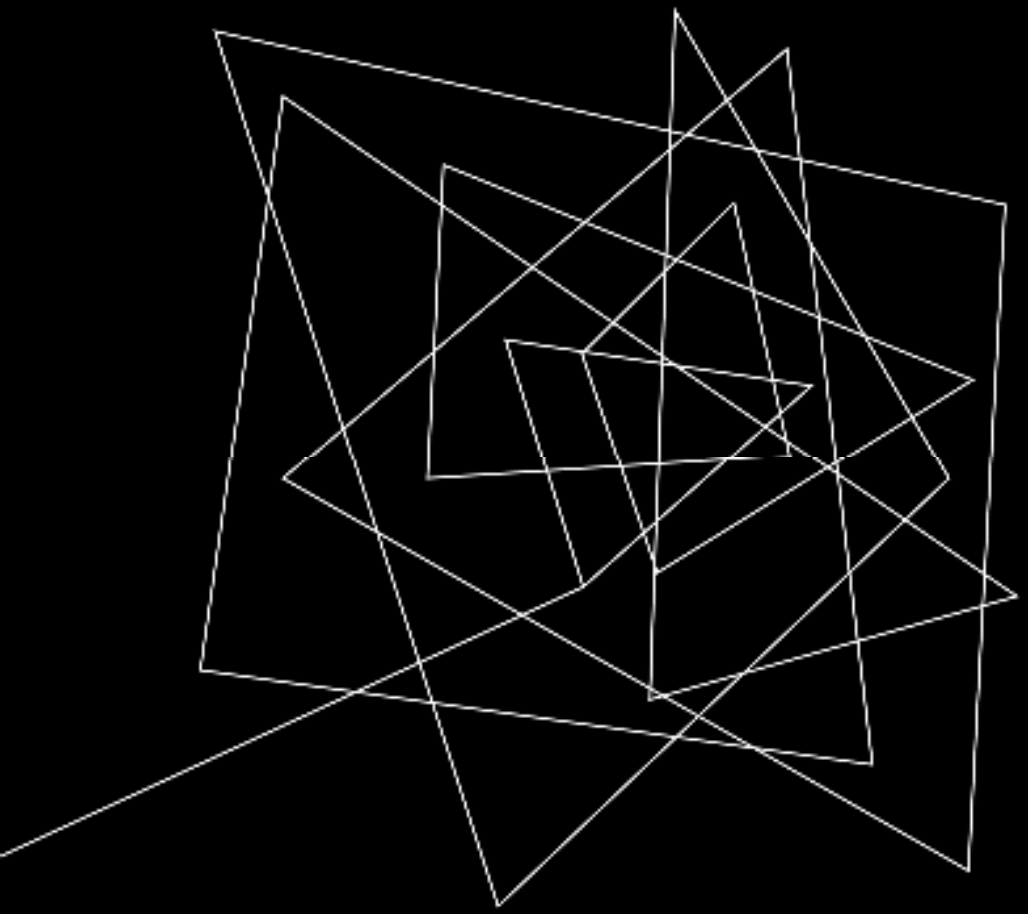
Schold et al. Am J Kidney Dis. 2018 72(1):19-29.

Tharumia Jagadeesan and Wirtz . J of Pharm Policy and Pract (2021) 14:28

Banerjee et al. Am J Kidney Dis 2017 Jul; 70(1): 38–47.

SOCIAL DETERMINANTS OF HEALTH

Healthy People 2030, U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Retrieved [date graphic was accessed], from https://health.gov/healthypeople/objectives-and-data/social-determinants-health



THE NKF-ASN TASK FORCE

THE NKF-ASN TASK FORCE

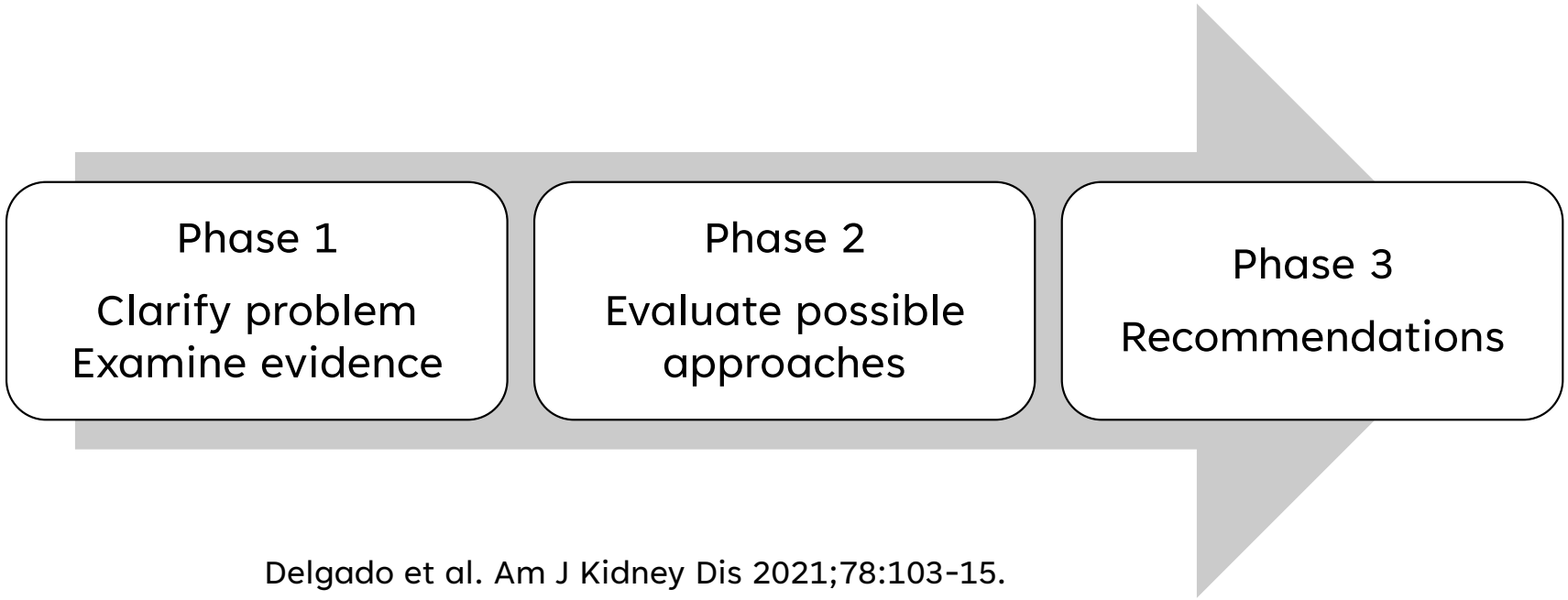
Announced July 2, 2020

Charge: "Reassess the inclusion of race in the estimation of GFR in the US and its implications for diagnosis and subsequent management of patients with, or at risk for, kidney disease."

Comprised of diverse group of healthcare professionals, patients, others

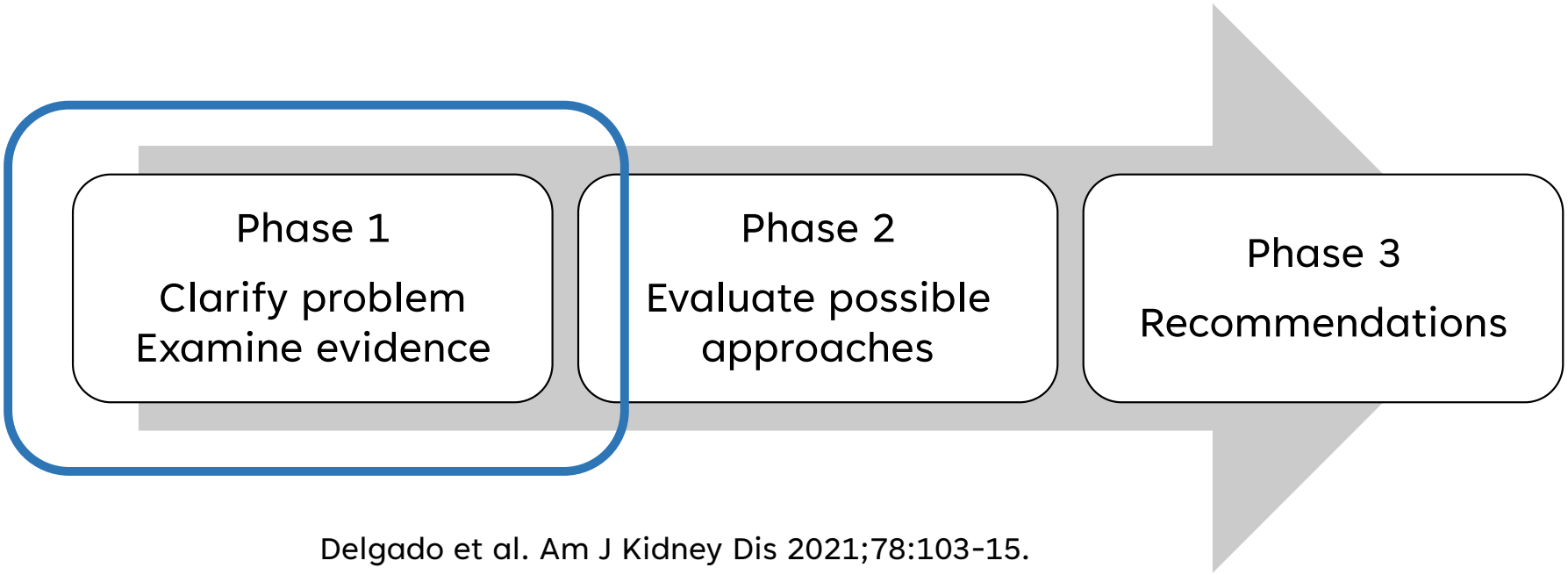
Delgado et al. Am J Kidney Dis 2021;78:103-15.

PHASED APPROACH OF NKF-ASN TASK FORCE



Delgado et al. Am J Kidney Dis 2021;78:103-15.

PHASED APPROACH OF NKF-ASN TASK FORCE



Delgado et al. Am J Kidney Dis 2021;78:103-15.

PHASE 1: CLARIFY THE PROBLEM, EXAMINE EVIDENCE

- Evaluated literature, expert panels, testimony, lectures

- Sessions held on
  - History of GFR evaluation
  - GFR Measurement in the US
  - Race and racism; genetic ancestry and race; creatinine, race and ancestry
  - Body composition and eGFR
  - Laboratory standardization and issues
  - Patient perspective and decision-making
  - Possible approaches to address race in GFR estimation

Delgado et al. Am J Kidney Dis 2021;78:103-15.

REMOVING RACE FROM GFR EQUATIONS

PRO

- Remove Race from Equations
- *"Race is a non-biological, social construct."*
- Potential benefits: Earlier identification of CKD, referral to Nephrology and Transplant

CON

- Do not remove Race from Equations
- *"There are differences that exist (regardless of reason) that need to be captured."*
- Removing race may lead to other disparities

Borrell et al. N Engl J Med 2021;384:474-80.

PHASE 1: CLARIFY THE PROBLEM, EXAMINE EVIDENCE

30 Evidence and Value statements established

Examples

- *"Equity in kidney health and kidney health care is a fundamental and important goal. (V)"*

- *"Race is defined as a construct of human variability based on perceived differences in biology, physical appearance, and behavior. (E) Race and ethnicity are social and not biological constructs. (E)"*

- *"Multiple studies among the US population, including national health statistics studies across age groups, show African American men and African American women have higher serum creatinine concentrations than their White counterparts. Not all factors that might affect serum creatinine concentrations were accounted for in these studies.(E) Studies have also shown African Americans have higher serum creatinine concentrations than White individuals at the same measured GFR in the United States. (E) The reasons for these differences are not understood. (E)*

Delgado et al. Am J Kidney Dis 2021;78:103-15.

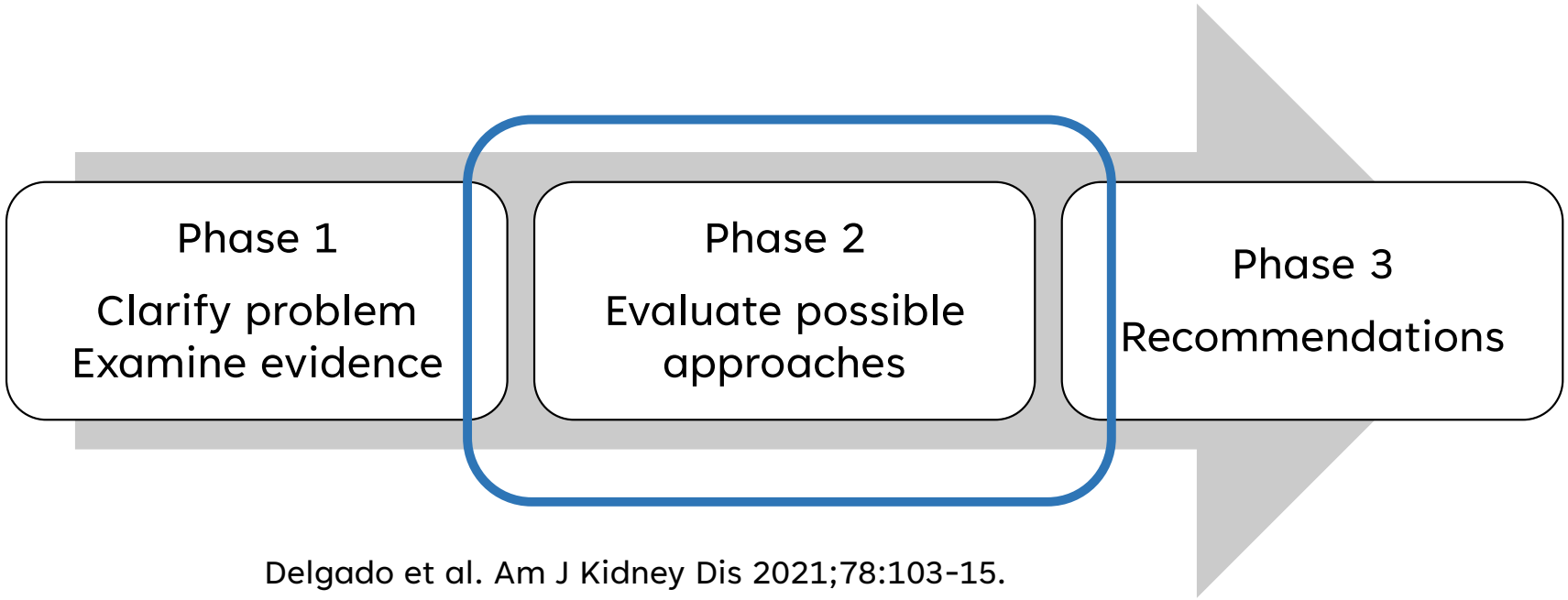
PHASE 1: CLARIFY THE PROBLEM, EXAMINE EVIDENCE

- Possible approaches to estimating and reporting GFR were identified

- 12 using Cr as biomarker
- 13 using a non-Cr biomarker
- 1 using a combination of methods

Delgado et al. Am J Kidney Dis 2021;78:103-15.

PHASED APPROACH OF NKF-ASN TASK FORCE



Delgado et al. Am J Kidney Dis 2021;78:103-15.

PHASE 2: EVALUATE APPROACHES

- Evaluate approaches, Determine clinical impact
- Task force members agreed that race should be removed from the eGFR estimation equation
- Attributes
  1. Filtration marker assay
  2. Implementation challenges
  3. Equation population diversity
  4. Equation performance
  5. Consequences
  6. Patient centeredness

Delgado et al. Am J Kidney Dis 2022;79:268-88.

PHASE 2: EVALUATE APPROACHES

Selected Considerations by Attribute

1. Filtration marker assay
   - Creatinine standardized, available, high throughput
   - Cystatin C not as widely available more expensive

2. Implementation challenges
   - Including height and weight would pose challenges for labs
   - Use of regional equations to reflect diversity in a specific community would pose challenges
   - CG equation not validated with standardized creatinine assay

Delgado et al. Am J Kidney Dis 2022;79:268-88.

PHASE 2: EVALUATE APPROACHES

Selected Considerations by Attribute

3. Equation population diversity
   - Ideally study sample would reflect US population
     - Racial and ethnic group representation
     - Age
     - Sex

4. Equation performance in external validation
   - Accuracy: % of estimates >30% of measured GFR
   - Bias: median difference between measured and estimated GFR
   - Precision: IQR of the difference between measured and estimated GFR

Delgado et al. Am J Kidney Dis 2022;79:268-88.

PHASE 2: EVALUATE APPROACHES

Selected Considerations by Attribute

5. Consequences
   - Clinical practice
   - Research implications

6. Patient centeredness
   - Earlier CKD detection
   - Transparent communication
   - Shared decision-making

Delgado et al. Am J Kidney Dis 2022;79:268-88.

PHASE 2: EVALUATE APPROACHES

Narrowed List of Approaches to 5 candidates

- CKD-EPI_NB
- CKD-EPIcr_R
- CKD-EPIcr-cys_NB
- CKD-EPIcr-cys_R
- CKD-EPIcys

NB: non-black estimate
Cr: creatinine
Cys: cystatin C
R: refit without race variable

Delgado et al. Am J Kidney Dis 2022;79:268-88.

EFFECTS ON MEDICATION USE

Consider what effects removing race from the eGFR calculation might have on medication use compared with using race-based equations.

Are the effects different for Black vs non-Black patients?

PHASE 2: EVALUATE APPROACHES

Potential Effects on Medication Use

- Black patients
  - Newer equations may underestimate eGFR for some patients
  - Inappropriate underdosing or discontinuation
  - More diagnosis of CKD might increase use of RAS blockers, SGLT2i, MRA
  - More severe CKD diagnosis might prevent use of SGLT2i at lower GFR thresholds

- Non-Black patients
  - CKD-EPI_NB: no change
  - CKD-EPIcr_R: may overestimate eGFR for some patients, less CKD diagnosis
  - Inappropriate overdosing or continuation

Delgado et al. Am J Kidney Dis 2022;79:268-88.

PHASE 2: EVALUATE APPROACHES

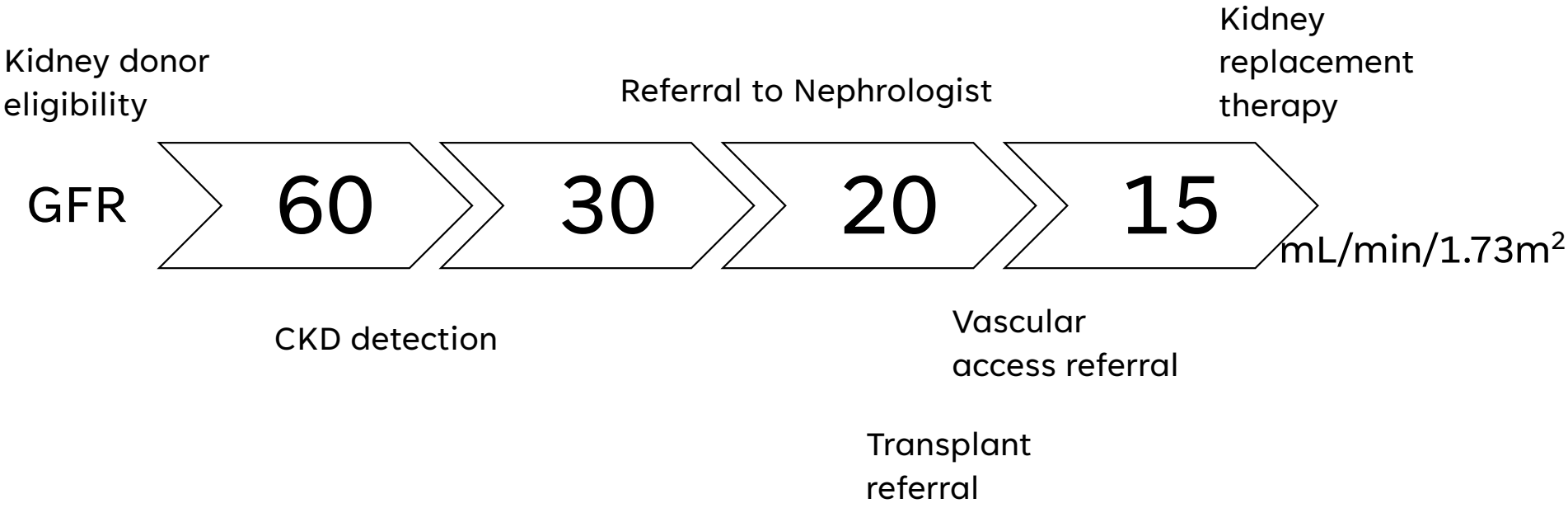
Strategies for Medication Dosing

- Medication clearance is best evaluated using non-indexed eGFR (mL/min) compared with indexed GFR (mL/min/1.73m^2)

- Limitations on using indexed eGFR for medication dosing
  - Overdosing if BSA significantly less than 1.73m^2
  - Underdosing if BSA significantly greater than 1.73m^2

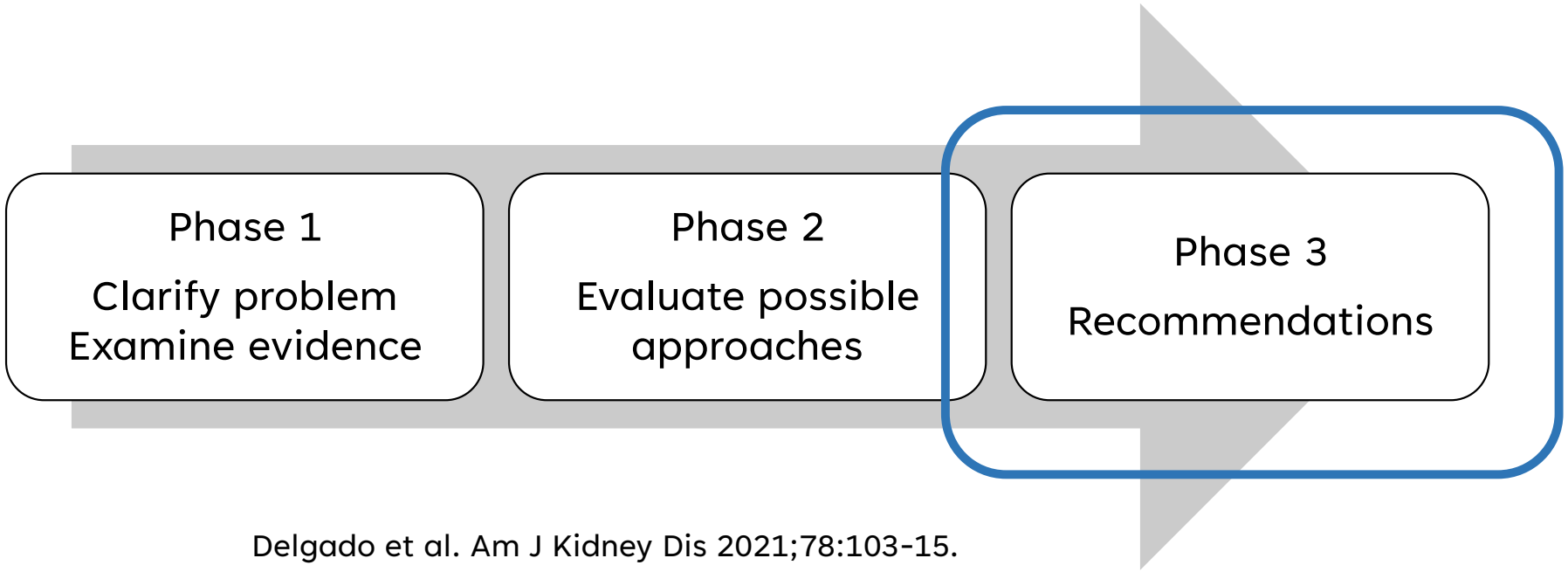
Nix et al. Am J Health-Syst Pharm. 2017; 74:1814-9
Delgado et al. Am J Kidney Dis 2022;79:268-88.

PHASE 2: EVALUATE APPROACHES



Delgado et al. Am J Kidney Dis 2022;79:268-88.

PHASED APPROACH OF NKF-ASN TASK FORCE



Delgado et al. Am J Kidney Dis 2021;78:103-15.

PHASE 3: RECOMMENDATIONS

1. The CKD-EPIcr_R should be implemented immediately.

2. National efforts should be made to increase use of cystatin-C
    1. should be used to confirm eGFR
    2. Combination with creatinine improves accuracy

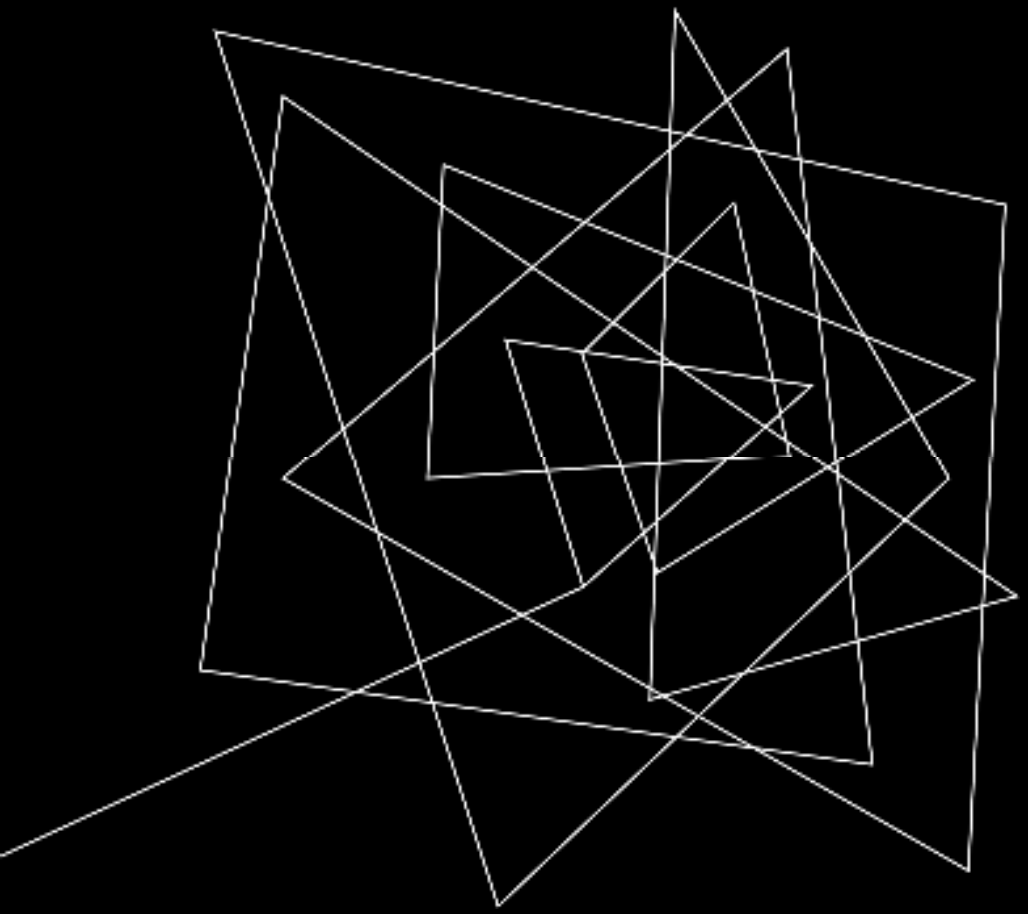
3. Further research is needed
    1. New markers
    2. Ways to eliminate race and ethnic disparities

Delgado et al. Am J Kidney Dis 2022;79:268-88.

PHASE 3: RECOMMENDATIONS

- eGFR reporting should be indexed (mL/min/1.73m^2)
- Include notation “use of nonindexed eGFR values (mL/min) should be considered for drug dosing decisions.”

Delgado et al. Am J Kidney Dis 2022;79:268-88.



IMPLEMENTATION

POLL

Does your institution's lab report eGFR using the new equation?

A. Yes
B. No but are planning to
C. No and are not planning to
D. Unsure

CKD-EPI (2021)

- In recognition that race is a social and not a biological construct, the CKD-EPI data were reanalyzed to develop a new equation removing the race coefficient

- Tested 7 equations
  - Previous equations: CKD-EPI eGFRcr, eGFRcys, and eGFRcr-cys
  - NB/Removing race coefficient: eGFRcr and eGFRcr-cys reporting non-Black calculation for everyone
  - Refit models using eGFRcr and eGFRcr-cys

Inker et al. N Engl J Med. 2021 November 04; 385(19): 1737–1749.

CKD-EPI (2021)

- Reporting non-Black calculation for everyone
  - No change for non-Black patients
  - Potential underestimation of GFR for some Black patients

- Refit models
  - Potential overestimation for some non-Black patients
  - Potential underestimation for some Black patients

- eGFRcr-cys equation minimized inaccuracies in both groups

- eGFRcr_R is more equitable than eGFRcr_NB because differences are averaged among all people

Inker et al. N Engl J Med. 2021 November 04; 385(19): 1737–1749.

CASE EXAMPLE: PATIENT A

- 63 y.o. man
- 5’10” 70 kg
- SCr 3.3 mg/dL

Method	Black	Non-Black
CG (mL/min)	23	23
MDRD*	23	19
CKD-EPI (2009)*	22	19
CKD-EPI (2021)*	20	20

*mL/min/1.73 m^2

If Patient A had T2D...

Metformin

- Reduce dose by 50% at eGFR < 45
- Discontinue at eGFR 30 mL/min/1.73m^2

SGLT2i

Initiate at/above eGFR 20 mL/min/1.73m^2

De Boer et al. Kidney International (2022) https://doi.org/10.1016/j.kint.2022.08.012

Lazarus et al. JAMA Intern Med. 2018 Jul; 178(7): 903–910.

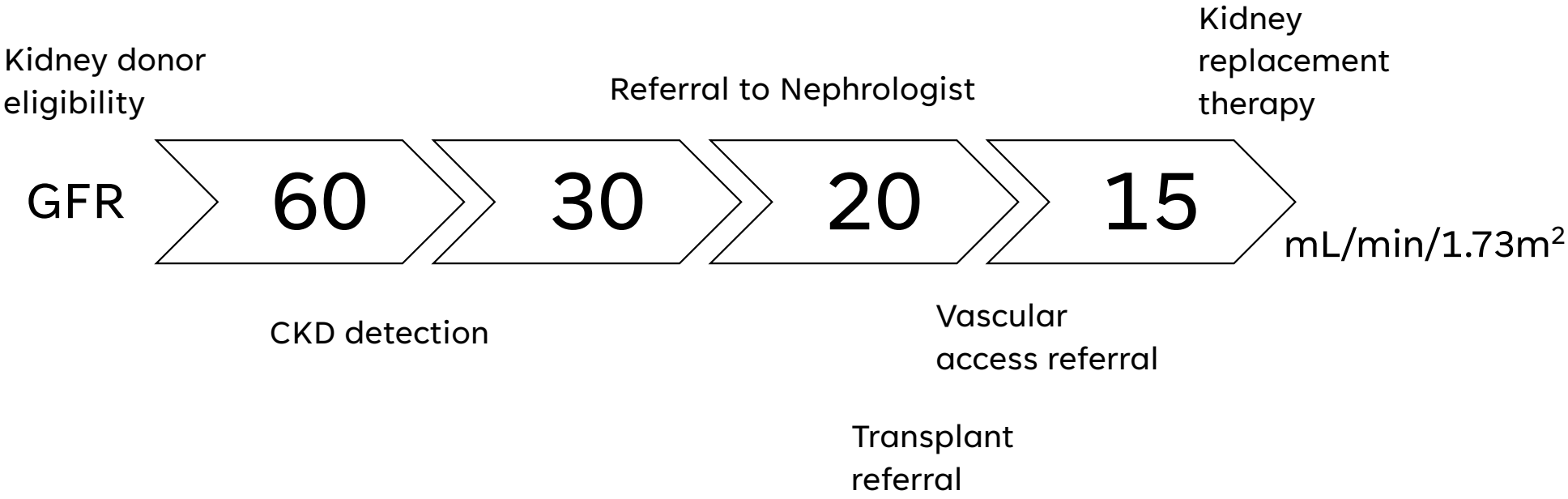
CASE EXAMPLE: PATIENT B

- 46 y.o. woman
- 5’3” 62 kg
- SCr 1.2 mg/dL
- Cystatin C 1.2 mg/L

Method	Black	Non-Black
CG (mL/min)	57	57
MDRD*	59	48
CKD-EPI (2009)*	63	54
CKD-EPI (2021)*	57	57
CKD-EPIcr-cys (2021)*	59	59

*mL/min/1.73 m^2

PHASE 2: EVALUATE APPROACHES



Delgado et al. Am J Kidney Dis 2022;79:268-88.

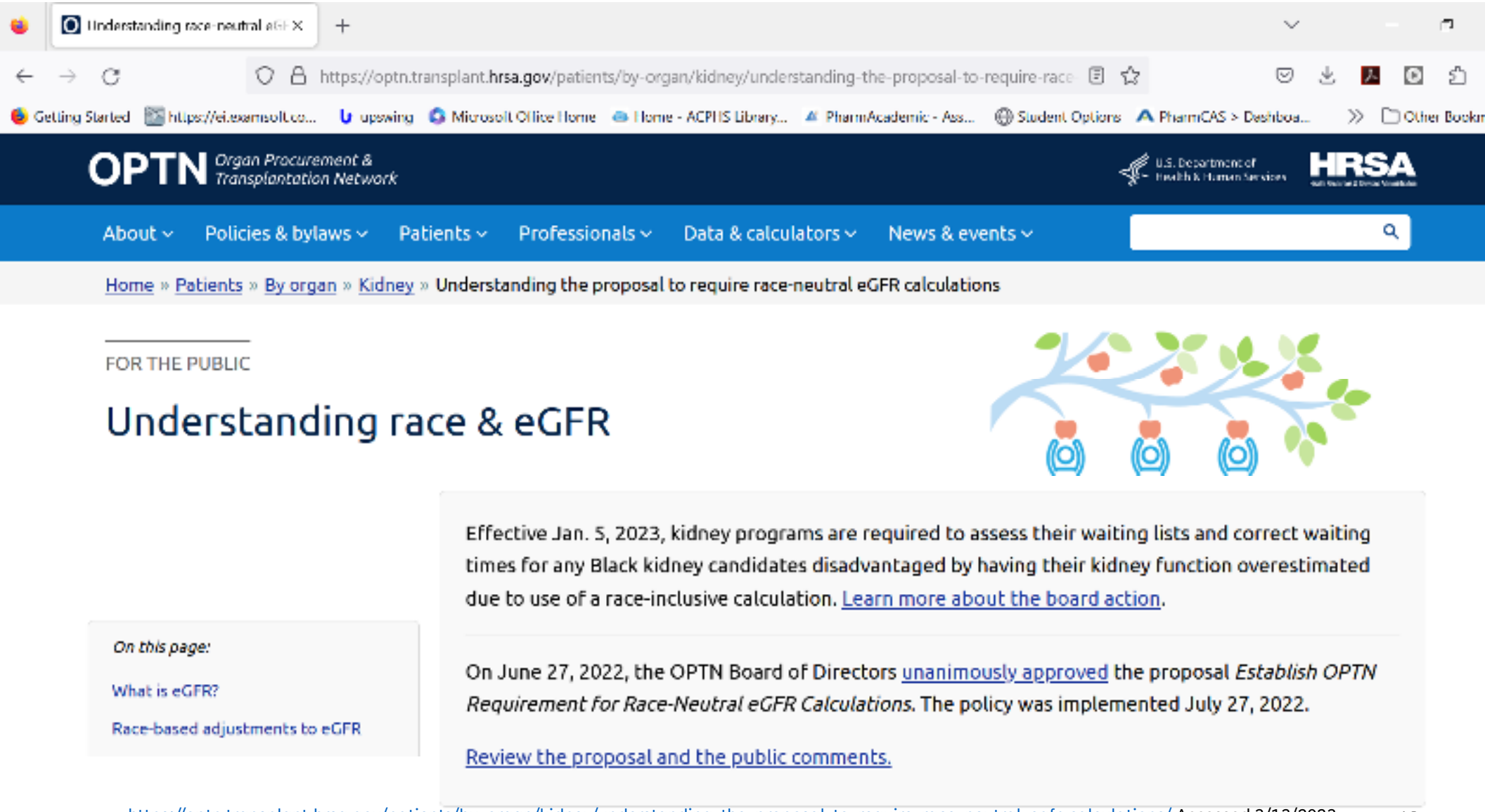
IMPLEMENTATION IMPLICATIONS

- Time to implementation
  - KDIGO 2012 CKD Guideline recommendation that the CKD-EPI (2009) be used to report eGFR.

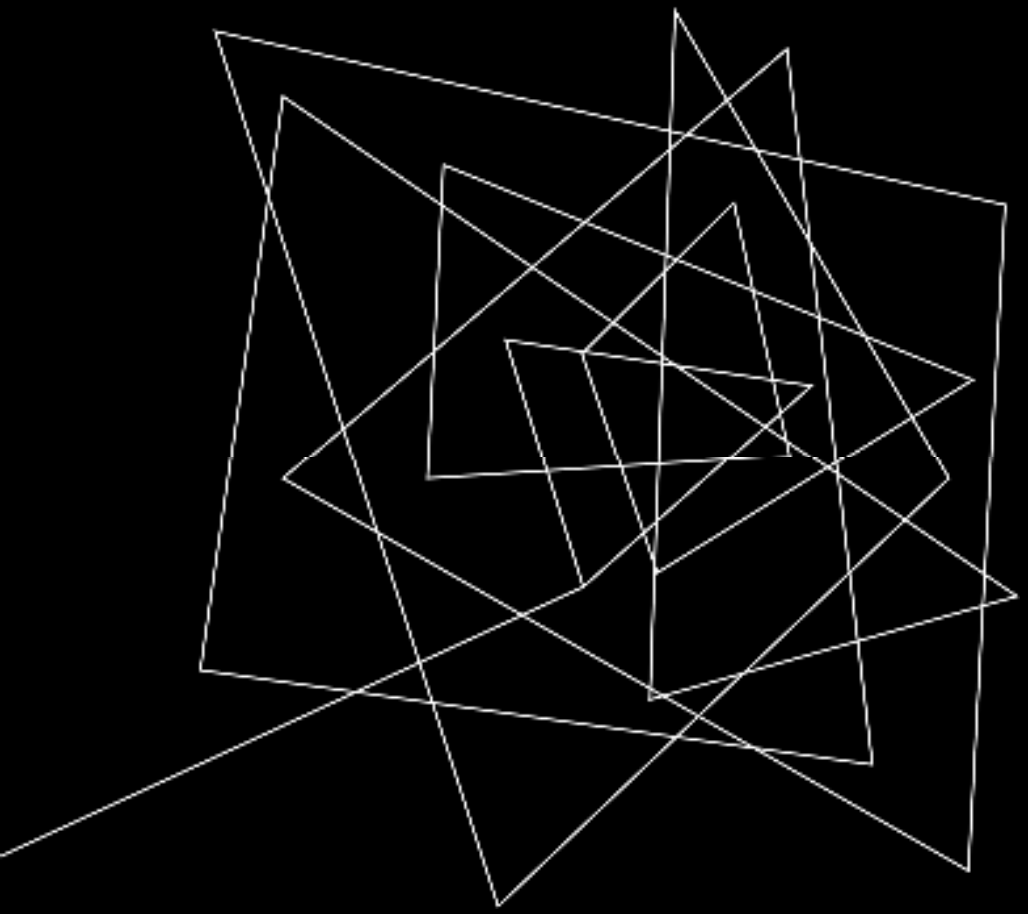
- Practice change
  - Use of Cystatin C

- Training
  - How to interpret eGFR values over time

Delgado et al. Am J Kidney Dis 2022;79:268-88.



https://optn.transplant.hrsa.gov/patients/by-organ/kidney/understanding-the-proposal-to-require-race-neutral-egfr-calculations/ Accessed 3/13/2023.



ADDRESSING THE PHARMACIST'S ROLE

Perspective

Kidney Medicine

Pharmacy Practice Standards for Outpatient Nephrology Settings

Katie E. Cardone, Rebecca Maxson, Katherine H. Cho, Joseph M. Davis, Wasim S. El Nekidy, Sandra L. Kane-Gill, Anusha McNamara, Lori Wazny, Lana Wong, and Marisa Battistella

Patients with kidney disease represent a medically complex group of patients with high medication burdens that could benefit from clinical pharmacy services as part of the interdisciplinary care team to optimize medication use. The "Advancing American Kidney Health" executive order includes new value-based reimbursement models to be tested by the Center for Medicare and Medicaid Innovation beginning January 2021 and January 2022. Advancing American Kidney Health executive order poses opportunities for the inclusion of comprehensive medication management. Following an iterative process integrating input from a diverse expert panel, published standards, clinical practice guidelines, peer review, and stakeholder feedback, our group developed practice standards for pharmacists caring for patients with kidney disease in health care settings. The standards focus on activities that are part of direct patient care and also include activities related to public health and advocacy, population health, leadership and management, and teaching, education and dissemination of knowledge. These standards are intended to be used by a variety of professionals, from pharmacists starting new practices to practice managers looking to add a pharmacist to the clinical team, to create standardization in services provided.

Complete author and article information provided before references.

Kidney Med. 4(8):100509. Published online June 26, 2022.

doi: 10.1016/j.xkme.2022.100509

DIRECT PATIENT CARE

Pharmacists should regularly participate in direct patient care activities including comprehensive medication management.

Cardone et al. Kidney Medicine 2022;4(8).

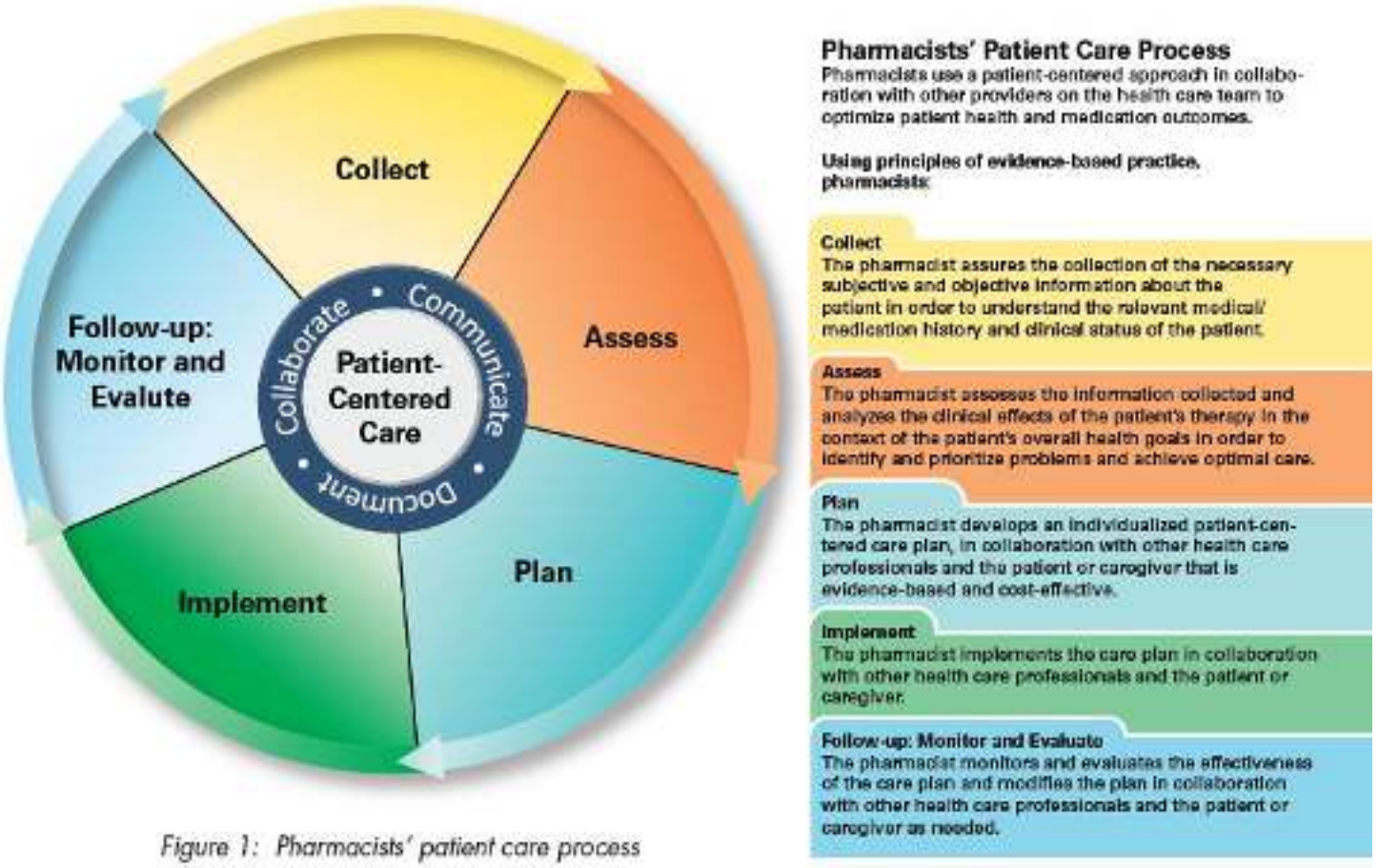


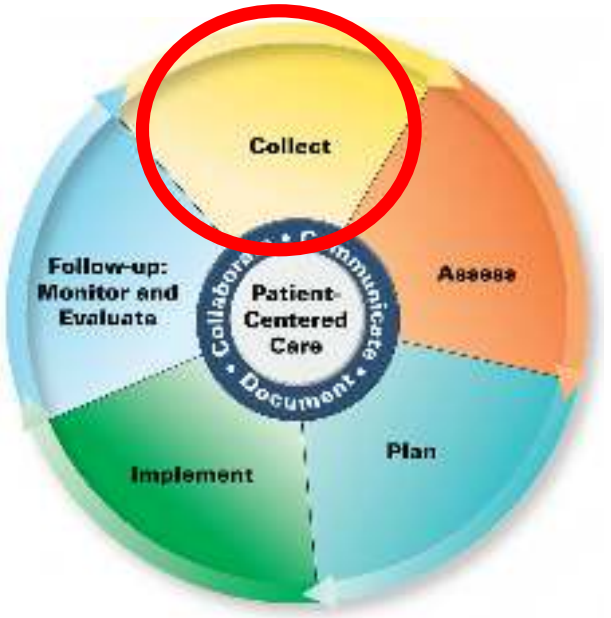
Figure 1: Pharmacists' patient care process

Joint Commission of Pharmacy Practitioners. Pharmacists' Patient Care Process. May 29, 2014. Available at: https://jcpp.net/wp-content/uploads/2016/03/PatientCareProcess-with-supporting-organizations.pdf.

COLLECT

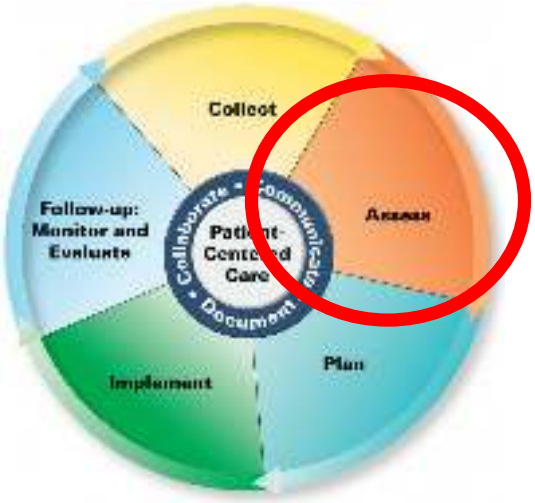
Collect and Analyze Information

- Medication history including prescription, nonprescription, complementary/alternative agents, social drugs, and adherence
- Immunization status
- Kidney function evaluation
- Screen for social determinants of health
- Subjective and objective data regarding
  - Hypertension
  - Diabetes
  - Lipid panel
  - Chronic kidney disease
  - Acute kidney injury
  - Drug-induced kidney disorders
  - Anemia
  - Electrolytes/acid base
  - CKD mineral and bone disorder
- Glomerulonephritis



Cardone et al. Kidney Medicine 2022;4(8).

ASSESS



Assess the Information and Formulate a Medication Therapy Problem List

- A comprehensive medication review should be conducted and include these considerations:
  - Suitability of medications regarding documented need, adverse effects, polypharmacy, etc.
  - Medications to slow progression of CKD in patients without kidney failure
  - Dosage adjustment based on kidney function
  - Avoidance of nephrotoxins, when possible[20]
  - Adherence barriers such as cost, access, cognitive function, and need for education
  - Pretransplant
    - Assess for drug-drug interactions with immunosuppressants
    - Identify medications that should be stopped or avoided once transplant occurs
  - Determine need for adherence aids or community resources to support adherence
- Immunizations needed, including all Advisory Committee on Immunization Practices-recommended vaccines, with special attention to hepatitis B vaccination status for patients on dialysis
- Hypertension management
- Fluid balance and need for diuretics
- Diabetes management
- Lipid panel
- Nature of kidney disease (eg, chronic kidney disease, acute kidney injury, acute kidney disease, and drug-induced kidney disorders)
- Presence and status of anemia
- Status of electrolytes and acid-base
- Development of CKD mineral and bone disorder

Cardone et al. Kidney Medicine 2022;4(8).

PLAN

Develop the Care Plan

- All components assessed (listed under Assess Information and Formulate a Medication Therapy Problem List)
- Shared decision-making with patient/care partner and consultation with interprofessional team
- Keep in mind overall goal of care: transplant vs kidney replacement therapy versus palliative care

Cardone et al. Kidney Medicine 2022;4(8).

IMPLEMENT

Implement the Care Plan

- Communicate plan and seek input from the interprofessional team, which may include nonnephrology providers
- Discuss the plan with the patient, including providing individualized education, with consideration of health literacy, regarding the medication regimen, nonpharmacologic interventions, and resources to help overcome barriers to care
- Provide a patient-friendly copy of the updated medication list to the patient/caregiver
- Ensure patient has adequate prescriptions and refills and has timely access to their medications
- Document the encounter in the medical record

Cardone et al. Kidney Medicine 2022;4(8).

FOLLOW-UP

Follow-up and Monitor

- On a routine basis, collect follow-up information, update patient data, conduct assessments, and revise the care plan

Cardone et al. Kidney Medicine 2022;4(8).

POPULATION HEALTH

- Pharmacists caring for patients with kidney disease should **participate in the development, revision, and implementation of protocols** related to the care of patients with or at risk for kidney disease or associated complications.
- Pharmacists should conduct **medication use evaluations to ensure clinical and quality population metrics are met.**
- Within the practice, pharmacists and the interprofessional team should **promote equity to ensure all patients receive access to CMM without regard to socioeconomic status, race, gender, sex, religious beliefs/ practices, sexual preferences, or health literacy.**

Cardone et al. Kidney Medicine 2022;4(8).

PUBLIC HEALTH AND ADVOCACY

Pharmacists working with patients with kidney disease should be prepared to **lead or participate in kidney educational initiatives,** immunization campaigns, **health screenings, and advocacy efforts.**

TEACHING, EDUCATION, AND DISSEMINATION OF KNOWLEDGE

As part of the interdisciplinary team, pharmacists should play a key role in **providing education on kidney disease and medication management** to a variety of stakeholders, including administrators, payors, nephrologists, advanced practitioners, other pharmacists, nurses, dietitians, social workers, other health care providers, and patients.

LEADERSHIP AND MANAGEMENT

- The pharmacist should ensure proper supervision and professional development of pharmacy team members.
- Pharmacists should ensure that services are efficient, effective, and well integrated into the interprofessional health care team.

Cardone et al. Kidney Medicine 2022;4(8).

FOR MORE INFORMATION

Interim Report of NKF-ASN Task Force

Delgado et al. JASN 32(6):p 1305-1317, June 2021.

DOI: 10.1681/ASN.2021010039

Final Report of Task Force

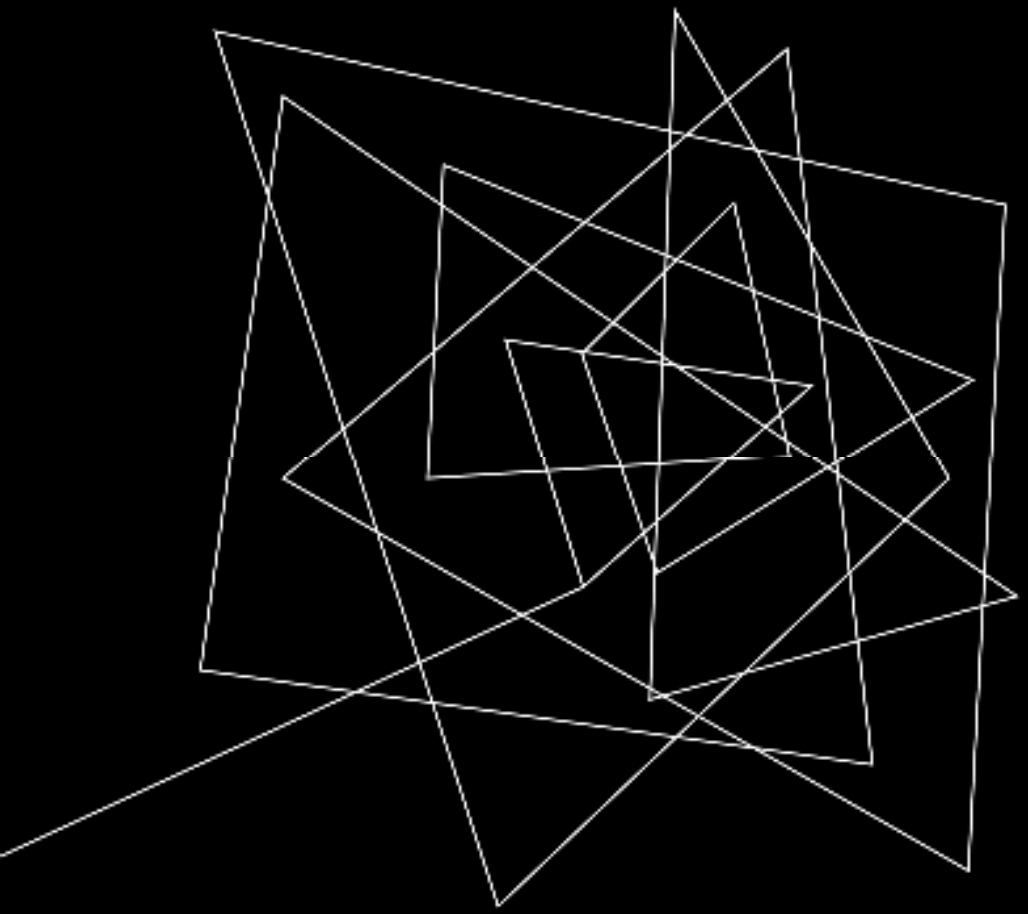
Delgado et al. Am J Kidney Dis 2022;79:268-88.

https://doi.org/10.1053/j.ajkd.2021.08.003

Refit CKD-EPI Equation

Inker et al. N Engl J Med 2021; 385:1737-1749
DOI: 10.1056/NEJMoa2102953

https://www.kidney.org/professionals/kdoqi/gfr_calculator



QUESTIONS?