CKD Update

NDAFP Big Sky Meeting 2024
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Main Street Rural Health

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Objectives

1. Identify and stratify patients using GFR and proteinuria to tailor interventions and prevent progression.
2. Itemize interventions to prevent disease progression.
3. Help patients make informed consent and prepare for renal replacement therapy

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1 Identify and Stratify Patients

- No recommendation for primary prevention/ screening USPSTF (2012) Update in progress
- No value for routine urinalysis
- CMP: measurement of Creatinine and other parameters estimates GFR
- For secondary Screening, (CKD, DMII), regular monitoring of Cr. Urine albumin/creatine ratio is important

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CKD Definition:

- Persistently elevated urine albumin excretion (30 mg/g, 3 mg/mmol])
  - OR
- Persistently reduced eGFR (<60 ml/min per 1.73 m2)
- Or both, for greater than 3 months

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Stage	Description	Est GFR	Action Plan
1	Kidney damage with normal or increased GFR	>90	Diagnose and treat chronic kidney disease and comorbid conditions, slow progression, reduced CVS risk
2	Kidney damage with mildly decreased GFR		
3a	Mild to mod decreased GFR	45-59	Evaluate & treat complications
3b	Moderately to severe dec GFR	30-44	Evaluate & treat complications
4	Severely decreased GFR	15-29	Evaluate & treat complications
5	Kidney failure	< 15 or on dialysis	Renal replacement therapy if uremia present

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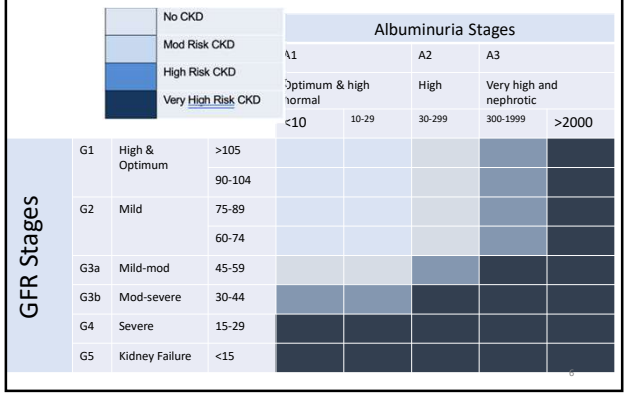
CKD Risk in Diabetes



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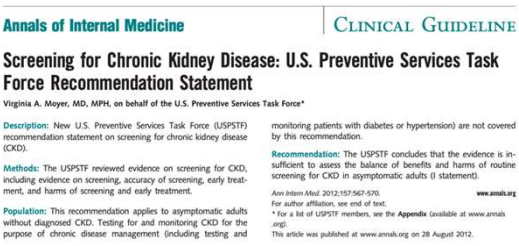
CKD screening USPSTF (I)



Annals of Internal Medicine | CLINICAL GUIDELINE

Screening for Chronic Kidney Disease: U.S. Preventive Services Task Force Recommendation Statement

Virginia A. Moyer, MD, MPH, on behalf of the U.S. Preventive Services Task Force*

Description: New U.S. Preventive Services Task Force (USPSTF) recommendation statement on screening for chronic kidney disease (CKD).

Methods: The USPSTF reviewed evidence on screening for CKD, including evidence on screening, accuracy of screening, early treatment, and harms of screening and early treatment.

Population: This recommendation applies to asymptomatic adults without diagnosed CKD. Testing for and monitoring CKD for the purpose of chronic disease management (including testing and monitoring patients with diabetes or hypertension) are not covered by this recommendation.

Recommendation: The USPSTF concludes that the evidence is insufficient to assess the balance of benefits and harms of routine screening for CKD in asymptomatic adults (I statement).

Ann Intern Med. 2012;157:567-570. www.annals.org

For author affiliation, see end of text.

* For a list of USPSTF members, see the **Appendix** (available at www.annals.org).

This article was published at www.annals.org on 28 August 2012.

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CKD Screening for people with Diabetes: ADA

- At least **annual urinary albumin**
  - (spot urinary **albumin-to-creatinine ratio**) and **EGFR**
- If DM and urinary albumin > 300 or EGFR 30-60 monitor microalbumin twice annually
- Optimize glucose control to prevent or slow CKD progression
- For DMII with CKD consider SGLT-2 if GFR >20 and urinary albumin >300
- For DMII with CKD consider SGLT-2 additionally for cardiovascular risk reduction

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AKI definition (2012 KDIGO)

- AKI is defined as any of the following:
- K Increase in SCr by X 0.3 mg/dl (X26.5 lmol/l) within 48 hours
- K Increase in SCr to X 1.5 times baseline, which is known or presumed to have occurred within the prior 7 days
- K Urine volume 0.5 ml/kg/h for 6 hours.

- STAGE 1 = 1.5–1.9 times baseline OR X 0.3 mg/dl
- STAGE 2 =. 2.0–2.9 times baseline
- STAGE 3 = 3.0 times baseline n or Cr > 4

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AKI Recommendations

- Cause should be determined
- d/c nephrotoxic agents
- Evaluate and address volume status
- Consider hemodynamic monitoring
- Crystalloid and pressors to support BP
- Avoid Hyperglycemia
- Avoid contrast materials
- Re-evaluate drug doses
- Consider ICU and or renal replacement therapy

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AKI Recommendations cont'd

- Avoid protein restriction
- Avoid Diuretics
- Enteral Nutrition
- Insulin for hyperglycemia
- Avoid Aminoglycosides
- Azole versus Amphotericin
- N Acetyl Cysteine (NAC) no longer recommended

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Contrast Media

- MRI: Newer generation Gadolinium poses minimal risk for nephrogenic systemic fibrosis. In MRI studies needing contrast
- CT/ Xray: Iso-osmolar or low-osmolar iodinated contrast media at lowest possible dose
- IV hydration
- GFR > 45 low risk
- GFR > 30 slight risk
- GFR < 30 higher risk / should weigh risk benefit

Hinson J. Recommend Performing Contrast-Enhanced CT. n engl j med 387;19. Nov 10, 2022

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DMII: Telling the Patient's Story in ICD-10

ICD-10	Complication
E11.1	Ketoacidosis
E11.2	**Diabetic Kidney Disease**
E11.3	Retinopathy
E11.4	Neuropathy
E11.5	Circulatory complications
E11.6	Arthropathy, Skin, Foot Ulcer, Hyperglycemia, Hypoglycemia
E11.69	Other specified complications ie. ED

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Hypertension & CKD in ICD-10 language

ICD10	Description
I10	Hypertension Uncomplicated
I11	Hypertensive Heart Disease
I12	Hypertensive Chronic Kidney Disease
I13	Hypertensive Heart & Renal
I13.0	Hypertensive Heart & Renal Disease with HF
N18.31	**GFR 45-60**
N18.32	GFR 30-45
N18.4	GFR 15-30
N18.5	GFR <15
N18.6	End Stage Renal Disease Dialysis, Transplant, Frailty Exclusion

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2 Itemize Interventions to Prevent Disease Progression

- Renal Protection
  - Avoid chronic NSAID
  - ACE or ARB for HTN or proteinuria
  - SGLT-2 if GFR > 15-20 even if no Diabetes
- CKD IV: (GFR < 30) Avoid Thiazides or Metformin or Glitazones
- Renal Consult for GFR < 30 to address Hyperparathyroid & Anemia of CKD
- Sodium Restriction, Bicarbonate, Phosphate Binders
- No longer recommend protein restriction
- Non-Steroidal MRA (Mineralocorticoid Receptor Antagonist) even if no HF if GFR > 20%

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Special Situation for Patients with Type II Diabetes

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Rationale for Aggressive Diabetes Treatment

- Quality Diabetes Care prevents adverse long-term outcomes by limiting **end-organ damage**
- Expensive and disfiguring for patients with **vascular Disease**
- 30% worldwide and up to **44% US patients have DM as cause of ESRD**

Worldwide Epidemiology of Diabetes-Related End-Stage Renal Disease, 2000–2015
Hui-Tang Cheng, Xiaoqi Xu, Park Seong Lim, Kuan-Yu Hung Diabetes Care Nov 2020, dc201913; **DOI**: 10.2337/dc20-1913
World Kidney Day: Chronic Kidney Disease. 2015; http://www.worldkidneyday.org/faqs/chronic-kidney-disease/ accessed 8_9_2021

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CKD and CKD with DM guidelines

- Evidence Based Guidelines
  - **KDIGO**: Kidney Disease Improving Global Outcomes: 2022
  - **AHA**: American Heart Association 2022
  - **ADA**: American Diabetes Association 2023
  - **AACE**: American Association of Clinical Endocrinology 2020 update 2022

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Kidney Disease Improving Global Outcomes KDIGO 2023

Guidelines

https://kdigo.org/guidelines/ accessed 11/19/2023

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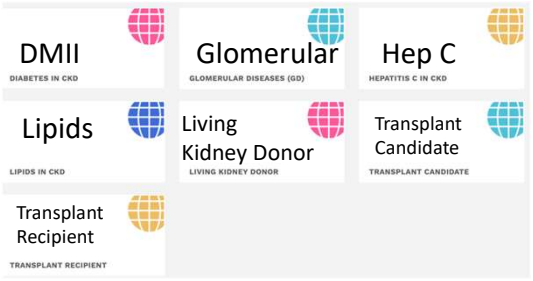
Additional Guidelines



https://kdigo.org/guidelines/ accessed 11/19/2023

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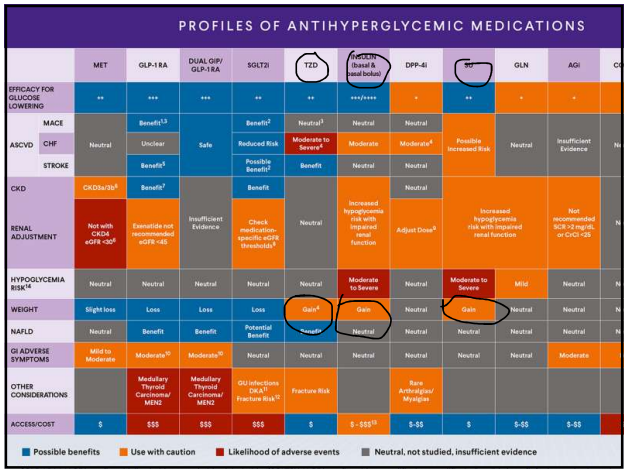

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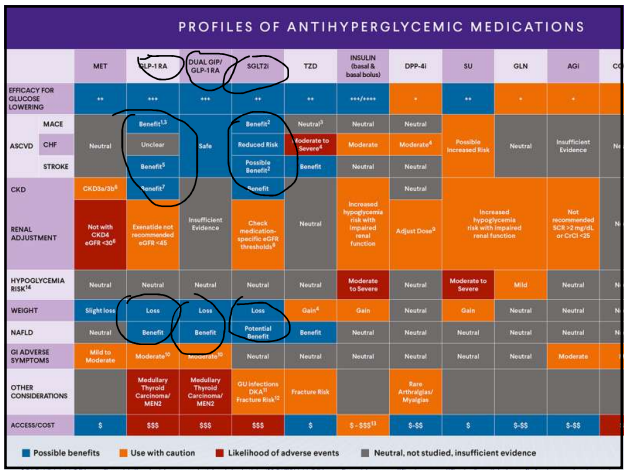

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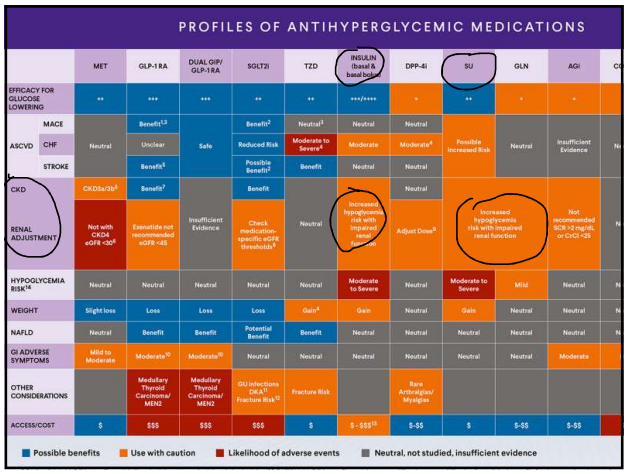

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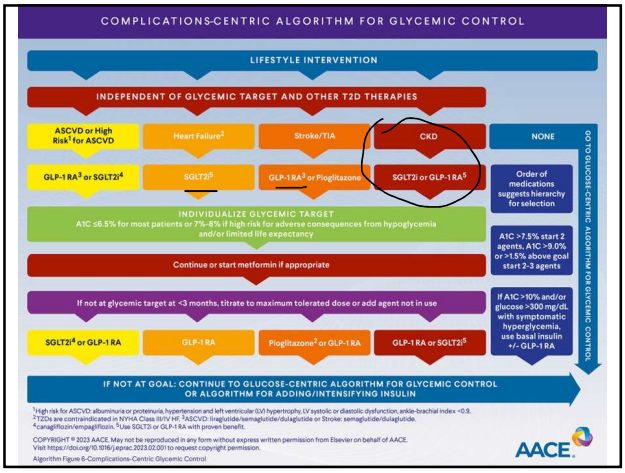

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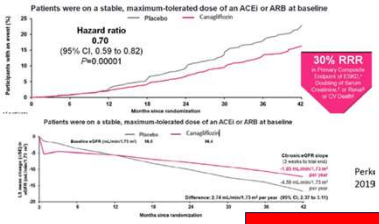
Credence Study Outcomes, ESRD, CV or Renal Death

- CREDENCE is the only completed, dedicated SGLT2 inhibitor trial studying renal outcomes as the primary endpoint in patients with DKD and T2D[1,2]
  - included patients with eGFR 30 to 90 mL/min/1.73 m² and albuminuria >300 mg/g



Perkovic. N Engl J Med 2019; 380:2295-2306

Update from 2019

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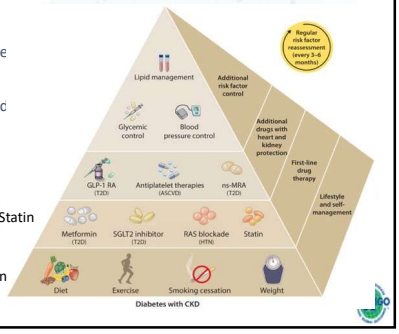
KDIGO 2023

Comprehensive Care in Patients with Diabetes and CKD

Practice Point 1.1.1: Patients with diabetes and chronic kidney disease (CKD) should be treated with a comprehensive strategy to reduce risks of kidney disease progression and cardiovascular disease (Figure 1 and 2).

Metformin, SGLT2i, RAS blockade, Statin

Diet, Exercise, Smoking Cessation
Weight Management



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SGLT2i if CKD, GFR >20, & DMII

1. Even if on other glucose-lowering agents, add SGLT2i for CVS protection
2. Choose SGLT2i with proven CVS benefits and monitor GFR
3. Withhold SGLT2i during fasting, surgery or critical illness to reduce ketosis risk
4. If risk for hypovolemia, decrease diuretic and worn patients about dehydration and hypotension
5. A small reversible GFR drop is expected when starting SGLT2i
6. **Tolerate up to a 20 ml/min GFR drop**
7. Insufficient evidence for SGLT2i in transplant recipients

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Sick Day Protocol

For illness or excessive exercise or alcohol intake

1. Temporarily withhold SGLT2i,
2. Keep drinking and eating (if possible)
3. Check blood glucose and blood ketone levels more often
4. Seek medical help early

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Periprocedural / Perioperative SGLT2i

1. Inform patients about risk of diabetic ketoacidosis
2. Withhold SGLT2i the day of day-stay procedures
3. Limit fasting to minimum required
4. Withhold SGLT2i at least 2 days in advance and the day of procedures/surgery requiring 1 or more days in hospital and/or bowel preparation
5. Measure both blood glucose and blood ketone levels on hospital admission (proceed with procedure/surgery if the patient is clinically well and ketones are <1.0 mmol/l)
6. Restart SGLT2i after procedure/surgery only when eating and drinking normally

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KDIGO ACE ARB

- Diabetes, albuminuria, and normal blood pressure, treatment with an **ACEi or ARB** may be considered
- Monitor for changes in blood pressure, serum creatinine, and serum potassium within 2-4 weeks of initiation or increase in the dose of an ACEi or ARB
- Continue ACEi or ARB therapy unless serum creatinine rises by more than 30% within 4 weeks following initiation of treatment or an increase in dose
- Advise contraception in women who are receiving ACEi or ARB therapy and discontinue these agents in women who are considering pregnancy or who become pregnant.

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MRA Mineralocorticoid Receptor Antagonist

Comprehensive Care in Patients with Diabetes and CKD

Recommendation 1.4.1: We suggest a nonsteroidal mineralocorticoid receptor antagonist with proven kidney or cardiovascular benefit for patients with T2D, an eGFR ≥25 ml/min per 1.73 m², normal serum potassium concentration, and albuminuria (≥30 mg/g [≥ 3mg/mmol]) despite maximum tolerated dose of RAS inhibitor (RASi) *(2A)*.

K^+ ≤4.8 mmol/l	K^+ 4.9–5.5 mmol/l	K^+ >5.5 mmol/l
• Initiate finerenone - 10 mg daily if eGFR 25–59 ml/min per 1.73 m² - 20 mg daily if eGFR ≥60 ml/min per 1.73 m² • Monitor K^+ at 1 month after initiation and then every 4 months • Increase dose to 20 mg daily, if on 10 mg daily • Restart 10 mg daily if previously held for hyperkalemia and K^+ now ≤5.0 mmol/l	• Continue finerenone 10 mg or 20 mg • Monitor K^+ every 4 months	• Hold finerenone • Consider adjustments to diet or concomitant medications to mitigate hyperkalemia • Recheck K^+ • Consider reinitiation if/when K^+ ≤5.0 mmol/l

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Comprehensive Care in Patients with Diabetes and CKD

Practice Point 1.4.1: Nonsteroidal MRA are most appropriate for patients with T2D who are at high risk of CKD progression and cardiovascular events, as demonstrated by persistent albuminuria despite other standard-of-care therapies.

Practice Point 1.4.2: A nonsteroidal MRA can be added to a RASi and an SGLT2i for treatment of T2D and CKD.

Practice Point 1.4.3: To mitigate risk of hyperkalemia, select patients with consistently normal serum potassium concentration and monitor serum potassium regularly after initiation of a nonsteroidal MRA.

Practice Point 1.4.4: The choice of a nonsteroidal MRA should prioritize agents with documented kidney or cardiovascular benefits.

Practice Point 1.4.5: A steroidal MRA should be used for treatment of heart failure, hyperaldosteronism, or refractory hypertension, but may cause hyperkalemia or a reversible decline in glomerular filtration, particularly among patients with a low GFR.

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Frequency of HbA1c measurement and use of Glucose management indicator GMI in CKD

Population	HbA1c			GMI
	Measure	Frequency	Reliability	
CKD G1–G3b	Yes	• Twice per year • Up to 4 times per year if not achieving target or change in therapy	High	Occasionally useful
CKD G4–G5 including treatment by dialysis or kidney transplant	Yes	• Twice per year • Up to 4 times per year if not achieving target or change in therapy	Low	Likely useful

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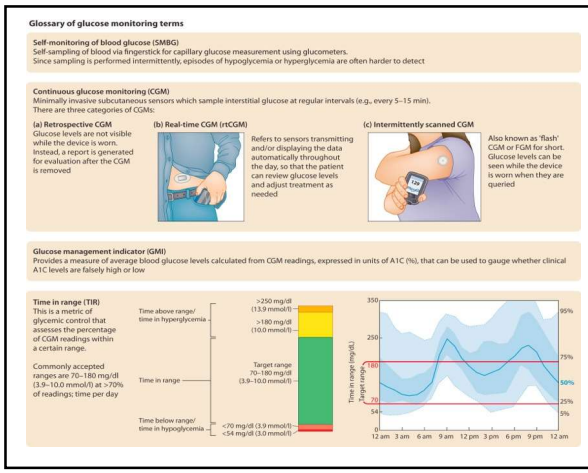

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GLP-1
American Diabetes Association ADA

- In patients with chronic kidney disease **who are at increased risk for cardiovascular events, use of a glucagon-like peptide 1** receptor agonist **reduces renal end point, primarily albuminuria, progression of albuminuria, and cardiovascular events**
- Optimize blood pressure control to reduce the risk or slow the progression of chronic kidney disease.
- Do not discontinue renin-angiotensin system blockade for minor increases in serum creatinine (<30%) in the absence of volume depletion.

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Hyperlipidemia: ADA

- **High-intensity statin therapy** in individuals with diabetes aged 40–75 years at higher risk, including those with one or more atherosclerotic cardiovascular disease risk factors, to **reduce the LDL cholesterol by ≥50%** of baseline and to target an **LDL cholesterol goal of <70 mg/dL.**
- Consider adding treatment with ezetimibe or a PCSK9 inhibitor to maximum tolerated statin therapy in these individuals.

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High Intensity Statin Therapy

High	Moderate	Low
Atorvastatin 40-80	Atorvastatin 10-20	Simvastatin 10
Rosuvastatin 20-40	Rosuvastatin 5-10	Pravastatin 10-20
	Simvastatin 20-40	Lovastatin 20
	Pravastatin 40-80	Fluvastatin 20-40
	Lovastatin 40	
	Fluvastatin XL 80	
	Fluvastatin 40 bid	
	Pitavastatin 2-4	

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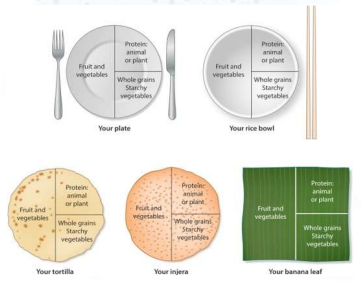
Lifestyle Interventions in Patients with Diabetes and CKD

Practice Point 3.1.1: Patients with diabetes and CKD should consume an individualized diet high in vegetables, fruits, whole grains, fiber, legumes, plant-based proteins, unsaturated fats, and nuts; and lower in processed meats, refined carbohydrates, and sweetened beverages.



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Lifestyle Interventions in Patients with Diabetes and CKD

Recommendation 3.1.2: We suggest that sodium intake be <2 g of sodium per day (or <90 mmol of sodium per day, or <5 g of sodium chloride per day) in patients with diabetes and CKD *(2C)*.

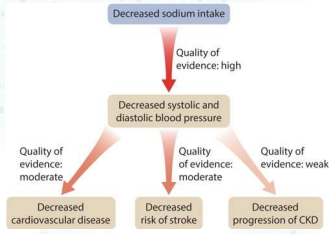

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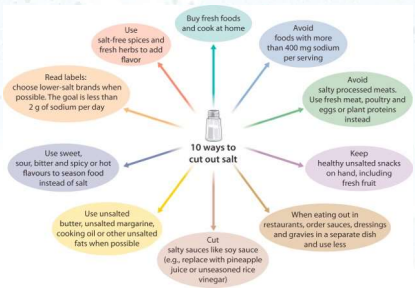
Figure 19. Ten ways to cut out salt



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3. ESRD: Dialysis or Transplant

- Help patients make informed consent and prepare for renal replacement therapy
- GFR < 15 in elderly may have an extended time without dialysis, depends on etiology and rate of decline
- Preserve central veins (no PIC lines)
- Treat depression, volume imbalance, sleep disorders, poor nutrition, and anemia
  - Blood Transfusion, erythropoietin stimulation (EPO)

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Consent for Kidney Donation

- Benefits:
  - Helping the recipient to prevent or discontinue dialysis
  - Diminished caregiving burden
  - Improved household dynamics
- Risks of Procedure: bleeding, infection, anesthetic complications
- Long term risks to donor
  - long-term risk for hypertension
  - Preeclampsia
  - end-stage renal disease
  - cardiovascular diseases
  - psychiatric problems

Informed consent for living kidney donation. Nephrology Dialysis Transplantation 38(7) July 2023

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Benefit / Risk for Recipients

- For those with significant life expectancy (5 years)
- Caregivers able to help care for patient
- Adequate Nutritional Status
- Adequate Physical Conditioning
- Able to tolerate prolonged immune supression

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ESRD GFR < 15

- Conservative Management prognosis 6-24 m
  - (stopping dialysis life expectancy 7 d)
- **Early referral to hospice** has the potential to reduce healthcare dollar spending and to improve quality of life while
- Effectively managing symptoms as patients approach their end of life
  - Itchiness
  - Dizziness
  - Pain: NSAID, fentanyl, methadone, and buprenorphine.
- Volume Overload: aggressive diuresis and sequential nephron blockade / Thiazide (Metolazone) and Loop
- Nausea: Ondansetron, Haldol, Metoclopramide

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Prognosis for Patients Receiving Dialysis

- 1 year mortality 20%
- Annual death rate 25%
- 5 year mortality 60%
- Anuric patients, who elect to not initiate or discontinue dialysis, typically survive for 7-14 days
- 20% die after a decision to stop dialysis
- Adverse prognosis
  - Age
  - Low Albumin
  - Co Morbidities such as CHF COPD
  - Functional Status (Karnofsky Score)

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CKD Palliative

- CKD patients may falsely assume they can be kept alive indefinitely on dialysis; end-of-life issues are commonly avoided until late in the illness.
- Cognitive dysfunction associated with advanced CKD may prevent the ability for meaningful participation in ACP
- Only ~ 60% of nephrologists would consider stopping dialysis for a non-decisional patient with unclear prior wishes

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Advance Care Planning & Informed Consent & Shared Decision Making

- Available dialysis modalities
- Not starting dialysis and continuing conservative management
- A time-limited trial of dialysis
- Emphasize how you expect their illness and proposed treatments will impact their daily function
- Stopping dialysis with expectation of death

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Consent for Hemodialysis

- Bacterial and/or viral (e.g., Hepatitis B or C) contamination of my blood \
- Bleeding due to blood clotting problems or disconnection of blood tubing
- "Destruction" or the breakdown of red blood cells, known as hemolysis
- Internal bleeding or bleeding from the access site; Infections of my access site (catheter or fistula infections)
- Introduction of air into my bloodstream
- Shock or cardiac arrest
- Allergic and toxic reactions to drugs, solutions, artificial kidneys or other equipment used during the hemodialysis treatment
- Clotting of my access or infiltration of my access

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Patient Selection for Considering Withholding or Withdrawing Dialysis

1. Patients who, being fully informed and making voluntary choices, decline to begin or request dialysis be stopped.
2. Patients who no longer posses decision-making capacity, who have previously indicated refusal of dialysis.
3. Patients who do not possess decision-making capacity and whose surrogate declines dialysis or determines it should be discontinued.
4. Patients with irreversible, profound neurological impairment such that they lack signs of thought, sensation, purposeful behavior, and awareness of self and environment.
5. Patients whose medical conditions precludes the technical process of dialysis.

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Dialysis Choice

- **Hemodialysis**
  - 3 x week x 4 hours HD
  - Patient passive
  - BP shifts, dizziness, Nausea
  - Sodium Restriction
  - Fistula or Graft
- **Peritoneal**: Continuous Ambulatory or Automated Peritoneal Dialysis: CAPD and APD
  - Multiple exchanges daily or only during sleep
  - Peritoneal dialysis is not a good option for obese patients or people who have abdominal scarring.
  - Patient training and commitment required
  - Clean environment

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Withholding or Withdrawing Dialysis

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Summary

- Prevent Renal Injury (DMII, HTN, other)
- Prevent CKD progression by documenting in problem list and adjusting therapy
- Nutritional and Exercise Interventions
- SGLT-2i, GLP1, non-steroidal MRA
- Titrate or resume ACE ARB as appropriate
- Shared Decision Making for Renal Transplant or Dialysis
- End of Life Care and Symptom Management

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