Dialysis Nutrition Guidelines

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Disclosures

- Nothing to disclose

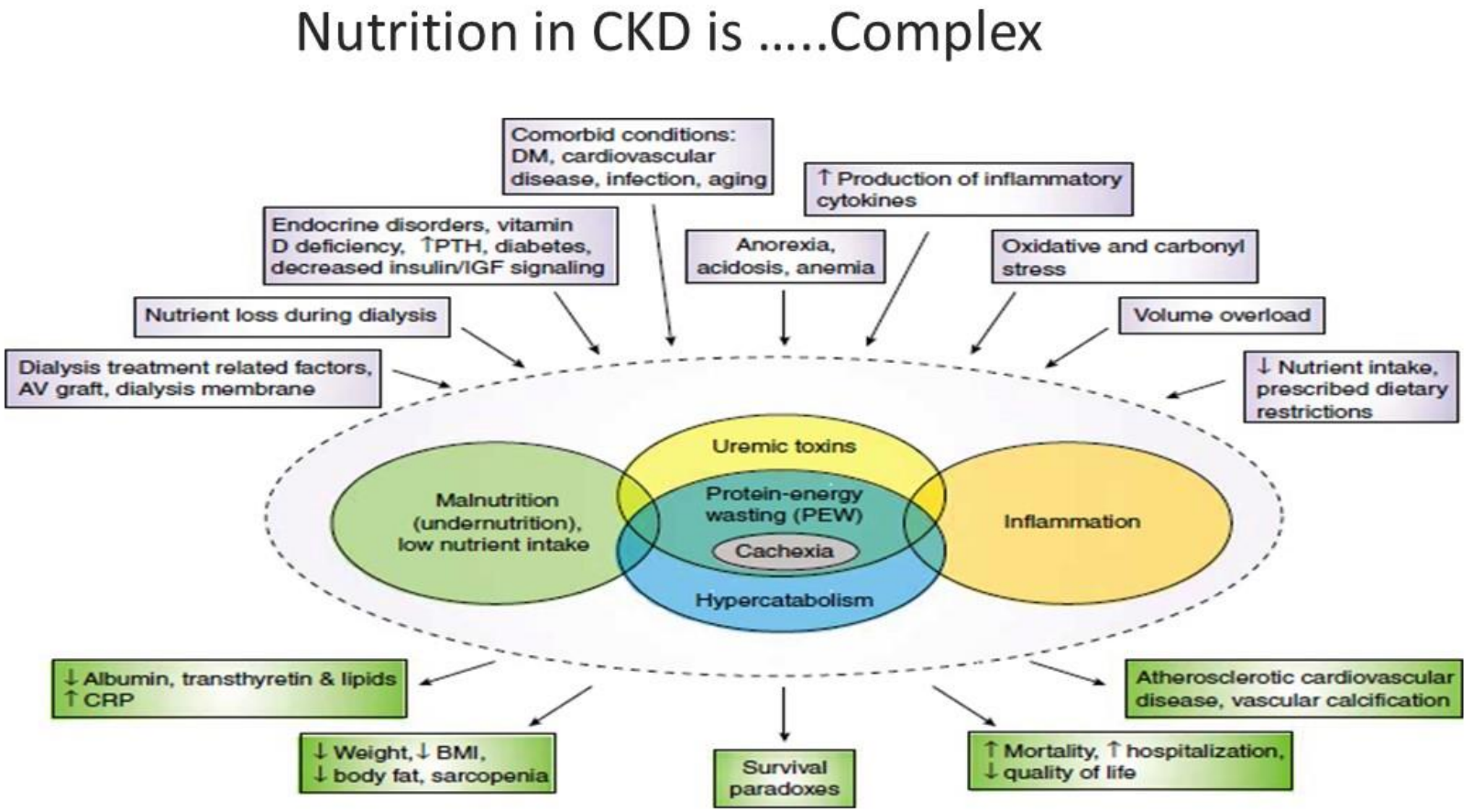
Objectives

- Review the prevalence of CKD and people on dialysis in the United States.
- Identify and interpret factors that contribute to protein-energy wasting in dialysis.
- Summarize current renal nutrition guidelines for providing MNT for people on dialysis.

Background

Guideline History and Development

Schematic diagram of causes and symptoms of protein-energy wasting in kidney disease. (from Fouque, et al, Kidney Int, 2008).



Evolution of US Based Nutrition Guidelines



KDOQI - Kidney Disease Outcomes Quality Initiative, EAL® - Evidence Analysis Library®

International representation of Work Group Members



NKF-KDOQI and Academy-EAL collaboration on CKD Guideline Work Group Members

Co-Chairs: T. Alp Ikizler, MD & Lillian Cuppari, PhD

Macronutrients

Laura Byham-Gray, PhD, RDN, FNKF (Chair)
Denis Fouque, MD, PhD
Winnie Chan, PhD, RD
Jerrilynn Burrowes, PhD, RD, CDN
Daniel Teta, MD, PhD

Micronutrients

Angela Wang, MD, PhD (Chair)
Jordi Fuchs, DSc, APN,NP-C,RD
Joel Kopple, MD
Sana Ghaddar, PhD, RDN
Alp Ikizler, MD

Electrolytes & other nutrients

Juan Jesus Carrero, PhD Pharm, PhD Med, MBA (Chair)
Katrina Campbell, PhD, RD
George Kaysen, MD, PhD
Allon Friedman, MD, FASN
Lilian Cuppari, PhD

Objective of Updated 2020 Guidelines

- "The overall objective of the 2020 CKD Guideline is to provide medical nutrition therapy (MNT) guidelines for patients with kidney disease to assess, prevent and treat protein-energy wasting, mineral and electrolyte disorders, and other metabolic disorders that are associated with kidney disease."

Evidence Analysis Library - https://www.andeal.org/topic.cfm?menu=5303

Limitations and issues

Literature search was intended to be comprehensive, however, they were not exhaustive.

Were not able to contact authors for incomplete data. Data presented in published original research was used in data analysis.

Eligible studies published after search dates or in congress proceedings have not been included.

Inconsistent reporting of clinical outcomes of interest resulted in evidence synthesis difficulty. (standardization of outcomes is needed in this field)

Low quality evidence in certain areas required substantial use of WG expertise to draft a recommendation

Issues with nutrition studies: baseline exposure, nutrient status, confounding variables…

GRADE Methodology

Assigns separate grades for:

1) ***Evidence Quality***
2) ***Strength of Recommendation***

Quality of evidence	High	A		**Strength of recom-mendation**	Level 1
	Moderate	B			
	Low	C			Level 2
	Very low	D			

Guideline work group decision

Assigning Quality of Evidence GRADE

	Quality of Evidence	Definition
A	High	Further research is very unlikely to change our confidence in the estimate of effect.
B	Moderate	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
C	Low	Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
D	Very Low	Any estimate of effect is very uncertain.

Already provided by Academy analysts for each sub topic

How Strength of Rec. Relates to Statement Wording

Level of strength	Patients	Clinicians	Policy
We recommend (Level 1)	Most patients would want recommended course of action. Only a small proportion would not.	Most patients should receive the recommended course of action	Can be evaluated for developing policy or performance measure
We suggest (Level 2)	The majority of patients would want the suggested course of action, but many would not.	Different choices will be appropriate for different patients. Each patient needs help to arrive at a decision consistent with their values and preferences	Uncertainty. There is a need for substantial debate and involvement of stakeholders

What's New and Updated?

Updates with 2020 Guidelines

What is different in the Updated Guidelines?

KDOQI 2000 guideline

- Population: Maintenance Dialysis; Adv. CRF without Dialysis
- Literature search dates: 1966 – 1997

Update KDOQI-Academy of Nutrition and Dietetics guideline

- Population: Adults with Chronic Kidney Disease: Stages 1-5, including dialysis and post-kidney transplant
- Literature search dates: 1985 - 2016

What is different in the Updated Guidelines?

- Topic covered
  - Evaluation of Protein Energy Nutritional Status
  - Management of Acid-Base Status and Protein and Energy Status
  - Nutritional Counseling and Follow-up
  - Carnitine

- Topics covered
  - More Comprehensively covered and additional "NEW" statements; more evidence-based statements
  - Carnitine- literature in this area was NOT explored in this update
  - Micronutrients- NEW
  - Electrolytes-NEW

Usual Care

- Screening
  - Biannual for Protein Energy Wasting

- Assessment
  - Within CMS guidelines, performed by RDN or International Equivalent
  - Including technical devices

Comprehensive Assessment

It is important for the RDN to conduct a comprehensive and thorough nutrition assessment

- Weight history
- Diet history - including appetite and taste changes
- Previous diet education
- Biochemical data
- Anthropometric measurements
- Nutrition focused physical findings
- Dentition
- Food security
- Physical activity
- Bonus for assessment: handgrip strength if able
- **Subjective global assessment (SGA)** is a valid and reliable tool for assessing nutritional status for patients with CKD 5D
- **The Malnutrition Inflammation Score (MIS)** is also a useful tool for individuals with CKD 5D, on MHD, or post-transplantation

Assessment Recommendations

KDOQI (2000)	KDOQI-AND (2019)	Changes
No specific screening recommendation	**Routine Nutrition Screening** ✓ In adults with **CKD 3-5D and post-transplant**, it is reasonable to consider routine nutrition **screening at least biannually** with the intent of identifying those at risk of protein-energy wasting (OPINION).	New
N/A	**Nutrition Screening Tools** ✓ In adults with **CKD 3-5D and post-transplant**, there is limited evidence to suggest the use of one tool over others for identifying those at risk of protein-energy wasting (2D).	New

Protein Energy Wasting

- Explains the complex relationship between inflammation, uremia and nutritional status.

- Decreased body stores of protein and energy.

- Prevalence 50 – 75% in later stage CKD and ESKD
  - Increase morbidity/mortality
  - Decreased quality of life

Sabatino et al. Clinical Nutrition. Volume 36, Issue 3, June 2017, Pages 663-671

Supporting Evidence : Composite Nutritional Indices

Name of Tool	N Studies	Quality of Evidence
Subjective Global Assessment (SGA)- 7 point	10	II
Geriatric Nutrition Risk Index (GNRI)	3	II
Malnutrition Inflammation Score (MIS)	8	III
Mini Nutrition Assessment (MNA) and Short Form	4	III
Body adiposity index (BAI)	1	III
Composite Score of Protein Energy Nutrition Status (cPENS)	1	III
Integrative Score	1	III
International Society of Renal Nutrition and Metabolism (ISRNM)	1	III
Malnutrition Score	1	III
Malnutrition Universal Screening Tool (MUST), Malnutrition Screening Tool (MST)	2	III
Nutrition Impact Symptoms (NIS)	1	III
Nutrition screening tool (NST)	1	III
Protein Energy Wasting (PEW) score	2	III
Protein Nutrition Index (PNI)	1	III
Renal Nutrition screening tool (R-NST)	1	III
SGA- 3 point	6	III

- Most frequently examined tools: 7-point SGA, MIS, MNA, GNRI
- 7-point SGA score, GNRI and MIS are quick, easy, valid and reliable tools for practitioners to assess nutritional status in HD patients
- Evidence was limited for other CKD populations.

Subjective Global Assessment



SGA								
6-7	NR	1153	928	676	492	314	174	95	70
	ND	89	106	72	55	49	25	8	
4-5	NR	367	253	185	126	79	48	23	19
	ND	72	43	34	24	13	15	2	
1-3	NR	81	54	32	21	12	9	4	-
	ND	22	11	9	6	2	2	1	

Kaplan-Meier cumulative survival during 7 y of follow-up of 1601 chronic dialysis patients per SGA category at baseline

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de Mutsert, R. et al. Am J Clin Nutr 2009

Malnutrition Inflammation Score

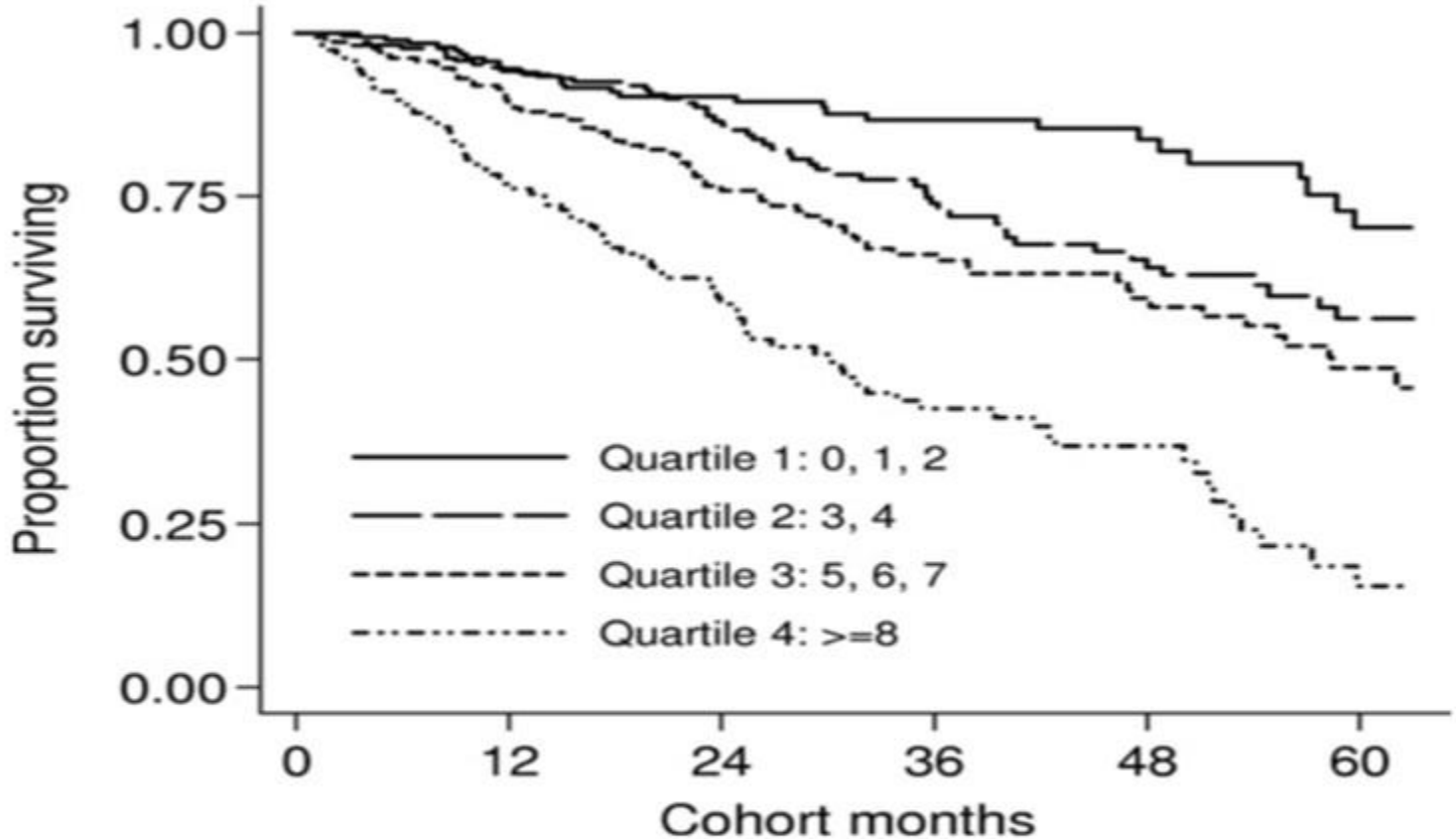


Figure 5. Kaplan-Meier proportion surviving after 5 years of observation according to quartiles of baseline Malnutrition-Inflammation Score in 809 hemodialysis patients (October 2001 to January 2007).

Rambod. *AJKD* 2009

Assessment Recommendations - SGA/MIS

KDOQI (2000)	KDOQI-AND (2019)	Changes
Subjective Global Nutritional Assessment (SGA) • SGA is a valid and clinically useful measure of protein-energy nutritional status in maintenance dialysis patients. *(Evidence)*	**7-point Subjective Global Assessment (SGA)** • In adults with **CKD 5D**, we recommend the use of the 7-point Subjective Global Assessment as **a valid and reliable tool** for assessing nutritional status (1B).	Updated
N/A	**Malnutrition Inflammation Score (MIS)** • In adults with **CKD on MHD and post-transplant**, Malnutrition Inflammation Score may be used to assess nutritional status (2C).	New

SGA vs. MIS

SUBJECTIVE GLOBAL ASSESSMENT RATING FORM

Patient Name: **ID #:** **Date:**

HISTORY

WEIGHT/WEIGHT CHANGE: ***(Included in K/DOQI SGA)*** — Rate 1-7

1. **Baseline Wt:** _____(Dry weight from 6 months ago)
   Current Wt: _____(Dry weight today)
   Actual Wt loss/past 6 mo: _____ **% loss:**_____(actual loss from baseline or last SGA)
2. **Weight change over past two weeks:** _____No change _____Increase _____Decrease

DIETARY INTAKE No Change_____(Adequate) No Change_____(Inadequate)

1. Change: Sub optimal Intake: _____ Protein _____ Kcal _____ Duration_____
   Full Liquid: _____ Hypocaloric Liquid _____ Starvation _____

GASTROINTESTINAL SYMPTOMS ***(Included in K/DOQI SGA-anorexia or causes of anorexia)***

Symptom:	Frequency:*	Duration:+
_____ None	_____	_____
_____ Anorexia	_____	_____
_____ Nausea	_____	_____
_____ Vomiting	_____	_____
_____ Diarrhea	_____	_____

Never, daily, 2-3 times/wk, 1-2 times/wk > 2 weeks, < 2 weeks

FUNCTIONAL CAPACITY — b

Description	Duration:
_____ No Dysfunction	_____
_____ Change in function	_____
_____ Difficulty with ambulation	_____
_____ Difficulty with activity (Patient specific "normal")	_____
_____ Light activity	_____
_____ Bed/chair ridden with little or no activity	_____
_____ Improvement in function	_____

DISEASE STATE/COMORBIDITIES AS RELATED TO NUTRITIONAL NEEDS

Primary Diagnosis_____Comorbidities_____

Normal requirements ____Increased requirements____ Decreased requirements _____

Acute Metabolic Stress: _____None _____Low _____Moderate _____High

PHYSICAL EXAM

_____ Loss of subcutaneous fat (Below eye, triceps, biceps, chest) ***(Included in K/DOQI SGA)*** ____Some areas _____All areas

_____ Muscle wasting (Temple, clavicle, scapula, ribs, quadriceps, calf, knee, interosseous ***(Included in K/DOQI SGA)*** ____Some areas _____All areas

_____ Edema (Related to undernutrition/use to evaluate weight change)

OVERALL SGA RATING

Very mild risk to well-nourished=6 or 7 most categories or significant, continued improvement.

Mild-moderate = 3, 4, or 5 ratings. No clear sign of normal status or severe malnutrition.

Severely Malnourished = 1 or 2 ratings in most categories/significant physical signs of malnutrition.

Figure 3. The 7-point scale SGA form.

COMPREHENSIVE MALNUTRITION INFLAMMATION SCORE

(A) Patients' related medical history:

1- Change in end dialysis dry weight (overall change in past 3-6 months):

0	1	2	3
No decrease in dry weight or weight loss <0.5 kg	Minor weight loss (>0.5 kg but <1 kg)	Weight loss more than one kg but <5%	Weight loss >5%

2- Dietary intake:

0	1	2	3
Good appetite and no deterioration of the dietary intake pattern	Somewhat sub-optimal solid diet intake	Moderate overall decrease to full liquid diet	Hypo-caloric liquid to starvation

3- Gastrointestinal (GI) symptoms:

0	1	2	3
No symptoms with good appetite	Mild symptoms, poor appetite or nauseated occasionally	Occasional vomiting or moderate GI symptoms	Frequent diarrhea or vomiting or severe anorexia

4- Functional capacity (nutritionally related functional impairment):

0	1	2	3
Normal to improved functional capacity, feeling fine	Occasional difficulty with baseline ambulation, or feeling tired frequently	Difficulty with otherwise independent activities (e.g. going to bathroom)	Bed/chair-ridden, or little to no physical activity

5- Co-morbidity including number of years on Dialysis:

0	1	2	3
On dialysis less than one year and healthy otherwise	Dialyzed for 1-4 years, or mild co-morbidity (excluding MCC*)	Dialyzed >4 years, or moderate co-morbidity (including one MCC*)	Any severe, multiple co-morbidity (2 or more MCC*)

(B) Physical Exam (according to SGA criteria):

6- Decreased fat stores or loss of subcutaneous fat (below eyes, triceps, biceps, chest):

0	1	2	3
Normal (no change)	mild	moderate	Severe

7- Signs of muscle wasting (temple, clavicle, scapula, ribs, quadriceps, knee, interosseous):

0	1	2	3
Normal (no change)	mild	moderate	Severe

(C) Body mass index:

8- Body mass index: BMI = Wt(kg) / Ht^2(m)

0	1	2	3
BMI≥20 kg/m^2	BMI: 18-19.99 kg/m^2	BMI: 16-17.99 kg/m^2	BMI<16 kg/m^2

(D) Laboratory Parameters:

9- Serum albumin:

0	1	2	3
Albumin≥ 4.0 g/dL	Albumin: 3.5-3.9 g/dL	Albumin: 3.0-3.4 g/dL	Albumin: <3.0 g/dL

10- Serum TIBC (total Iron Binding Capacity): ♣

0	1	2	3
TIBC≥ 250 mg/dL	TIBC: 200-249 mg/dL	TIBC: 150-199 mg/dL	TIBC: <150 mg/dL

Total Score = sum of above 10 components (0-30):

*MCC (Major Comorbid Conditions) include CHF class III or IV, full blown AIDS, severe CAD, moderate to severe COPD,

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Assessment Recommendations - Nutrient Intake

KDOQI (2000)	KDOQI-AND (2019)	Changes
Dietary Interviews and Diaries • Dietary interviews and/or diaries are valid and clinically useful for measuring dietary protein and dietary energy intake in maintenance dialysis patients. *(Evidence and Opinion)*	**Considerations when Assessing Dietary Intake** • In adults with **CKD 3-5D and post-transplant**, it is reasonable to **assess factors beyond dietary intake** (e.g. medication use, knowledge, beliefs, attitudes, behavior and access to food, depression, cognitive function etc.) to effectively plan nutrition interventions. (OPINION). **3 Day Food Records to Assess Dietary Intake** • In adults with **CKD 3-5D**, we suggest the use of a **3-day food record**, conducted during both dialysis and non-dialysis treatment days (when applicable), as a preferred method to assess dietary intake (2C).	Updated; New Statements

Food Records vs 24-Hour Diet Recall

- **Food Records**
  - Self-reported
  - Record of meal and snack consumption for 3 – 7 days
  - 7-days had been the “gold-standard” before use of biomarkers
- **24-Hour Diet Recall**
  - To assess nutrient intake
  - Can be done in-person or on the telephone
  - Brief interview, 20 – 30 minutes
  - Requires a trained interviewer

Food Frequency Questionnaires

- Estimates usual dietary intake over a period-of-time (6 months – 1-year)
- Good for evaluating dietary intake in a group of people
- Typically used in large, cohort studies
- Simplified and modified FFQs designed as screening tool for study enrollment, and they can also be beneficial for patient referral to clinician for diet counseling

Validation Studies

Author(s)	Purpose	Methods	Result
El Kinany K et al 2018	Adapt and examine reproducibility and validity of FFQ in the Moroccan population.	Adapted the European Global Asthma and Allergy Network (GA^2LEN) FFQ. 105 healthy adults invited to participate in the study. Completed two FFQ 1 month apart and three 24-hour recalls.	87 adults completed the questionnaires. Energy intake was higher in the FFQs vs diet recalls. Statistical testing showed that the FFQ had good validity and was reproducible for most nutrients.
Zang et al. 2019	To evaluate the validity and reliability of the Shanghai Diet and Health Study FFQ.	Analyzed results of 3-day and 24-hour recalls from 1623 adult (>18 years old) Shanghai residents.	Validity reported between 0.33-0.77 and 0.46-0.79 for reliability (Spearman's). 80% consistency for various nutrients.
Mumu et al. 2020	To validate FFQ compared to 24-hour recall and biomarkers among rural and urban adults in Bangladesh.	Two FFQs of 166 items were administered three-months apart and three 24-hour recalls completed. Urine and blood samples were collected and compared to FFQs.	Overestimation in FFQs when compared to 24-hou recall. There was agreement between FFQ and 24-hour recall and some biomarkers.

Limitations with FFQs and Diet Recalls

Author(s)	Purpose	Intervention	Result
Briefel et al 1997	Assessed for underreporting of total energy intake to estimated basal metabolic rate by reviewing NHANES III data	Analyzed 24-hour diet recalls from 7,769 adults >20 years of age	18% of men and 28% of women underreported
Tooze et al 2004	Determine psychological and behavioral factors associated with underreporting on FFQ and 24-hour recalls	Included 223 men and 261 women aged 40 – 69 years. Used DLW to estimate energy intake and compared to FFQ and 24-hour recalls	Both men and women underreported energy intake in FFQ and 24-hour recalls
Archer et al 2018	To discuss limitations with FFQs and diet recall or memory-based dietary assessment methods	A review and opinion about the limitations of FFQ and diet recall	Argued that human memory and recall are not valid tools for scientific data collection and cannot be used to make policy. Discussed the limitation on verification of actual foods and beverages consumed.

Intervention Recommendations

- Medical Nutrition Therapy (MNT)
-Protein requirements
- Energy requirements
-Protein-Energy supplements (oral, dialysate, IDPN, enteral & parenteral)
- omega-3 supplements
-Dietary Patterns
-Micronutrients
-Electrolytes

Intervention Recommendations - MNT

KDOQI (2000)	KDOQI-AND (2019)	Changes
Intensive Nutritional Counseling With Maintenance Dialysis (MD) • Every MD patient should receive intensive nutritional counseling based on an individualized plan of care developed before or at the time of commencement of MD therapy. (Opinion). • A plan of care for nutritional management should be developed before or during the early phase of MD care and modified frequently based on the patient's medical and social conditions. • The plan of care should be updated at least every 3 to 4 months. • Nutrition counseling should be intensive initially and provided thereafter every 1 or 2 months and more frequently if inadequate nutrient intake or malnutrition is present or if adverse events or illnesses occur that may cause deterioration in nutritional status.	**Medical Nutrition Therapy** • *In adults with **CKD 1-5D**, we recommend that a registered dietitian nutritionist (RDN) or an international equivalent, in close collaboration with a physician or other provider (nurse practitioner or physician assistant), provide medical nutrition therapy (MNT).* Goals are to optimize nutritional status, and to minimize risks imposed by co-morbidities and alterations in metabolism on the progression of kidney disease (1C) and on adverse clinical outcomes (OPINION). • MNT should be tailored to the individuals' needs, nutritional status, and comorbid conditions (OPINION).	Updated

Intervention Recommendations - DPI_MHD

KDOQI (2000)	KDOQI-AND (2019)	Changes
Dietary Protein Intake (DPI) in Maintenance Hemodialysis (MHD) • The recommended DPI for clinically stable MHD patients is 1.2 g/kg body weight/d. (Evidence and Opinion) • At least 50% of the dietary protein should be of high biological value.	**Dietary Protein Intake, Maintenance Hemodialysis and Peritoneal Dialysis** • In adult with **CKD on MHD (1C) and PD (OPINION) who are metabolically stable**, we recommend prescribing a dietary protein intake of **1.0 -1.2** g /kg ideal body weight per day to maintain a stable nutritional status.	Updated
Dietary Protein Intake, MHD/PD; DM **N/A**	**Dietary Protein Intake, MHD/PD; DM** • In adults with **CKD on MHD and PD and who have diabetes**, it is reasonable to prescribe a dietary protein intake of **1.0 -1.2 g /kg body weight per day** to maintain a stable nutritional status. For patients at risk of hyper and/or hypoglycemia, higher levels of dietary protein intake may need to be considered to maintain glycemic control (OPINION).	New

Intervention Recommendations - DPI_PD

KDOQI (2000)	KDOQI-AND (2019)	Changes
Dietary Protein Intake (DPI) for Chronic Peritoneal Dialysis (CPD) • The recommended DPI for clinically stable CPD patients is **1.2 to 1.3 g/kg body weight/d.** (Evidence) • • Dietary protein intake should be no less than 1.2 g/kg/d. • • Unless a patient has demonstrated adequate protein nutritional status on a 1.2 g protein/kg/d diet, 1.3 g protein/kg/d should be prescribed. • • At least 50% of the dietary protein should be of high biological value.	**Dietary Protein Intake, Maintenance Hemodialysis and Peritoneal Dialysis** • In adult with **CKD on MHD (1C) and PD (OPINION) who are metabolically stable**, we recommend prescribing a dietary protein intake of **1.0 -1.2 g /kg ideal body weight per day** to maintain a stable nutritional status.	Updated

Intervention Recommendations – Protein type

KDOQI (2000)	KDOQI-AND (2019)	Changes
N/A	**Protein Type** In adults with **CKD 1-5D (1B) and post-transplant (OPINION)**, there is **insufficient evidence** to make conclusions about the effects of protein type (plant vs animal) on nutritional status, calcium or phosphorus levels, or the blood lipid profile.	New Opinion

Intervention Recommendations - Energy_CKD/MD

KDOQI (2000)	KDOQI-AND (2019)	Changes
Dietary Energy Intake (DEI) for Nondialyzed and Maintenance Dialysis Patients • The recommended DEI for individuals with chronic renal failure (CRF; GFR _25 mL/min) who are not undergoing maintenance dialysis is **35 kcal/kg/d** for those who are younger than 60 years old and 30 to 35 kcal/kg/d for individuals who are 60 years of age or older. (Evidence and Opinion) • The recommended daily energy intake for maintenance hemodialysis or chronic peritoneal dialysis patients is **35 kcal/kg** body weight/d for those who are less than 60 years of age and 30 to 35 kcal/kg body weight/d for individuals 60 years or older. (Evidence and Opinion)	**Energy, CKD 1-5D and post-Tx** • In adults with **CKD 1-5D (1C) and post-transplant (OPINION) who are metabolically stable**, we recommend prescribing an energy intake of **25-35 kcal/kg ideal body weight per day** based on age, gender, level of physical activity, body composition, weight status goals, CKD stage, and concurrent illness or presence of inflammation to maintain normal nutritional status.	Updated Opinion

Intervention Recommendations - Energy_CKD/MD

KDOQI (2000)	KDOQI-AND (2019)	Changes
Dietary Energy Intake (DEI) for Nondialyzed and Maintenance Dialysis Patients • The recommended DEI for individuals with chronic renal failure (CRF; GFR _25 mL/min) who are not undergoing maintenance dialysis is **35 kcal/kg/d** for those who are younger than 60 years old and 30 to 35 kcal/kg/d for individuals who are 60 years of age or older. (Evidence and Opinion) • The recommended daily energy intake for maintenance hemodialysis or chronic peritoneal dialysis patients is **35 kcal/kg** body weight/d for those who are less than 60 years of age and 30 to 35 kcal/kg body weight/d for individuals 60 years or older. (Evidence and Opinion)	**Energy, CKD 1-5D and post-Tx** • In adults with **CKD 1-5D (1C) and post-transplant (OPINION) who are metabolically stable**, we recommend prescribing an energy intake of **25-35 kcal/kg ideal body weight per day** based on age, gender, level of physical activity, body composition, weight status goals, CKD stage, and concurrent illness or presence of inflammation to maintain normal nutritional status.	Updated Opinion

"Body weight is a complicated measure in CKD….

…and requires **careful, clinical interpretation**. Regardless of stage of CKD, **body weight should be measured serially, and any sudden changes in body weight (e.g., unintentional weight loss or weight gain) can indicate serious changes in health status**. A **patient's weight history**, and comparison to his/her usual body weight over time **assists in determining risk for PEW as well as establishing optimal health goals**. When using published weight norms in the anthropometric assessment of adult CKD patients, **caution must be use as each norm has significant drawbacks**."

KDOQI WorkGroup

Measuring Body Weight

Ideal BW (Hamwi method [a]) (Hamwi G 1964)	•Women: 100 lb (45.36 kg) for first 5'0" (127 cm) and add 5 lb (2.27 kg) for each additional inch (25.4 cm) > 5'0"•Men: 106 lb (48.08 kg) for first 5'0" (127 cm) and add 6 lb (2.72 kg) for each additional inch (25.4 cm) > 5'0"
Standard BW (KDOQI Work Group 2000)	•Average 50th percentile weights for men and women by age, height, and frame size in the US (based on NHANES II date). Tables are published in KDOQI 2000 Nutrition Guideline. [67]
Desirable BW (Kopple JD 1999)	•Based on body mass index
Adjusted BW (Karkeck J 1984)	•Adjusted BW = ideal BW + [(actual BW − ideal BW) × 0.25]•It is recommended that BW should be adjusted for calculation of nutrient recommendation if patient's weight is <95% or >115% of ideal/standard BW: adjusted BW = edema-free BW + [(standard BW − edema-free BW) × 0.25]
Edema-free BW (McCann L 2015)	•Analogous to estimated dry weight in the patient being treated by renal replacement therapies
Percent of usual BW (Byham-Gray L 2013)	•Percent usual BW = (usual BW − current BW)/usual BW) × 100

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Abbreviations: BW, body weight; KDOQI, Kidney Disease Outcomes Quality Initiative; NHANES II, Second National Health and Nutrition Examination Survey; US, United States.

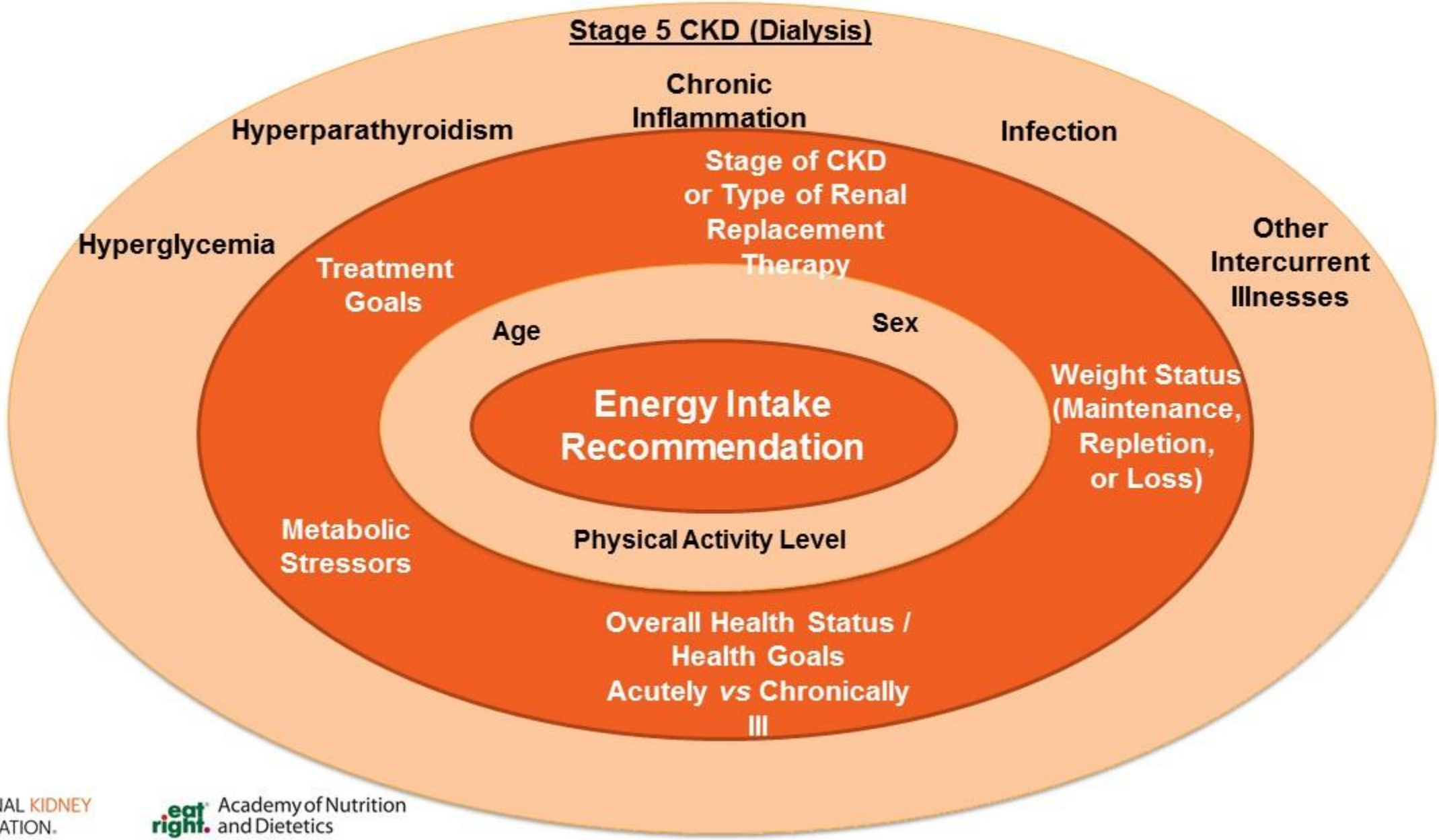
Can subtract 10% for small frame and add 10% for large frame.

Putting it Into Practice…

How to determine whether to use Ideal body weight, standard body weight or actual body weight--professional judgment

- What are weight goals? need for weight gain, stable weight at goal, considerations for weight loss
- What is realistic? listening to patient's diet history, appetite considerations, mobility considerations, how often will follow up be possible for adjusting to changes in energy needs
- Energy needs 25-35 kg/kg body weight is a targeted goal to meet patient needs where they are at time of contact

Implementation Considerations: Energy Intake in CKD



Dietary Protein and Energy Intake Implementation considerations

- Increase the training and number of specialized renal dietitians worldwide.
- Gradual implementation is more likely to succeed.
- Enforce the dietary interventions to improve symptoms when chronic dialysis is not a treatment option or is to be postponed (vascular access maturation, organizing pre-emptive renal transplant, ..)
- If wasting is present, priority should be given to the correction of wasting.
- Compliance to diets should be monitored frequently during the first year of dietary intervention by dietary interviews (3 are optimal) and urine collection for urea output measures.
- Then yearly follow-up recommended until start of maintenance dialysis.

Intervention Recommendations - Nutritional Supplementation

KDOQI (2000)	KDOQI-AND (2019)	Changes
Indications for Nutritional Support Individuals undergoing maintenance dialysis who are unable to meet their protein and energy requirements with food intake for an extended period of time should receive nutrition support. (Evidence and Opinion) • The period of inadequate intake after which nutritional support should be instituted ranges from days to 2 weeks, depending on the severity of the patient's clinical condition, degree of malnutrition (if any), and the degree of inadequacy of their nutritional intake. • Before considering nutrition support, the patient should receive a complete nutritional assessment. • Any potentially reversible or treatable condition or medication that might interfere with appetite or cause malnutrition should be eliminated or treated. • For nutrition support, the oral diet may be fortified with energy and protein supplements. • If oral nutrition (including nutritional supplements) is inadequate, tube feeding should be offered if medically appropriate. • If tube feedings are not used, intradialytic parenteral nutrition (IDPN; for hemodialysis) or intraperitoneal amino acids (IPAA; for peritoneal dialysis) should be considered if either approach in conjunction with existing oral intake meets the protein and energy requirements. • If the combination of oral intake and IDPN or IPAA does not meet protein and energy requirements, daily total or partial parenteral nutrition should be considered. • The dialysis regimen should be regularly monitored and modified to treat any intensification of the patient's uremic state that is caused by superimposed illness or increased protein intake.	**Oral Protein-Energy Supplementation** • In adults with **CKD 3-5D (2D) and post-transplant (OPINION) at risk of or with protein-energy wasting**, we suggest a minimum of a 3-month trial of oral nutritional supplements to improve nutritional status if dietary counselling alone does not achieve sufficient energy and protein intake to meet nutritional requirements.	Updated

Clin J Am Soc Nephrol 8: 100–107, January, 2013

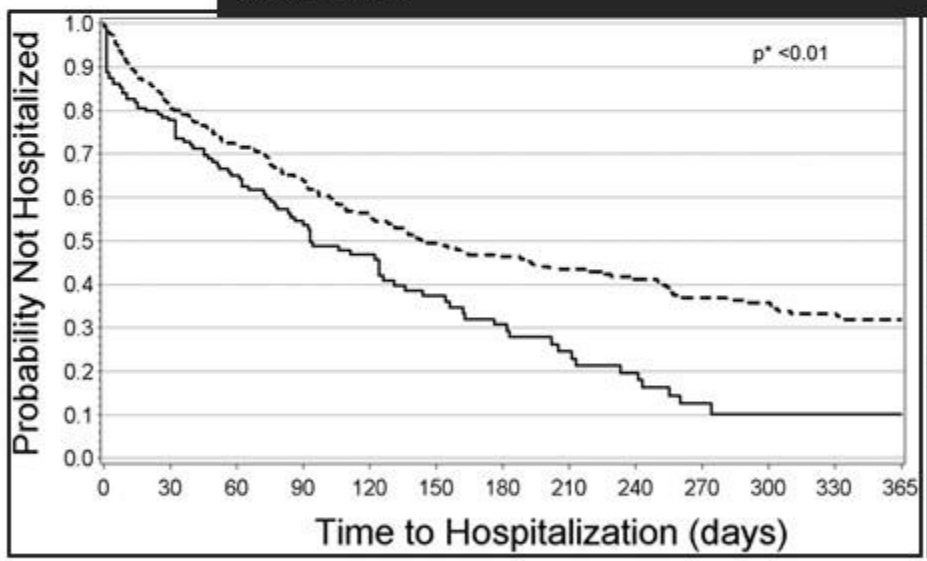
Association between Oral Nutritional Supplementation and Clinical Outcomes among Patients with ESRD

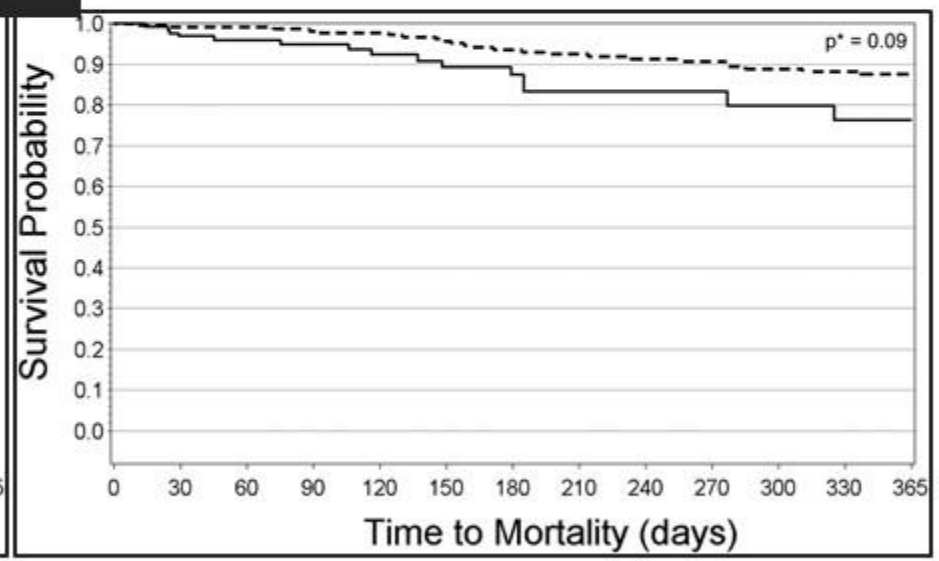
Christine Cheu, Jeffrey Pearson,* Claudia Dahlerus,* Brett Lantz,* Tania Chowdhury,* Peter F. Sauer,† Robert E. Farrell,† Friedrich K. Port,* and Sylvia P.B. Ramirez**

n = 470

Without oral nutritional supplementation in first 3 months of enrollment

With oral nutritional supplementation in first 3 months of enrollment





Oral supplementation use associated with lower hospitalisation rates

Oral supplementation had no significant effect on mortality

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Specifics of Oral Nutritional Supplementation

Who	All versus at-risk
When	During Dialysis; In between meals
How much	Replacement versus Supplementation
How long	> 3-months
How to monitor	Weight Biomarkers

NATIONAL KIDNEY FOUNDATION.

eat right. Academy of Nutrition and Dietetics

Intervention Recommendations - Nutritional Supplementation

KDOQI (2000)	KDOQI-AND (2019)	Changes
Indications for Nutritional Support Individuals undergoing maintenance dialysis who are unable to meet their protein and energy requirements with food intake for an extended period of time should receive nutrition support. (Evidence and Opinion) • The period of inadequate intake after which nutritional support should be instituted ranges from days to 2 weeks, depending on the severity of the patient's clinical condition, degree of malnutrition (if any), and the degree of inadequacy of their nutritional intake. • Before considering nutrition support, the patient should receive a complete nutritional assessment. • Any potentially reversible or treatable condition or medication that might interfere with appetite or cause malnutrition should be eliminated or treated. • For nutrition support, the oral diet may be fortified with energy and protein supplements. • If oral nutrition (including nutritional supplements) is inadequate, tube feeding should be offered if medically appropriate. • If tube feedings are not used, intradialytic parenteral nutrition (IDPN; for hemodialysis) or intraperitoneal amino acids (IPAA; for peritoneal dialysis) should be considered if either approach in conjunction with existing oral intake meets the protein and energy requirements. • If the combination of oral intake and IDPN or IPAA does not meet protein and energy requirements, daily total or partial parenteral nutrition should be considered. • The dialysis regimen should be regularly monitored and modified to treat any intensification of the patient's uremic state that is caused by superimposed illness or increased protein intake.	**Enteral and Parenteral Nutrition supplementation** • In adults with **CKD 1-5D,** with chronically inadequate intake and whose protein and energy requirements cannot be attained by dietary counselling, oral nutritional supplements and/or IDPN should be considered for enteral tube feeding or total parenteral nutrition (OPINION).	Updated

Intervention Recommendations - Nutritional Supplementation

KDOQI (2000)	KDOQI-AND (2019)	Changes
Indications for Nutritional Support Individuals undergoing maintenance dialysis who are unable to meet their protein and energy requirements with food intake for an extended period of time should receive nutrition support. (Evidence and Opinion) • The period of inadequate intake after which nutritional support should be instituted ranges from days to 2 weeks, depending on the severity of the patient's clinical condition, degree of malnutrition (if any), and the degree of inadequacy of their nutritional intake. • Before considering nutrition support, the patient should receive a complete nutritional assessment. • Any potentially reversible or treatable condition or medication that might interfere with appetite or cause malnutrition should be eliminated or treated. • For nutrition support, the oral diet may be fortified with energy and protein supplements. • If oral nutrition (including nutritional supplements) is inadequate, tube feeding should be offered if medically appropriate. • If tube feedings are not used, intradialytic parenteral nutrition (IDPN; for hemodialysis) or intraperitoneal amino acids (IPAA; for peritoneal dialysis) should be considered if either approach in conjunction with existing oral intake meets the protein and energy requirements. • If the combination of oral intake and IDPN or IPAA does not meet protein and energy requirements, daily total or partial parenteral nutrition should be considered. • The dialysis regimen should be regularly monitored and modified to treat any intensification of the patient's uremic state that is caused by superimposed illness or increased protein intake.	**Intradialytic Parenteral Nutrition (IDPN) Protein-Energy Supplementation** • In adults with **CKD with protein-energy wasting**, we suggest a trial of TPN for CKD 1-5 patients **(2C)** and IDPN for CKD 5D on MHD patients **(2C)**, to improve and maintain nutritional status if nutritional requirements cannot be met with existing oral and enteral intake.	Updated

Intradialytic Parenteral Nutrition (IDPN)

J Am Soc Nephrol 18: 2583–2591, 2007

Intradialytic Parenteral Nutrition Does Not Improve Survival in Malnourished Hemodialysis Patients: A 2-Year Multicenter, Prospective, Randomized Study

Noël J.M. Cano,* Denis Fouque,† Hubert Roth,‡ Michel Aparicio,§ Raymond Azar,‖ Bernard Canaud,¶ Philippe Chauveau,** Christian Combe,§** Maurice Laville,† Xavier M. Leverve;‡ and the French Study Group for Nutrition in Dialysis

n = 186
(maintenance haemodialysis patients with protein-energy wasting)

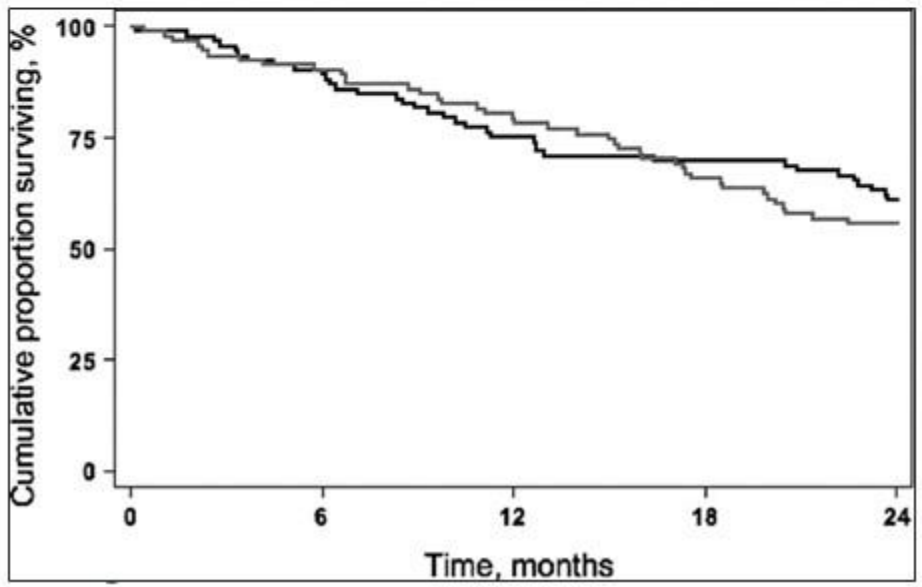
randomised

IDPN + Oral Nutritional Supplementations (ONS)

Oral Nutritional Supplementations (ONS) only

↑ BMI
↑ Serum albumin
↑ Serum pre-albumin

Kaplan-Meier survival analysis in IDPN + ONS (grey line) and ONS (black line) groups



IDPN did not improve:
- Hospitalisation rate
- Karnofsky score (functional index)
- BMI
- Laboratory markers of nutritional status

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Intervention Recommendations - Nutritional Supplementation

KDOQI (2000)	KDOQI-AND (2019)	Changes
Indications for Nutritional Support Individuals undergoing maintenance dialysis who are unable to meet their protein and energy requirements with food intake for an extended period of time should receive nutrition support. (Evidence and Opinion) • The period of inadequate intake after which nutritional support should be instituted ranges from days to 2 weeks, depending on the severity of the patient's clinical condition, degree of malnutrition (if any), and the degree of inadequacy of their nutritional intake. • Before considering nutrition support, the patient should receive a complete nutritional assessment. • Any potentially reversible or treatable condition or medication that might interfere with appetite or cause malnutrition should be eliminated or treated. • For nutrition support, the oral diet may be fortified with energy and protein supplements. • If oral nutrition (including nutritional supplements) is inadequate, tube feeding should be offered if medically appropriate. • If tube feedings are not used, intradialytic parenteral nutrition (IDPN; for hemodialysis) or intraperitoneal amino acids (IPAA; for peritoneal dialysis) should be considered if either approach in conjunction with existing oral intake meets the protein and energy requirements. • If the combination of oral intake and IDPN or IPAA does not meet protein and energy requirements, daily total or partial parenteral nutrition should be considered. • The dialysis regimen should be regularly monitored and modified to treat any intensification of the patient's uremic state that is caused by superimposed illness or increased protein intake.	**Dialysate Protein-Energy Supplementation** • In adults with **CKD on peritoneal dialysis with protein-energy wasting**, we suggest <u>not substituting</u> conventional dextrose dialysate with amino acid dialysate as a general strategy to improve nutritional status (2C), although in selected cases of protein-wasting when energy intake is adequate, 1.1% amino acid dialysate with alkali supplements may ameliorate protein deficits (OPINION).	Updated

Natural progression of nutritional interventions in patients with kidney disease



Intervention Recommendations - Acid Base Balance

KDOQI (2000)	KDOQI-AND (2019)	Changes
Measurement of Serum Bicarbonate • Serum bicarbonate should be measured in maintenance dialysis patients once monthly. (Opinion)	**Dietary Management of net acid production (NEAP)** • In adults with **CKD 1-4**, we suggest reducing net acid production (NEAP) through increased dietary intake of fruits and vegetables (2C) in order to reduce the rate of decline of residual kidney function.	Updated
Treatment of Low Serum Bicarbonate • Predialysis or stabilized serum bicarbonate levels should be maintained at or above 22 mmol/L. (Evidence and Opinion)	**Bicarbonate Maintenance** • In adults with **CKD 3-5D**, we suggest reducing net acid production (NEAP) through increased bicarbonate supplementation (1C) in order to reduce the rate of decline of residual kidney function. • In adults with **CKD 3-5D**, it is reasonable to maintain serum bicarbonate levels at 24 - 26 mmol/L (OPINION).	Updated

Intervention Recommendations - Electrolytes

KDOQI (2000)	KDOQI-AND (2019)	Changes
Phosphorus **N/A**	**Dietary Phosphorus Amount** • In adults with **CKD 3-5 and on MHD**, we recommend adjusting dietary phosphorus intake to maintain serum phosphate levels in the normal range (1B). **Dietary Phosphorus Source** • In adults with **CKD 1-5D and post-transplant**, it is reasonable when making decisions about phosphorus restriction treatment to consider the bioavailability of phosphorus sources (e.g. animal, vegetable, additives) (OPINION). **Phosphorus Intake with Hypophosphatemia** • For adult **kidney transplant recipients with hypophosphatemia**, it is reasonable to consider prescribing high-phosphorus intake (diet or supplements) in order to replete serum phosphorus (OPINION).	New

Intervention Recommendations - Electrolytes

KDOQI (2000)	KDOQI-AND (2019)	Changes
Calcium **N/A**	**Calcium Intake** • In adults with **CKD 3-4** not taking active vitamin D analogs, we suggest that a total elemental calcium intake of **800-1,000 mg/d (including dietary calcium, calcium supplementation and calcium-based phosphate binders)** be prescribed to maintain a neutral calcium balance (2B).	New

Intervention Recommendations - Electrolytes

KDOQI (2000)	KDOQI-AND (2019)	Changes
Sodium **N/A**	**Sodium Intake and Blood Pressure** • In adults with **CKD 3-5 (non-dialyzed) (1B), maintenance dialysis (1C), and post-transplant (1C),** we recommend limiting sodium intake to less than **100 mmol/day (or <2.3 g/day)** to reduce blood pressure and improve volume control. **Sodium Intake and Proteinuria** • In adults with **CKD 3-5 (non-dialyzed),** we suggest that reduced sodium intake 100 mmol/day (or <2.3 g/day) be prescribed to reduce proteinuria (2A). **Sodium Intake and Dry Body Weight** • In adults with **CKD 3-5D,** we suggest reduced sodium intake as an adjunctive lifestyle modification strategy to achieve better volume control and a more desirable body weight (2B).	New

Intervention Recommendations - Electrolytes

KDOQI (2000)	KDOQI-AND (2019)	Changes
Potassium **N/A**	**Dietary Potassium Amount** • In adults with **CKD 3-5D and post- transplant**, it is reasonable to adjust dietary potassium intake to maintain serum potassium within the normal range (OPINION). **Dietary Potassium in Hyperkalemia** • In adults with **CKD 3-5D and post-transplant who exhibit hyperkalemia**, it is reasonable to consider lowering dietary potassium intake as a therapeutic strategy (OPINION). **Potassium Intake for Hyperkalemia or Hypokalemia** • In adults with **CKD 3-5 on MHD (2D) and post-transplant (OPINION)** with either hyperkalemia or hypokalemia, we suggest that dietary or supplemental potassium intake be based on a patient's individual needs and clinician judgment.	New

Supporting Evidence: Potassium

The consequences of dietary potassium intake in patients with CKD are not well understood.

No interventional study examined the relationship between dietary potassium consumption and serum levels **(research priority).**

Clinical consequences: 3 observational studies, 1 randomized study

- Higher dietary potassium (quintile of 24-h food recalls) **associated with mortality** in HD patients
- High urinary potassium excretion **associated with CKD progression but not mortality** in non-dialysis CKD
- High urinary potassium excretion **associated with mortality but not with RRT risk** in non-dialysis CKD
- Dietary potassium restriction was **associated with stabilization of a neuropathy score and several other nerve-related or general health scores**

Implementation Considerations: Potassium

Factors other than dietary intake influence serum potassium levels:

- medications
- residual kidney function
- hydration status
- acid-base status
- glycemic control
- adrenal function
- catabolism
- GI problems like vomiting, diarrhea, constipation and bleeding

All these factors should be considered when formulating a strategy to keep serum potassium within the normal range

Main sources of potassium: fruits, vegetables, legumes, nuts, meat, and dairy

Concern exists that excessive restriction could lead to **deficiencies of other valuable nutrients** (e.g. fiber, vitamins, antioxidants, vegetable protein)

Generalities: Vitamins and Trace-Elements

Ideal amounts of daily vitamins and trace elements are those required to:

- Maintain health / prevent diseases
- Maintain nutritional status
- Reverse deficiencies
- Prevent toxicity

Recommendations for vitamins/trace element intakes are challenging

- Depend on physical properties (hydro vs fat-solubility)
- Depend on type of population: General population vs CKD patients
- Depend on body stores, previous supplementation, nutritional status and intake, Gut absorption, impaired renal metabolism, additional losses through dialysis

Recommended Dietary Allowances for Adult General Population

Micronutrients	Recommended Dietary Allowance (per day)
Thiamine	1.2mg (M), 1.1mg (F)
Vitamin B12	2.4µg (M & F)
Folic acid	400 µg (M & F)
Vitamin C	90mg (M), 75mg (F)
Vitamin D	10 µg (M), 5 µg (F)
Vitamin E	15mg (M & F)
Vitamin K	120 µg (M), 90 µg (F)
Selenium	55 µg (M & F)
Zinc	11mg (M), 8 mg (F)

Intervention Recommendations - LC n-3 PUFA

KDOQI (2000)	KDOQI-AND (2019)	Changes
N/A	**LC n-3 PUFA Nutritional Supplements for Lipids, Mortality and CVD** • In adults with **CKD on MHD, PD (Opinion) or post-transplant**, we suggest not routinely prescribing long-chain n-3 PUFA, including those derived from fish or flaxseed and other oils, to lower risk of mortality (2C) or cardiovascular events (2B). • In adults with **CKD on MHD**, we suggest that 1.3-4 g/d long-chain n-3 PUFA may be prescribed to reduce triglycerides and LDL cholesterol (2C) and raise HDL levels (2D). • In adults with **CKD on PD**, it is reasonable to consider prescribing 1.3-4 g/d long-chain n-3 PUFA to improve the lipid profile (OPINION).	New

Intervention Recommendations - LC n-3 PUFA

KDOQI (2000)	KDOQI-AND (2019)	Changes
N/A	**LC n-3 PUFA Nutritional Supplements for AV Graft and Fistula Patency** • In adults with **CKD on MHD**, we suggest not routinely prescribing fish oil to improve primary patency rates in patients with AV grafts (2B) or fistulas (2A). **LC n-3 PUFA Nutritional Supplements for Kidney Allograft Survival** • In adults with **CKD with kidney allograft**, we suggest not routinely prescribing long-chain n-3 PUFA to reduce the number of rejection episodes or improve graft survival (2D).	New

Intervention Recommendations - Dietary Patterns

KDOQI (2000)	KDOQI-AND (2019)	Changes
Mediterranean Diet **N/A**	**Mediterranean Diet** • In adults with **CKD 1-5 (non-dialysis) and post-transplant**, with or without dyslipidemia, we suggest that prescribing a Mediterranean Diet may improve lipid profiles (2C).	New Weak, Conditional
Fruits and Vegetables **N/A**	**Fruits and Vegetables** • In adults with **CKD 1-4**, we suggest that prescribing increased fruit and vegetable intake may decrease body weight, blood pressure and net acid production (NEAP) (2C).	New Weak, Conditional

Intervention Recommendations - Vitamins

KDOQI (2000)	KDOQI-AND (2019)	Changes
Folic Acid and B vitamins **N/A**	**Folic Acid Supplementation for Hyperhomocysteinemia** • In adults with **CKD 3-5D and post-transplant who have hyperhomocysteinemia associated with kidney disease**, we recommend not routinely supplementing folate with or without B-complex since there is no evidence demonstrating reduction in cardiovascular outcomes (1A). **Folic Acid Deficiency and Insufficiency** • In adults with **CKD 1-5 D (2B) and post-transplant (OPINION)**, we suggest prescribing folate, Vit B12 and/or B-complex supplement to correct for folate or Vitamin B12 deficiency/insufficiency (2B).	New

Intervention Recommendations - Vitamins

KDOQI (2000)	KDOQI-AND (2019)	Changes
Vitamin C **N/A**	**Vitamin C Supplementation Limit** • In adults with **CKD 1-5D and post-transplant who are at risk of Vitamin C deficiency** it is reasonable to consider supplementation to meet the recommended intake of at least 90 mg/d for men and 75 mg/d for women (OPINION).	New
Vitamin K **N/A**	**Anticoagulant Medication and Vitamin K Supplementation** • In adults with **CKD 1-5D and post-transplant**, it is reasonable that patients receiving anticoagulant medicines known to inhibit vitamin K activity (e.g., warfarin compounds) do not receive vitamin K supplements (OPINION).	

Intervention Recommendations - Vitamins

KDOQI (2000)	KDOQI-AND (2019)	Changes
Vitamin E and A **N/A**	**Vitamins A and E Supplementation and Toxicity** • In adults with **CKD on MHD or PD**, it is reasonable to not routinely suggest vitamin A or E supplementation because of the potential for vitamin toxicity. However, if supplementation is warranted, it is reasonable to use caution and monitor patients for toxicity (OPINION).	New

Intervention Recommendations - Vitamins

KDOQI (2000)	KDOQI-AND (2019)	Changes
Vitamin D **N/A**	**Vitamin D Supplementation for Vitamin D Deficiency and Insufficiency** • In adults with **CKD 1-5 D (2C) and post-transplant (OPINION),** we suggest prescribing vitamin D supplementation in the form of cholecalciferol or ergocalciferol to **correct 25(OH)D deficiency or insufficiency**. **Vitamin D Supplementation with Proteinuria** • In adults with **CKD with chronic nephrotic range proteinuria**, it is reasonable to consider supplementation of cholecalciferol, ergocalciferol or other safe and effective 25(OH)D precursors **(OPINION).**	New

Recommendations: HD, PD, and Pre-dialysis(CKD)

Screening	Routine, biannual screening for protein energy wasting
Assessment	Registered dietitian nutritionist (RDN) or an international equivalent conduct a comprehensive nutrition assessment (including but not limited to appetite, history of dietary intake, body weight and body mass index, biochemical data, anthropometric measurements, and nutrition-focused physical findings) at least within the first 90 days of starting dialysis, annually, or when indicated by nutrition screening or provider referral
Body Composition	CKD 5D on MHD, bioimpedance when available, performed 30 min or more after the end of HD session. Dual-energy X-Ray Absorptiometry to be used when feasible in adults with CKD1-5D or posttransplant. Measure body weight and BMI at least monthly in MHD and PD, every 3 months in CKD 4-5 or post-transplantation, and every 6 months with CKD1-3. CKD 1-5D and post-transplantation use skinfold thickness for assessment of body fat in the absence of edema.
Dietary Intake	In adults with CKD 3-5D, use 3-day food record, conducted during both dialysis and non-dialysis treatment days (when applicable), as a preferred method to assess dietary intake. Alternative Methods of Assessing Dietary Intake in adults with CKD 3-5 or CKD 5D, 24-hour food recalls, food frequency questionnaires, and nPCR.

Ikizler T et al. KDOQI Clinical Practice Guideline for Nutrition in CKD: 2020 Update. AJKD Vol 76 | Iss 3 | Suppl 1 | September 2020

Recommendations: HD, PD, and Pre-dialysis(CKD)

	HD/PD	HD/PD DM	PreDialysis/ CKD	PreDialysis/DM.CKD
Protein:	1.0 – 1.2 g/kg BW		0.55-0.60 g/kg BW or 0.28-0.43 g/kg BW with keto analogues	0.6 – 0.8 g/kg BW
Calories	25-35 kcal/kg body weight per day based on age, sex, level of physical activity, body composition, weight status goals, CKD stage, and concurrent illness or presence of inflammation to maintain normal nutritional status.			
K+:	Adjust to maintain serum potassium level Restricted		May be restricted	
Na:	Limiting sodium intake to less than 100 mmol/d (or <2.3 g/day) to reduce blood pressure and for volume control or for proteinuria management			
Fluid:	Restricted	Usually not restricted	May be restricted	May be restricted
Calcium	Adjust to avoid hypercalcemia		800-1000 mg elemental calcium	
Phosphorus	Restricted	Restricted	May be Restricted	May be restricted
Vitamin/Mineral	In adults with CKD 3-5D or post transplantation, it is reasonable for the registered dietitian nutritionist (RDN) or an international equivalent to encourage eating a diet that meets the recommended dietary allowance (RDA) for adequate intake for all vitamins and minerals.			

Ikizler T et al. KDOQI Clinical Practice Guideline for Nutrition in CKD: 2020 Update. AJKD Vol 76 | Iss 3 | Suppl 1 | September 2020

Summary

Updated guidelines from 2000 and include more evidenced-based statements

Clinical judgement and individualization of care is suggested throughout the guidelines

An RDN should be performing MNT and working within the IDT to improve outcomes