TABLE B-8 Interpretation of Lab Values *(continued)*

Value	Normal Range	Purpose or Comment	Increased In	Decreased In
Acetone, ketones	0	Elevation indicates ketosis.	Diabetic ketoacidosis; starvation; fever; prolonged vomiting; high-protein, high-fat, or low-CHO diet; diarrhea; anorexia	
Aldosterone	6–16 mg/24 h			
Ammonia	20–70 mEq/L		Hepatic disease or coma, renal failure, severe heart failure, high-protein diet	Essential hypertension
Amylase	260–950 Somogyi units/24 h		Perforated peptic ulcer, acute pancreatitis, mumps, cholecystitis, renal insufficiency, alcohol poisoning	Hepatitis, pancreatic insufficiency, severe burns
Calcium, normal diet	<250 mg/24 h		Hyperparathyroidism, high calcium or vitamin D in diet, immobilization, metastatic bone disease, multiple myeloma, renal tubular acidosis	Decreased levels may reflect poor intake. Hypoparathyroidism, rickets, renal failure, steatorrhea, osteomalacia
Cortisol, urinary free	10–100 μg/dL		Elevated in stress	Adrenal insufficiency
Creatinine clearance	Males (20 years old): 90 mL/min/SA; females (20 years old): 84 mL/min/SA; decreases by 6 mL/min/SA per decade		Pregnancy, childhood, exercise.	Ascites, dehydration, renal failure, heart failure, shock, cirrhosis
Epinephrine, norepinephrine	Epinephrine: <10 μg/24 h; Norepinephrine <100 μg/24 h		Stress	
Estrogens	4–25 mg/24 h in males; 4–60 mg/24 h in females, higher in pregnancy			
Hemoglobin, myoglobin	0	Any amount	Blood loss, urinary tract injury	
5-Hydroxyindoleacetic acid	0	Serotonin excretion		
(5-HIAA)	20–60 mg/24 h		Calcium oxalate stones	
Oxalate pH	4.6–8; average of 6 (dependent on diet)	Depends on time of sampling and food ingested	Alkaline: metabolic alkalemia, proteus infection, aged specimen, large amount of fruits and vegetables eaten	Acidic: high-protein intake
Protein (albumin)	<30 mg/24 h (0 qualitative)	Amino acids in urine should be 0.4–1 g/L.	Nephrotic syndrome	
Specific gravity	1.003–1.030	Ability to concentrate urine	High in antidiuretic hormone deficiency	Low in renal tubular dysfunction
Sugar	0		Hyperglycemia, ketosis, DKA	
3-Methyl histidine, urine		Indicator of lean body mass turnover	Increased levels may reflect loss of lean body mass.	
Urea	20–35 g/L			
Uric acid	0.2–2.0 g/L			
Vanillylmandelic acid (VMA)	<6.8 mg/24 h	Metabolite of both epinephrine and norepinephrine		
Volume	1000–1500 mL	Varies slightly between individuals	Diabetes insipidus	Dehydration

The table provides estimated and sample normal values; normal ranges will vary by the techniques used by the laboratory completing the tests.
Developed from: Pagana KD, Pagana TJ. *Mosby's manual of diagnostic and laboratory tests*. 4th ed. Philadelphia: Mosby, 2009.

TABLE B-9 Quick Reference: Food–Drug Interactions

Drugs	Effects and Precautions
Antibiotics	
Cephalosporins, penicillin	Take on an empty stomach to speed absorption of the drugs.
Erythromycin	Do not take with fruit juice or wine, which decrease the drug's effectiveness.
Sulfa drugs	Increase the risk of vitamin B_{12} deficiency.
Tetracycline	Dairy products reduce the drug's effectiveness. Lowers vitamin C absorption.
Anticonvulsants	
Dilantin, phenobarbital	Increases the risk of anemia and nerve problems due to a deficiency in folate and other B vitamins.
Antidepressants	
Fluoxetine	Reduces appetite and can lead to excessive weight loss.
Lithium	A low-salt diet increases the risk of lithium toxicity; excessive salt reduces the drug's efficacy.
Monoamine oxidase (MAO) inhibitors	Foods high in tyramine (e.g., aged cheeses, processed meats, legumes, wine, and beer) can bring on a hypertensive crisis.
Tricyclics	Many foods, particularly legumes, meat, fish, and foods high in vitamin C, reduce absorption of the drugs.
Antihypertensives, Heart Medications	
Angiotensin-converting enzyme (ACE) inhibitors	Take on an empty stomach to improve the absorption of the drugs.
Alpha-blockers	Take with liquid or food to avoid excessive drop in blood pressure.
Antiarrhythmic drugs	Avoid caffeine, which increases the risk of an irregular heartbeat.
Beta-blockers	Take on an empty stomach; food, especially meat, increases the drug's effects and can cause dizziness and low blood pressure.
Digitalis	Avoid taking with milk and high-fiber foods, which reduce absorption; increases potassium loss.
Diuretics	Increases the risk of potassium deficiency.
Potassium-sparing diuretics	Unless a doctor advises otherwise, do not take diuretics with potassium supplements or salt substitutes, which can cause potassium overload.
Thiazide diuretics	Increases the reaction to MSG.
Asthma Drugs	
Pseudoephedrine	Avoid caffeine, which increases feelings of anxiety and nervousness.
Theophylline	Charbroiled foods and a high-protein diet reduce absorption. Caffeine increases the risk of drug toxicity.
Cholesterol-Lowering Drugs	
Cholestyramine	Increases the excretion of folate and vitamins A, D, E, and K.
Gemfibrozil	Avoid fatty foods, which decrease the drug's efficacy in lowering cholesterol.
Heartburn and Ulcer Medications	
Antacids	Interfere with the absorption of many minerals; for maximum benefit, take medication 1 hour after eating.
Cimetidine, famotidine, sucralfate	Avoid high-protein foods, caffeine, and other items that increase stomach acidity.
Hormone Preparations	
Oral contraceptives	Salty foods increase fluid retention. Drugs reduce the absorption of folate, vitamin B_6, and other nutrients; increase intake of foods high in these nutrients to avoid deficiencies.
Steroids	Salty foods increase fluid retention. Increase intake of foods high in calcium, vitamin K, potassium, and protein to avoid deficiencies.
Thyroid drugs	Iodine-rich foods may lower the drug's efficacy.
Laxatives	
Mineral oils	Overuse can cause a deficiency of vitamins A, D, E, and K.
Painkillers	
Aspirin and stronger nonsteroidal anti-inflammatory drugs	Always take with food to lower the risk of gastrointestinal irritation; avoid taking with alcohol, which increases the risk of bleeding. Frequent use of these drugs lowers the absorption of folate and vitamin C.
Codeine	Increase fiber and water intake to avoid constipation.
Sleeping Pills, Tranquilizers	
Benzodiazepines	Never take with alcohol. Caffeine increases anxiety and reduce drug's effectiveness.
Weight Loss–Inducing Drugs	
Many drugs cause weight loss because of changes in appetite or other side effects.	

TABLE B-10 Sample Worksheet for Using Standardized Nutrition Terminology

***Nutrition Care Process*—**Critical thinking worksheet to help determine the appropriate standardized language to document and support the NCP

STEP ONE: NUTRITION ASSESSMENT

Complete a comprehensive assessment of a patient using the established assessment standards/guidelines set by your facility or practice setting. Be sure to include "comparative standards:" anthropometrics, estimated needs, and nutrient intake as well as identify the reference standards used to analyze the calculated/numerical data such as the DRIs, BMI, and NCHS charts.

STEP TWO: NUTRITION DIAGNOSIS

(1) List all of the patient's problems/issues:

(2) Cross off medical problems/medical diagnoses.

(3) Cross off issues that do not have supporting evidence (of signs/symptoms).

(4) Cross off issues where the root etiology (cause of) cannot be determined.

(5) Place a "✓" by the issues you will be able to re-evaluate upon follow-up; be sure to have updated signs/symptoms data on the reassessment date.

(6) Of the checked issues, circle those that are the most urgent nutrition problem(s) to resolve and the priority issue to start addressing.

(7) Based on the problem(s) circled, choose the diagnosis that best suits the nutrition issue in its most detailed form.

(8) Write P.E.S statement(s) with the appropriate "root" etiology and signs/symptoms:

P: _____ related to **E:** _____ as evidenced by **S/S:** _____ ***See examples

STEP THREE: NUTRITION INTERVENTION (Direct interventions at the **etiology.** If a dietitian cannot change the etiology, then direct the interventions at reducing the signs/symptoms of the nutrition diagnosis).

Nutrition Prescription: (Proper diet and regimen to meet the nutrient needs of what?) _____

Based upon scope of practice and clinical privilege established by your facility or practice setting, choose:

1) Recommended Interventions (other practitioner must do)

- intervention term: _____
  goal of intervention: _____
- intervention term: _____
  goal of intervention: _____
- intervention term: _____
  goal of intervention: _____

2) Interventions you can/will do on your own (actions)

- intervention term: _____
  goal of intervention: _____
- intervention term: _____
  goal of intervention: _____
- intervention term: _____
  goal of intervention: _____

Goal of intervention = why you chose that intervention/strategy — what the intervention is intended to do/accomplish

STEP FOUR: MONITORING & EVALUATION (Directed at the **signs/symptoms to** monitor the success of intervention(s) and progress toward goal(s)

1) Indicate when/timeframe during which you plan to reassess: within _____ days/weeks/months

2) List signs/symptoms from PES above and match to M&E Terms (unshaded) from Assess/M&E list (indicators)

3) Establish criteria for each M&E indicator (pt goals)

- Signs/Symptoms: _____
  M&E term: _____
  Criteria-Pt will: _____
- Signs/Symptoms: _____
  M&E term: _____
  Criteria-Pt will: _____
- Signs/Symptoms: _____
  M&E term: _____
  Criteria-Pt will: _____

Criteria = measurable patient-centered goals

Reassessment or follow-up encounter

1) Do you have the info/data needed to compare previous signs/symptoms to the current time? If no, you need to address this as an intervention recommendation, and check it at the next encounter. If yes, evaluate progress toward the M&E criteria on the left (pt goals).

☐ Pt met goal/criteria ☐ Pt did not meet goal/criteria

2) Based upon progress toward pt goals, evaluate progress toward the resolution of the nutrition problem from the PES:

☐ Resolved (nutrition problem no longer exists)

☐ Improvement shown (nutrition problem still exists)

☐ Unresolved no improvement shown

☐ No longer appropriate (change in condition)

3) If no improvement is shown, you may need to change intervention(s).

(continued)

TABLE B-10 Sample Worksheet for Using Standardized Nutrition Terminology *(continued)*

		***SAMPLE COMMON PES STATEMENTS	
Diagnostic Label	**Domain Code**	• **Common Etiology** • **"as related to . . ."**	**Common Signs/Symptoms "as evidenced by . . ." [with M/E codes]**
Inadequate oral food/ beverage intake	NI-2.1	• Decreased appetite • Nausea • Emesis • Altered mental status	• Poor po intake of ≤25% of meals [M&E – FH-1.3.2]
		• Increased needs with advanced Ca • Increased needs due to wound healing, infection, multiple frax • Increased needs secondary to catabolic state	• Wt loss of >5% in 1–2 months [M&E – AD-1.1.4] • Poor po intake of ≤25% of meals [M&E – FH-1.3.2]
		• Comfort measures only (Hospice)	• Consumption of minimal comfort foods <10% needs [M&E – FH-1.2.1]
Inadequate intake from enteral/ parenteral nutrition	NI-2.3	• Current TF formula/rate • Increased needs sec to surgery • Infusion goal not reached due to intolerance of feeding	• Current nutrition regimen only meeting __% of est. needs [M&E – FH-1.2.1] • TF/TPN only meeting __% of est. needs [M&E – FH-1.4.1] • Wt loss of ___% in ___ weeks/months [M&E – AD-1.1.4] • Delayed wound healing [M&E – PD-1.1.8]
Excessive intake from enteral/parenteral nutrition	NI-2.4	Decreased needs due to ventilator	• Current nutrition regimen meeting ≥100% of est. needs [M&E – FH-1.2.1] • TF/TPN meeting ≥100% of est. needs [M&E – FH-1.4.1]
Increased nutrient needs (protein)	NI-5.1	• Increased nutrient demands (PRO) for: • Wound healing • Surgical wounds	• Prealb or alb of __g/L (decreased) [M&E – BD-1.11.1] • Loss of skin integrity (surgical wounds) [M&E – PD-1.1.8] • Loss of muscle mass [M&E – PD-1.1.4] • Stage __ pressure ulcer [M&E – PD-1.1.8] • Inadequate protein intake– consuming only __% pro needs [M&E – FH-1.6.2]
Malnutrition	NI-5.2	• End-stage liver disease • Short gut • Small bowel transplant • Mental illness • Ascites • ETOH dependency	• Decreased albumin of ____g/L [M&E – BD-1.11.1] • Decreased food intake, consuming only ___% meals [M&E – FH-1.3.2] • Pt refusing to eat [M&E – FH-1.3.2] • Wt loss of ___% in ___weeks/months [M&E – AD-1.1.4] • Evident temporal wasting [M/E – PD-1.1.6] • Evident minimal body fat / fat stores [M/E – PD-1.1.4] • Evident cachexia [M/E – PD-1.1.4] • Delayed wound healing [M/E – PD-1.1.8]

Provided courtesy of Sherri Jones, MS, MBA, RD, LDN. UPMC Presbyterian Shadyside, Pittsburgh PA.

TABLE B-11 Clinical Case Review and Audit

Assessment	3 Exceeds Very detailed	2-Met Goals Competent	1-Unsat. Large amt missing	Comments
Pathophysiology of disease/disorder				
Stage/phase (if applicable)				
Relevance of nutrition status in this disorder/disease				
Prognosis for this disease				
Up-to-date interpretation of evidence-based research				
General information noted- Ht, Wt				
Social background reviewed				
Past medical status/socioeconomic status				
Family history; genetics, if relevant				
Pertinent medical/surgical status reviewed/documented				
Medications and potential drug/nutrient interactions assessed/noted				
Laboratory values: skewed values and relevance noted				
Typical diet recall or diet Hx analyzed				
Correct calculations/anthropometrics used to estimate nutrition needs				
Nutrition Diagnoses	**3 Exceeds** Very detailed	**2-Met Goals** Competent	**1-Unsat.** Large amt missing	**Comments**
1–2 Nutrition diagnosis(es) identified & appropriate				
P.E.S statements: logical, able to be managed by an RD in this setting				
Nutrition Interventions	**3 Exceeds** Very detailed	**2-Met Goals** Competent	**1-Unsat.** Large amt missing	**Comments**
Short- and long-term goals set with pt/significant other				
Recommendations based on etiologies of problems				
Food–nutrient delivery:				
Education:				
Counseling:				
Coordination of care:				
Monitoring and Evaluation	**3 Exceeds** Very detailed	**2-Met Goals** Competent	**1-Unsat.** Large amt missing	**Comments**
Progress: day to day analysis – Intake				
Progress: day to day analysis – Clinical				
Progress: day to day analysis – Behavioral/Environmental				
Documented need for f/up; timeframe noted				
If education provided, pt/family understanding is documented				
Nutrition support – kilocalories, protein, fluid, recommendations proper				
Nutrition care plans updated in a timely manner				
Meal plan established if warranted				
Age-appropriate standards and assessment tools used if needed				
Discharge plan or needs discussed				
Communication and Documentation	**3 Exceeds** Very detailed	**2-Met Goals** Competent	**1-Unsat.** Large amt missing	**Comments**
Organized; follows a comprehensible sequence				
Educational flow sheets documented accurately				
Uses correct grammar and terms				
Follow-up notes re-evaluate nutrition diagnoses, status, plans				

Evaluator:_____ Date:_____ Medical Record #_____

TOTAL POINTS:_____

TABLE B-12 Tips for Adult Education and Counseling

The adult as a learner	During the process of maturation, a person moves from dependency toward increasing self-directedness but at different rates for different people and in different dimensions of life. Teachers have a responsibility to encourage and nurture this movement. Adults have a deep psychological need to be generally self-directing, but they may be dependent in certain temporary situations.
The learner's experience	As people grow and develop, they accumulate an increasing reservoir of experience that becomes an increasingly rich resource for learning—for themselves and for others. Furthermore, people attach more meaning to lessons they gain from experience than those they acquire passively. Accordingly, the primary techniques in education are experiential ones—laboratory experiments, discussion, problem-solving cases, field experiences, case reports.
Readiness to learn	People become ready to learn something when they experience a need to learn it in order to cope more satisfyingly with real-life tasks and problems. The educator has a responsibility to create conditions and provide tools and procedures for helping learners discover their "need to know." Learning programs should be organized around life-application categories and sequenced according to the learners' readiness to learn. Key: Attend to learners' developmental readiness.
Orientation to learning	Adult learners see education as a process of developing increased competence to achieve their full potential in life. They want to be able to apply whatever knowledge and skill they gain today to living more effectively tomorrow. Accordingly, learning experiences should be organized around competency-development categories. People are performance-centered in their orientation to learning.
Assumptions	1. All learners can think; critical and creative thinking are goals. 2. There needs to be a safe, risk-taking environment and sufficient time to learn. 3. The environment for learning should be rich and responsive. 4. Offer challenging problem-solving opportunities.
Chief assessment factors for learning	1. Socioeconomic factors 2. Cultural/religious beliefs and background 3. Age and sex of patient and significant others (SOs) 4. Birth order of patient and family involvement 5. Occupation 6. Medical status and medical history 7. Marital status; number and ages of children 8. Cognitive status; educational level 9. Readiness to learn and staging: precontemplation, contemplation, preparation, action, or maintenance 10. Emotional status (stress, acceptance of illness, chronic disease, or condition)
Health literacy and teaching tools	Low health literacy (the ability to read, understand, and act on health information) is a public health issue. One out of five American adults reads at the fifth-grade level or below, and the average American reads at the eighth to ninth grade level. Most consumers need help understanding healthcare information. Patients prefer medical information that is easy to read and understand. Easy-to-read healthcare materials are *essential*. Provide important information first.
Written materials	Print very clearly and avoid handwritten messages. Use large print; font size should be a minimum of 12 points. Double space text to avoid crowding. Avoid using all capital letters. Use headings to introduce the upcoming topic. Avoid abbreviations, and use black ink on light-colored paper. Information must be current and accurate. Provide important information first. Highlight the "need to know" versus the "nice to know." Present information in a "how to" manner. Use a conversational style. Spell out numbers below 10. Limit syllables to —one or two per word. Keep sentences short, and use bullets when possible.
Educational tools	Newsletters and bulletin boards Demonstrations or role-playing Laboratory reports, flip charts Food recall or intake records with feedback Educational games and fun quizzes Group classes or supermarket tours Educational video and audio tapes

(continued)

TABLE B-12 Tips for Adult Education and Counseling *(continued)*

Visual aids	Visuals should be able to stand alone, without words.
	Use photographs and realistic images.
	Use culturally appropriate food models, empty packages of real foods, and measuring cups and spoons.
	Work with restaurant menus where needed.
	Share simple recipes.
Principles of learning	The recipient must value the information.
	Pace should be adequate for learner; take small steps.
	Environment should be conducive to learning (free of distractions and stress), and patient should be ready to learn (free from pain).
	Information must be meaningful, relevant, and organized. Material should be logical in sequence.
	Counselor must be truly interested in sharing the information.
	Adequate follow-up should be available for the reinforcement of facts and principles.
	For adult learners, information that is useful in the present is more meaningful than facts learned for the "future."
	Adults tend to prefer problem-solving information (survival skills) over learning facts.
Principles of teaching	The counselor must first listen to the patient. Involve the patient in setting mutual objectives.
	Small segments of information should be presented in understandable language in small, manageable "sound bytes."
	An organized plan should be used to teach. Clear objectives should be established, with timelines and short- and long-term outcomes.
	Feedback should be used with each step. Be prepared to receive evaluation (peer review) from the patient; improve as needed.
	Good eye contact should be maintained with the patient. Be aware, however, that direct or prolonged eye contact can be seen as rude or threatening by some cultures; know your client.
	Appropriate teaching tools or audiovisual aids should be used as appropriate. Using a sixth- to eighth-grade reading level is suggested, preferably with an easy layout, visual appeal, and illustrations.
	Questions must be allowed for clarification.
	Praise and positive reinforcement should be offered to the learner. Carl Rogers emphasizes the use of "unconditional positive regard" for all persons.
Counseling tips	Knowledge does not automatically ensure compliance. Behavioral change takes time and encouragement.
	Trial and error will be common for the patient in learning new behaviors.
	An increase in self-esteem comes with an improvement in behavior.
	The counselor should appropriately foster independence.
	Empathy is an important part of humanistic care.
	The counselor serves as an intervention specialist. The "patient-centered" approach to counseling is effective.
	Assess the stage of change and motivation level of client. Evaluate past experiences with dietary changes and anticipated challenges.
	Goal-setting requires the patient to recognize the need for change, establish a goal, monitor goal-related activity, and use self-reward for goal attainment.
	Identify challenges, obstacles, coping strategies, and skills. Help the client to anticipate lapses and relapses.
Patient assessment of chronic illness care (PACIC tool)	Patient-centered model of behavioral counseling using the **5 As**:
	Assess: Beliefs, behavior, and knowledge.
	Advise: Provide specific information about health risks and benefits of change.
	Agree: Collaboratively set goals based on the patient's interest and confidence in their ability to change behavior.
	Assist: Identify personal barriers, strategies, problem-solving techniques, and social/environmental support.
	Arrange: Specify a plan for follow-up (e.g., visits, phone calls, mailed reminders).
Counseling in hospice care	Attempt to reduce fears related to eating.
	Recognize stages of terminal illness: fear of abandonment, finding a natural and realistic approach, building bridges, and ownership of the experience.
	Pain management is most important for quality of life.
	Respect the individual's cultural beliefs and needs.
	Identify a patient advocate who will address concerns as care progresses.
	Help maintain self-esteem and dignity.
	Comfort foods can be important to patient satisfaction; address these needs on a meal-to-meal basis.
	Listen for hidden messages from the patient; communicate with other healthcare team members.

TABLE B-13 Health-Promotion Intervention Models

Because increasing evidence suggests that health-promotion interventions that are based on social and behavioral science theories are more effective than those lacking a theoretical base, five models are described here (Glanz and Bishop, 2010.)

Behavioral Ecological Model (BEM)

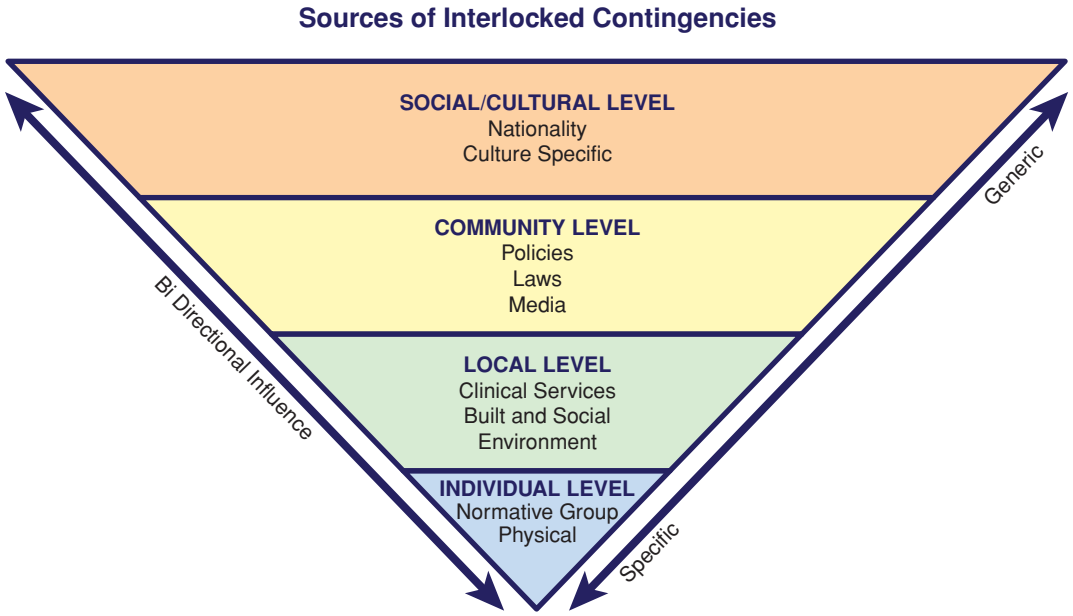

Figure B-4 Behavioral Ecological Model (BEM). (Image courtesy of Hovell et al [2002].)

Behavioral Ecological Model (BEM) Principle	Processes	Application
Environment influences behavior	Consequences are produced by the behavior	Control or change risky environment
Hierarchy of interacting reinforcement contingencies	Interaction is key	Interaction among both physical and social contingencies explain and ultimately control health behavior.

Hovell MF, Wahlgren DR, Gehrman C. The Behavioral Ecological Model: Integrating public health and behavioral science. In DiClemente RJ, Crosby R, Kegler M, (eds.). *New and Emerging Theories in Health Promotion Practice & Research*. Jossey-Bass Inc., San Francisco, California, 2002.

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TABLE B-13 Health-Promotion Intervention Models *(continued)*

Health Belief Model

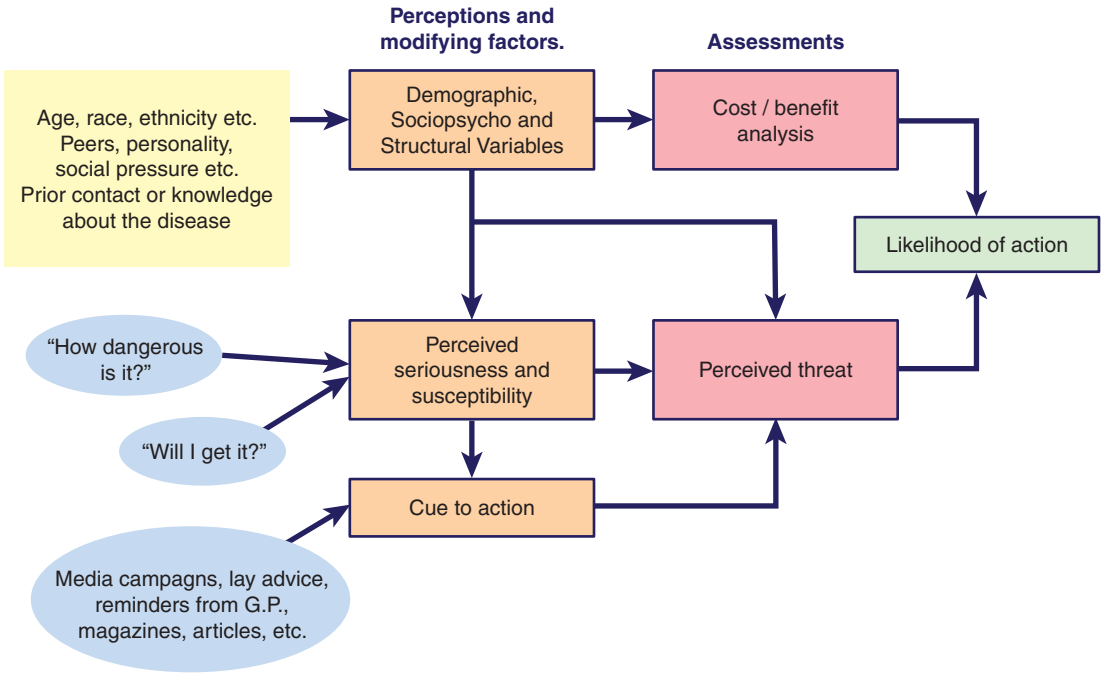

Figure B-5 Health Belief Model (HBM). (Image courtesy of Glanz et al (2002).)

Health Belief Model Concept	Definition	Application
Perceived susceptibility	One's opinion of chances of getting a condition.	Define population(s) at risk, risk levels. Personalize risk based on a person's features or behavior. Heighten perceived susceptibility if too low.
Perceived severity	One's opinion of how serious a condition and its sequelae are.	Specify consequences of the risk and the condition.
Perceived benefits	One's opinion of the efficacy of the advised action to reduce risk or the seriousness of impact.	Define action to take: how, where, when; clarify the positive effects to be expected.
Perceived barriers	One's opinion of the tangible and psychological costs of the advised action.	Identify and reduce barriers through reassurance, incentives, and assistance.
Cues to action	Strategies to activate readiness.	Provide how-to information; promote awareness, reminders.
Self-efficacy	Confidence in one's ability to take action.	Provide training, guidance in performing action.

Glanz K, Bishop DB. The role of behavioral science theory in development and implementation of public health interventions. *Annu Rev Public Health*. 31:399, 2010.
Glanz, K., Rimer, BK, Lewis, FM. *Health Behavior and Health Education. Theory, Research and Practice*. San Francisco: Wiley & Sons., 2002.

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TABLE B-13 Health-Promotion Intervention Models *(continued)*

Motivational Interviewing

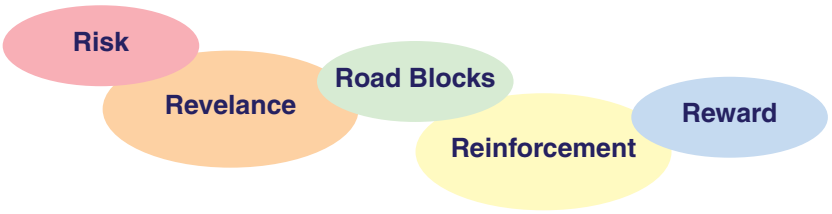

Figure B-6 Key Words for Motivational Interviewing.

Motivational Interviewing (MI) Concept	Definition	Application
Motivation to change comes from the client, not the counselor	Direct persuasion is not an effective method for achieving change. Client must articulate and resolve his or her own ambivalence.	Counseling style is a quiet, eliciting one. Partnership is the goal, not an expert—recipient relationship.
Resolution of ambivalence	Directive, client-centered counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence.	Compared with nondirective counseling, it is more focused and goal-directed. Readiness to change is a fluctuating product of personal interaction.

Rollnick S., & Miller, W.R. What is motivational interviewing? Behavioural and Cognitive Psychotherapy, 23: 325, 1995.

Social Cognitive Theory

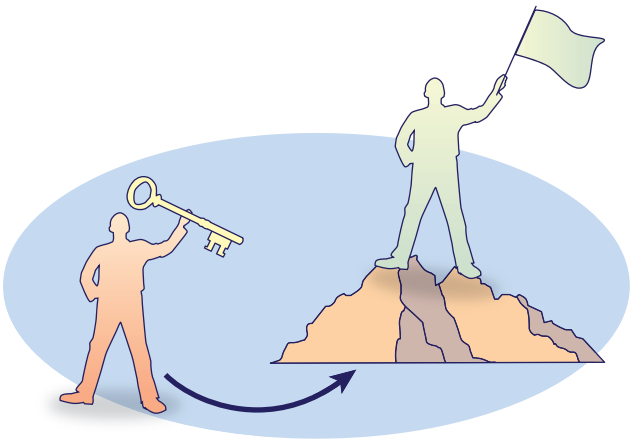

Figure B-7 Self-Efficacy as part of Social Cognitive Theory.

Social Cognitive Theory Principle	Processes	Application
Human functioning is self-regulated	Cognitive, vicarious, and self-reflective processes	Human adaptation to change
Dynamic interplay of personal, behavioral, and environmental influences	Self as organizing, proactive, self-reflective	People are not reactive organisms shepherded by environmental forces or concealed inner impulses
People watch and learn from others	Interactive learning	Confidence comes from practice
Self-efficacy is the belief in the ability to succeed in specific situations	Positive approaches to goals, tasks, and challenges.	Those who believe they can perform well are more likely to view difficult tasks as something to be mastered rather than something to be avoided.

Bandura, A. *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall, 1986.

(continued)

TABLE B-13 Health-Promotion Intervention Models *(continued)*

Transtheoretical Model (TTM)

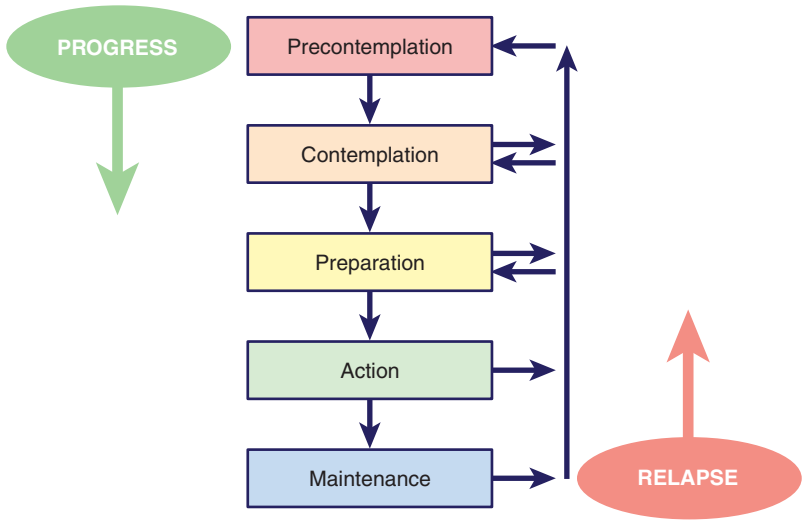

Figure B-8 Transtheoretical Model (TTM). (Image courtesy of Prochaska and DiClemente (1982).)

TTM Stage	Definition	Helping Processes
Precontemplation	Individual has the problem (whether he/she recognizes it or not) and has no intention of changing.	Consciousness raising (information and knowledge) Dramatic relief (role-playing) Environmental reevaluation (how problem affects physical environment)
Contemplation	Individual recognizes the problem and is seriously thinking about changing.	Self-reevaluation (assessing one's feelings regarding behavior)
Preparation for action	Individual recognizes the problem and intends to change the behavior within the next month. Some behavior change efforts may be reported but the defined behavior change criterion has not been reached consistently.	Self-liberation (commitment or belief in the ability to change)
Action	Individual has enacted consistent behavior change for less than six months.	Reinforcement management (overt and covert rewards) Helping relationships (social support, self-help groups) Counterconditioning (alternatives for behavior) Stimulus control (avoid high-risk cues)
Maintenance	Individual maintains new behavior for six months or more.	Support and encouragement

Prochaska JO, DiClemente CC. Trans-theoretical therapy – toward a more integrative model of change. *Psychotherapy: Theory, Research & Practice.* 19(3):276, 1982.

TABLE B-14 Sample Monitoring and Evaluation Audits for Patient Education

This patient education audit identifies the ability of the patient to demonstrate or verbalize how he or she will or has changed behaviors after nutritional instructions.

Any Patient

1. Patient is able to personalize the MyPyramid food guidance system.
2. Patient is able to explain the importance of his or her diet for his or her health.
3. Patient is able to plan _____ day's menus and snacks from his/her dietary pattern.
4. Patient is able to incorporate desirable economic/ethnic food choices into his/her prescribed diet.
5. Patient has been following _____ diet at home for a period of time and is able to describe the elements of this diet with accuracy.
6. Patient expresses recognition of a need to lose/gain weight.
7. Patient is able to describe specific food allergies and food ingredients to avoid.
8. Patient is able to describe the reasons for following _____ diet (e.g., improve appearance, increase energy, reduce chances for complications, improve quality of life).
9. Patient is able to describe the impact of appropriate activity or exercise on health and nutritional well-being.

Cardiac Diet

1. Patient is able to name three beverages that are high in caffeine.
2. Patient is able to describe modifications in his or her diet that will be needed to prevent further coronary complications: saturated versus poly- and monounsaturated fats, sodium and potassium, fiber, and use of the DASH diet.
3. Patient is able to categorize correctly into the proper food pyramid lists.
4. Patient is able to plan menus for home use that include appropriate modifications.
5. Patient is able to name snack foods that can be included in dietary plan.

Diabetes Diet

1. Patient is able to explain the relationship of diet with complications of diabetes.
2. Patient is able to name foods that contain CHO.
3. Patient is able to preplan meals for _____ weeks.
4. Patient is able to verbalize a simple definition of diabetes.
5. Patient is able to describe the role of medications related to food intake.
6. Patient is able to explain the rationale for following a prudent diet to prevent complications such as heart disease.
7. Patient is able to explain how proper spacing of meals affects his/her disorder.
8. Patient is able to describe symptoms of ketoacidosis and insulin shock and can name foods to take or avoid for each condition.
9. After looking at several food labels, patient is able to point out ingredients that mean carbohydrate.
10. Patient is able to describe techniques for managing special events (travel, parties, restaurants, holiday meals, weekends).
11. Patient is able to describe his or her personal exercise prescription as ___ minutes of activity ___ times per week.
12. Patient is able to describe 1–2 items to carry in case of episodes of low blood glucose.
13. Patient is able to define when to call his or her health provider (e.g., when glucose is above/below normal ___ times).
14. Patient is able to discuss proper foot care, the need for eye exams, and the need for foot exams.

Dumping Syndrome Diet

1. Patient is able to verbalize the effects of diet on dumping syndrome.
2. Patient is able to explain the guidelines to be followed to prevent dumping syndrome (e.g., beverages are served 30 minutes before or after meals; concentrated sweets are omitted or severely limited).

Gliadin-Free/Gluten-Restricted Diet

1. Patient is able to examine food labels and to name ingredients that must be avoided.
2. Patient is able to list products that must be avoided in diet.
3. Patient is able to plan menus that can be used at home.
4. Patient is able to adapt recipes for use at home.

High-Fiber Diet

1. Patient is able to verbalize foods that can be used to increase fiber in his or her diet, to desired level of ___ grams daily.
2. Patient is able to explain the role of fiber in his or her particular disorder.
3. Patient is able to describe the purpose of adequate fluids in the dietary regimen and is able to consume ___ milliliters daily.

Lactose Intolerance Diet

1. Patient is able to name foods or beverages that must be avoided.
2. Patient is able to plan menus that are nutritionally complete for calcium but are lactose restricted.
3. Patient demonstrates awareness that he or she can tolerate up to ___ milliliters of lactose per day at this time.
4. Patient is able to discuss the difference between lactose intolerance and milk allergy.

Low-Cholesterol and Dyslipidemia Diets

1. Patient is able to describe simple definitions for cholesterol and saturated, polyunsaturated, and monounsaturated fats.
2. Patient is able to identify foods that have high cholesterol content.
3. Patient is able to name vegetable oils that may be used in the diet.
4. Patient is able to describe three cooking methods that are acceptable for the dietary regimen.
5. Patient is able to name foods that are good sources of monounsaturated fats.

(continued)

TABLE B-14 Sample Monitoring and Evaluation Audits for Patient Education *(continued)*

Low-Fat Diet

1. Patient is able to name foods that he or she must omit for the low-fat diet.
2. Patient is able to explain the role of fat in his or her condition.
3. Patient is able to note grams of fat from a given food label.

Mineral-Altered Diets (Iron, Potassium, Calcium, Sodium)

1. Patient is able to name foods that are high/low in minerals.
2. Patient is able to accurately select menu choices for days that include/exclude foods that are high in mineral.
3. Patient is able to plan menus for home that are high/low in minerals.

Pregnancy Diet

1. Patient is able to describe nutritional changes to her diet in order to have a healthy baby.
2. Patient is able to describe why breastfeeding is an important consideration.

Protein-Altered Diets

1. Patient can identify foods that contain protein of high biological value.
2. Patient can name foods to include/omit in diet to increase/decrease the protein content of meals and snacks.

Renal Diets

1. Patient is able to describe restrictions that are needed in regard to protein, sodium, potassium, fluid, calories, and phosphorus.
2. Patient is able to plan menus that are balanced for the restricted nutrients.
3. Patient is able to name "free" foods that he or she can eat as desired.
4. Patient is able to discuss how foods, nutrients, and prescribed medications may interact.

Sodium Restrictions

1. Patient is able to name foods that are naturally high in sodium.
2. Patient is able to name foods that have been processed or prepared with an excess of sodium.
3. Patient is able to explain the difference between "salt" and "sodium" in foods.
4. Patient is able to list seasonings that can be used at home in place of salt and salt-containing seasonings.
5. Patient is able to plan menus for home that will be low in sodium.
6. Patient is able to identify salt substitutes that he or she can use for his or her condition.
7. Patient is able to discuss how other minerals (potassium, calcium, magnesium) play a role in the specific condition.

Vegetarian Diet

1. Patient is able to identify correctly two or more complementary protein foods.
2. Patient is able to plan menus that provide adequate protein and vitamin B_{12}, zinc, and so on for age and gender.

Weight Management Diet

1. Patient is able to verbalize his or her primary motivation for losing weight and current readiness for a change in behaviors.
2. Patient is able to describe his or her realistic goal for weight loss—either short term or long term, including a timetable.
3. Patient is able to list foods that are low in energy and may be eaten as snacks.
4. Patient is able to categorize foods into the proper pyramid food categories.
5. Patient is able to demonstrate a proper technique for recording food intake at home.
6. Patient has demonstrated weight loss over a certain timeframe.

APPENDIX C

Acuity Ranking for Dietitian Services and Concept Map

Over 100 dietitians, clinical nutrition managers, and specialists were surveyed for this acuity ranking for dietitian services, and a summary is given below. Levels of consensus on acuity are indicated for the medical diagnoses and conditions in this text. Where strong consensus was available, this table provides the acuity ranking for the nutritional involvement needed from a registered dietitian (RD). The survey asked the questions listed in Table C-1. Table C-2 summarizes the rankings given by participants to the nutrition acuity by condition or disease. Concept maps are useful for organizing data to prepare assessments or case reviews. Figure C-1 can be used or adapted as a teaching tool for skill development. Figure C-2 provides an example of a process chart for considering all aspects of data for a comprehensive functional nutrition plan.

TABLE C-1 Nutrition Acuity and Medical Diagnosis–Related Survey Questions

Rate your opinion about the level of dietitian involvement (over time, not just per visit) for the following diagnoses on a 1 to 5 rating scale where

1 = Little involvement; minimal, can be delegated to others
2 = Some roles in oversight of nutrition care
3 = Moderate involvement needed over time
4 = Extensive involvement needed over time
5 = Unable to determine; no opinion or experience

TABLE C-2 Acuity for Dietitian Roles in Medical Diagnoses

Minimal Role of Dietitian–1	Some Roles of Dietitian–2	Moderate Role of Dietitian–3	Extended Role of Dietitian–4
NORMAL LIFE-CYCLE CONDITIONS			
Pregnancy, normal	Child, normal (1–2)	Pregnancy, high risk	
Lactation	Teenager, normal		
Infant, normal (birth up to 6 months)	Adult male, normal		
Infant, normal (6–12 months) (1–2)	Adult female, normal		
	Elderly male, normal		
	Elderly female, normal		
DIETARY PRACTICES AND MISCELLANEOUS CONDITIONS			
Periodontal disease (1–2)	Complementary medicine and herbal/botanical counseling	Pressure ulcer, stages 1 or 2 (2–3)	Pressure ulcer, stages 3 or 4 or multiple
Temporomandibular joint (TMJ) dysfunction	Cultural food pattern, advisement and planning	Vitamin deficiency prevention or counseling	
Skin disorders (acne, rosacea, eczema, psoriasis)	Vegetarian diet advisement or planning	Food allergy, multiple or complex (3–4)	
Ménière's syndrome	Religious dietary patterns, advisement/planning		
	Dental difficulties (caries, wired jaw, mouth pain, xerostomia) (2–3)		
	Vision and self-feeding problems (low vision or chewing problems) (1–2) blindness, coordination		
	Food allergy, simple (2–3)		
	Foodborne illness, prevention or counseling		

(continued)

TABLE C-2 Acuity for Dietitian Roles in Medical Diagnoses *(continued)*

Minimal Role of Dietitian–1	Some Roles of Dietitian–2	Moderate Role of Dietitian–3	Extended Role of Dietitian–4
PEDIATRICS: BIRTH DEFECTS, GENETIC, ACQUIRED DISORDERS			
Attention deficit disorders	Abetalipoproteinemia (variable)	Bronchopulmonary dysplasia (3–4)	Failure to thrive, pediatric
Autism spectrum disorders (1–2)	Biliary atresia (2–3)	Cerebral palsy	Inborn errors of carbohydrate metabolism
Adrenoleukodystrophy (variable)	Congenital heart disease	Cleft palate	Hirschsprung's disease (congenital megacolon)
Leukodystrophies (variable)	Cystinosis and Fanconi's syndrome (variable)	Homocystinuria (3–4)	HIV infection and AIDS, pediatric
Otitis media	Down syndrome	Maple syrup urine disease (MSUD) (3–4)	Low birth weight or premature infant (3–4)
	Fetal alcohol syndrome (1–2)	Medium-chain acyl-CoA dehydrogenase deficiency (MCADD)	Necrotizing enterocolitis
	Large for gestational age infant (variable)	Myelomeningocele (variable)	Phenylketonuria (PKU)
		Obesity, childhood (prevention, treatment) (3–4)	Tyrosinemia (variable)
		Prader–Willi syndrome (3–4)	Urea cycle disorders (variable)
		Rickets, nutritional	
		Spina bifida and neural tube defects	
		Wilson's disease (hepatolenticular degeneration)	
NEUROLOGICAL AND PSYCHIATRIC CONDITIONS			
Neurological Disorders			
Migraine headache, prevention or counseling	Epilepsy or seizure disorders	Amyotrophic lateral sclerosis	Brain trauma
Trigeminal neuralgia (1–2)	Multiple sclerosis	Cerebral aneurysm	Coma
	Myasthenia gravis and neuromuscular junction disorders	Guillain-Barré syndrome	
	Parkinson's disease	Huntington's chorea (variable)	
	Tardive dyskinesia	Spinal cord injury	
		Stroke (cerebrovascular accident)	
Eating Disorders		Anorexia nervosa	
		Binge eating disorder (3–4)	
		Bulimia (3–4)	
		Other disordered eating patterns (3–4)	
Psychiatric Disorders			
Bipolar disorder (1–2)		Alzheimer's disease or other dementias	
Depression with numerous medications (1–2)			
Schizophrenia and psychoses (1–2)			
Substance use disorders			

(continued)

TABLE C-2 Acuity for Dietitian Roles in Medical Diagnoses *(continued)*

Minimal Role of Dietitian–1	Some Roles of Dietitian–2	Moderate Role of Dietitian–3	Extended Role of Dietitian–4
PULMONARY DISORDERS			
Asthma	Cor pulmonale (variable)	Chronic obstructive pulmonary diseases (emphysema or chronic bronchitis)	Chylothorax
Bronchiectasis	Interstitial lung disease (1–2)	Cystic fibrosis	
Bronchitis, acute	Sarcoidosis	Respiratory distress syndrome (3–4)	Respiratory failure and ventilator dependency
Pneumonia (1–2)	Sleep apnea	Transplantation, lung (3–4)	
Pulmonary embolism (1–2)	Thoracic empyema		
	Tuberculosis		
CARDIOVASCULAR DISORDERS			
Angina pectoris	Peripheral artery disease	Atherosclerosis, coronary heart disease, and dyslipidemias	Cardiac cachexia
Arteritis		Cardiomyopathies	Heart transplantation or heart–lung transplantation
Pericarditis and cardiac tamponade		Heart failure	
Thrombophlebitis		Hypertension	
		Myocardial infarction	
GASTROINTESTINAL DISORDERS			
Upper GI			
Dyspepsia or indigestion (1–2)	Esophageal varices (2–3)	Dysphagia (3–4)	
	Hiatal hernia, esophagitis, and gastroesophageal reflux (GERD) (2–3)	Esophageal stricture or spasm, achalasia, or Zenker's diverticulum	
	Gastric retention or gastroparesis (2–3)	Esophageal trauma (3–4)	
	Peptic ulcer	Gastritis and gastroenteritis	
		Giant hypertrophic gastritis (Ménétrier's disease)	
		Gastrectomy and/or vagotomy (3–4)	
		Vomiting, pernicious	
Lower GI			
Lactose malabsorption (lactase deficiency) (variable)	Diarrhea, dysentery, and traveler's diarrhea	Fat malabsorption syndrome	Tropical sprue
Constipation (1–2)	Diverticular diseases (2–3)	Megacolon, acquired	Celiac disease
Fecal incontinence	Peritonitis	Irritable bowel disease	Crohn's disease (3–4)
Hemorrhoids, hemorrhoidectomy	Colostomy (2–3)	Carcinoid syndrome	Ulcerative colitis
Proctitis		Ileostomy	Short bowel syndrome
		Intestinal lymphangiectasia (variable)	Intestinal fistula
		Whipple's disease (intestinal lipodystrophy) (3–4)	Intestinal transplantation

(continued)

TABLE C-2 Acuity for Dietitian Roles in Medical Diagnoses *(continued)*

Minimal Role of Dietitian–1	Some Roles of Dietitian–2	Moderate Role of Dietitian–3	Extended Role of Dietitian–4
HEPATIC, PANCREATIC, AND BILIARY DISORDERS			
Jaundice	Ascites and chylous ascites	Alcoholic liver disease	Liver transplantation
	Hepatitis	Hepatic cirrhosis	
	Pancreatic insufficiency (2–3)	Hepatic encephalopathy, failure or coma (3–4)	
	Gallbladder disease, surgical or nonsurgical	Pancreatitis, acute (3–4)	
	Biliary cirrhosis	Pancreatitis, chronic	
	Cholestatic liver disease (2–3)	Zollinger–Ellison syndrome (variable)	
ENDOCRINE DISORDERS			
Adrenocortical insufficiency, chronic	Pregnancy-induced	Metabolic syndrome (3–4)	Type 1 diabetes
	Hypertension and preeclampsia	Prediabetes (3–4)	Pancreatic transplantation
Addison's disease (variable)	Syndrome of inappropriate antidiuretic hormone (SIADH)	Diabetic gastroparesis (3–4)	Type 2 diabetes mellitus, adults
Cushing's syndrome (variable)		Diabetic ketoacidosis (3–4)	Type 2 diabetes mellitus, children and teens
Acromegaly (variable)	Parathyroid disorders	Hyperosmolar hyperglycemic state (3–4)	Gestational diabetes
Hyperaldosteronism (variable)	(altered calcium)	Hypoglycemia, iatrogenic	
Hypopituitarism (variable)		Hyperinsulinism and spontaneous hypoglycemia (3–4)	
Pheochromocytoma (variable)		Diabetes insipidus	
Hyperthyroidism			
Hypothyroidism			
WEIGHT MANAGEMENT, UNDERNUTRITION, AND MALNUTRITION		Underweight or unintentional weight loss (3–4)	Overweight or uncomplicated obesity
		Protein–calorie malnutrition, mild (3–4)	Obesity, medical (with comorbidities)
			Protein–calorie malnutrition, moderate or severe
			Energy malnutrition
			Refeeding syndrome
MUSCULOSKELETAL AND COLLAGEN DISORDERS			
Ankylosing spondylitis (variable)	Immobilization, extended	Rhabdomyolysis (variable)	
Myofascial pain syndromes: fibromyalgia or polymyalgia rheumatica	Muscular dystrophy		
Osteomyelitis, acute (1–2)	Osteoarthritis and degenerative joint disease		
Paget's disease (osteitis deformans) (variable)	Osteopenia and osteomalacia		
Polyarteritis nodosa (variable)	Osteoporosis		
Rheumatoid arthritis	Systemic lupus erythematosus		
Ruptured intervertebral disc			
Scleroderma (systemic sclerosis) (1–2)			

(continued)

TABLE C-2 Acuity for Dietitian Roles in Medical Diagnoses *(continued)*

Minimal Role of Dietitian–1	Some Roles of Dietitian–2	Moderate Role of Dietitian–3	Extended Role of Dietitian–4
HEMATOLOGY: ANEMIAS AND BLOOD DISORDERS			
Aplastic anemia	Anemia, hemolytic from vitamin E deficiency (2–3)		
Anemia from parasitic infestation	Anemia, iron deficiency		
Anemia, sickle cell	Anemia, nutritional (folic acid, copper, etc.)		
Anemia, sideroblastic	Anemia, pernicious or vitamin B_{12} deficiency		
Polycythemia vera (Osler's disease)	Hemochromatosis (iron overloading)		
Thalassemia (Cooley's anemia)	Hemorrhage, acute or chronic		
Thrombocytic purpura			
CANCER	Breast cancer	Brain tumor	Bone marrow transplantation
	Choriocarcinoma	Esophageal cancer (3–4)	
	Leukemia, chronic	Gastric carcinoma (3–4)	
	Lung cancer	Hepatic carcinoma	
	Myeloma (simple or multiple) (2–3)	Intestinal carcinoma (3–4)	
	Prostate cancer	Leukemia, acute	
		Lymphoma, Hodgkin's disease	
		Lymphoma, non-Hodgkin's	
		Oral cancer (3–4)	
		Osteosarcoma (2–3)	
		Pancreatic carcinoma	
		Radiation colitis or enteritis (3–4)	
		Wilms' tumor (embryoma of kidney)	
SURGICAL DISORDERS			
Appendectomy	Surgery, general	Bowel surgery	Gastric bypass surgery
Cesarean delivery	Sodium imbalances: hyponatremia or hypernatremia	Open heart surgery	
Hysterectomy, abdominal	Potassium imbalances: hypokalemia or hyperkalemia	Pancreatic surgery (3–4)	
Pelvic exenteration	Calcium imbalances: hypocalcemia or hypercalcemia		
Spinal surgery (1–2)	Magnesium imbalances: hypomagnesemia or hypermagnesemia		
Total hip arthroplasty	Phosphate imbalances: hypophosphatemia or hyperphosphatemia		
Tonsillectomy and adenoidectomy	Amputation, one or more limbs		
	Parathyroidectomy		

(continued)

TABLE C-2 Acuity for Dietitian Roles in Medical Diagnoses *(continued)*

Minimal Role of Dietitian–1	Some Roles of Dietitian–2	Moderate Role of Dietitian–3	Extended Role of Dietitian–4
AIDS, INFECTIONS, BURNS, IMMUNOLOGY, AND TRAUMA			
Candidiasis	Bacterial endocarditis	AIDS and HIV infection, adult (3–4)	Burns, major thermal injury
Chronic fatigue syndrome (1–2)	Burns, minor thermal injury	Sepsis or septicemia	Multiple organ dysfunction
Fever >102°F	Encephalitis or Reye's syndrome	Trauma, major	
Herpes simplex 1 or 2	Fracture, hip or long bone		
Herpes zoster (shingles)	Trauma, minor		
Infection, general			
Influenza (flu, respiratory)			
Intestinal parasites			
Meningitis			
Mononucleosis			
Pelvic inflammatory disease			
Poliomyelitis			
Rheumatic fever			
Toxic shock syndrome			
Trichinosis			
Typhoid fever			
RENAL DISORDERS			
Pyelonephritis	Inborn errors: polycystic kidney disease	Inborn errors: vitamin D–resistant rickets (3–4)	Chronic kidney disease
Urolithiasis (renal stones) (1–2)	Glomerulonephritis, acute	Inborn errors: Hartnup disease (variable)	Hemodialysis
	Glomerulonephritis, chronic	Nephrosclerosis (2–3)	Peritoneal renal dialysis
	Nephritis (Bright's disease) (2–3)	Renal failure, acute	Renal transplantation
	Nephrotic syndrome (2–3)		
ENTERAL–PARENTERAL NUTRITION			Tube feeding, initiation, monitoring, or home
			Parenteral nutrition, initiation, monitoring, or home

Thanks to Matthew Dallas, MS, RD, for summarizing this table.

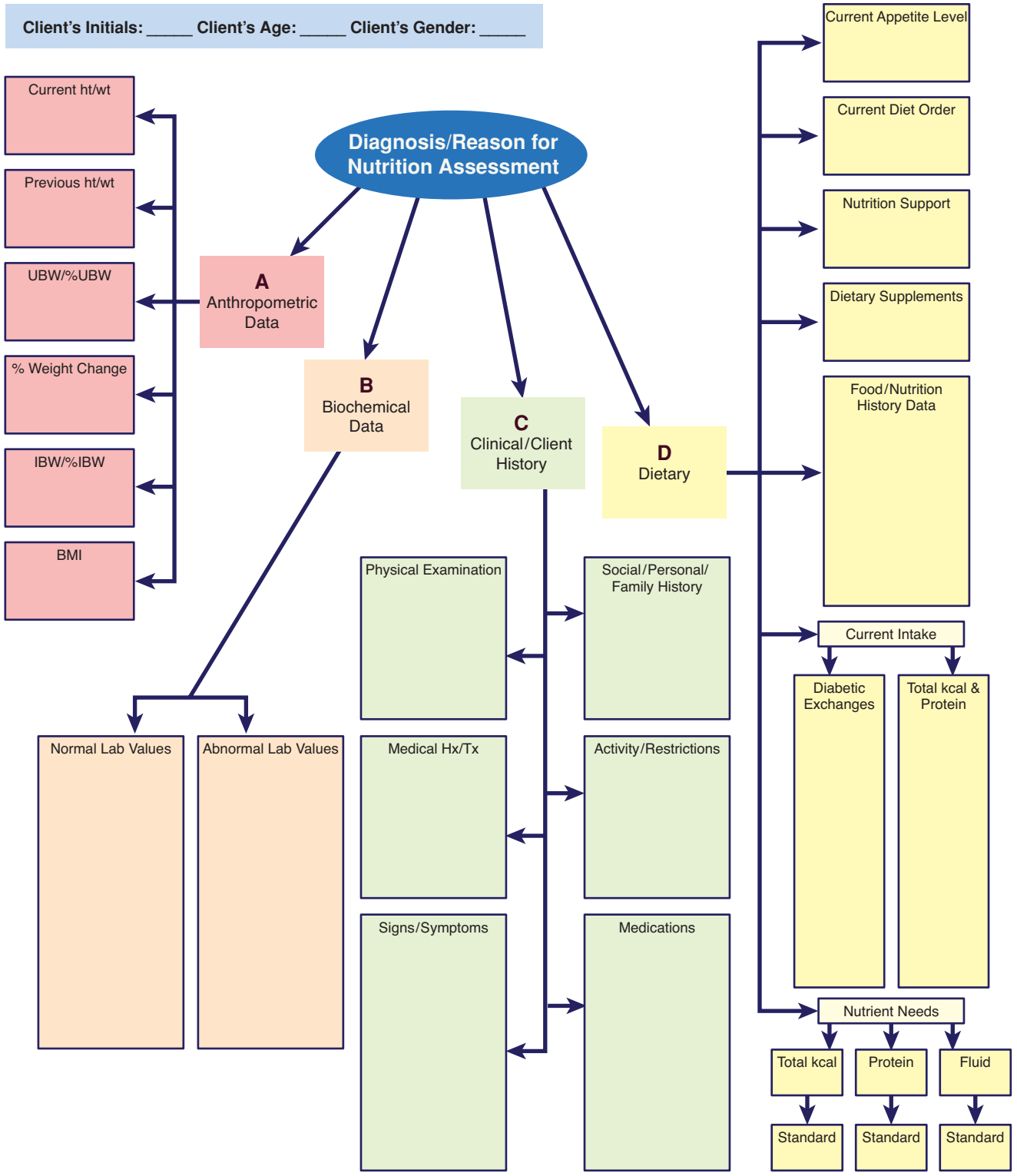

Figure C-1 Concept Map. Used with permission from Molaison, E.F., Taylor, K., Erickson, D., and Connell, C.L. (2009). Perception of concept mapping as a learning tool by dietetic internship students and preceptors. *Journal of Allied Health*, 38, e-97–e-103.

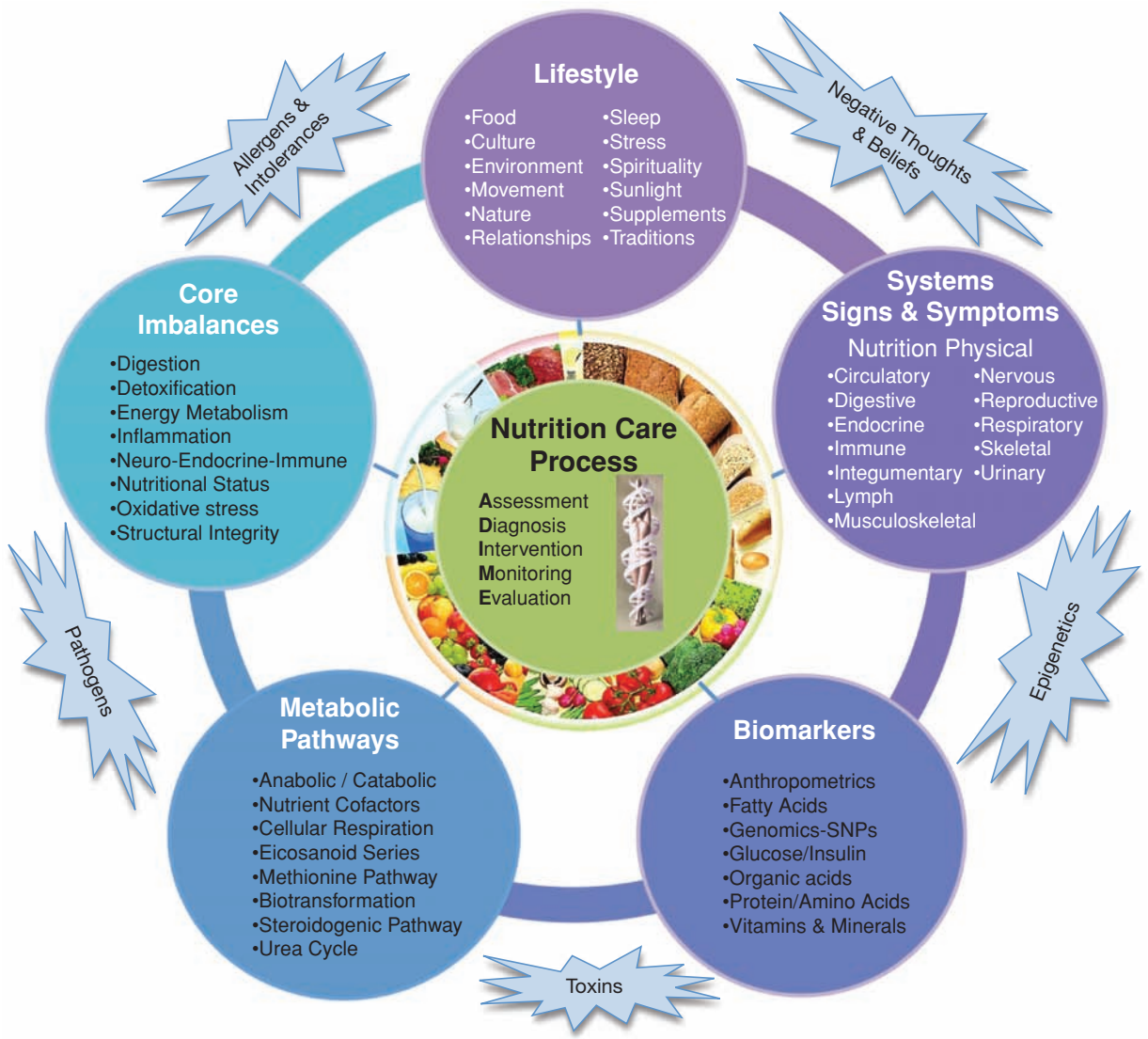

Figure C-2 Integrative & Functional Medical Nutrition Therapy (IFMNT) Process Guide. (© 2010 Copyright. Used with permission from M. Swift, D. Noland & E. Redmond.)

APPENDIX D

Dietary Reference Intakes

Dietary Reference Intakes (DRIs): Recommended Intakes for Individuals, Vitamins

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Vit A (µg/d)[a]	Vit C (mg/d)	Vit D (µg/d)[b,c]	Vit E (mg/d)[d]	Vit K (µg/d)	Thiamin (mg/d)	Riboflavin (mg/d)	Niacin (mg/d)[e]	Vit B_6 (mg/d)	Folate (µg/d)[f]	Vit B_{12} (µg/d)	Pantothenic Acid (mg/d)	Biotin (µg/d)	Choline[g] (mg/d)
Infants														
0–6 mo	400*	40*	5*	4*	2.0*	0.2*	0.3*	2*	0.1*	65*	0.4*	1.7*	5*	125*
7–12 mo	500*	50*	5*	5*	2.5*	0.3*	0.4*	4*	0.3*	80*	0.5*	1.8*	6*	150*
Children														
1–3 y	**300**	**15**	5*	**6**	30*	**0.5**	**0.5**	**6**	**0.5**	**150**	**0.9**	2*	8*	200*
4–8 y	**400**	**25**	5*	**7**	55*	**0.6**	**0.6**	**8**	**0.6**	**200**	**1.2**	3*	12*	250*
Males														
9–13 y	**600**	**45**	5*	**11**	60*	**0.9**	**0.9**	**12**	**1.0**	**300**	**1.8**	4*	20*	375*
14–18 y	**900**	**75**	5*	**15**	75*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	25*	550*
19–30 y	**900**	**90**	5*	**15**	120*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	30*	550*
31–50 y	**900**	**90**	5*	**15**	120*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	30*	550*
51–70 y	**900**	**90**	10*	**15**	120*	**1.2**	**1.3**	**16**	**1.7**	**400**	**2.4**[i]	5*	30*	550*
> 70 y	**900**	**90**	15*	**15**	120*	**1.2**	**1.3**	**16**	**1.7**	**400**	**2.4**[i]	5*	30*	550*
Females														
9–13 y	**600**	**45**	5*	**11**	60*	**0.9**	**0.9**	**12**	**1.0**	**300**	**1.8**	4*	20*	375*
14–18 y	**700**	**65**	5*	**15**	75*	**1.0**	**1.0**	**14**	**1.2**	**400**[i]	**2.4**	5*	25*	400*
19–30 y	**700**	**75**	5*	**15**	90*	**1.1**	**1.1**	**14**	**1.3**	**400**[i]	**2.4**	5*	30*	425*
31–50 y	**700**	**75**		**15**	90*	**1.1**	**1.1**	**14**	**1.3**	**400**[i]	**2.4**	5*	30*	425*
51–70 y	**700**	**75**	10*	**15**	90*	**1.1**	**1.1**	**14**	**1.5**	**400**	**2.4**[h]	5*	30*	425*
> 70 y	**700**	**75**	15*	**15**	90*	**1.1**	**1.1**	**14**	**1.5**	**400**	**2.4**[h]	5*	30*	425*
Pregnancy														
14–18 y	**750**	**80**	5*	**15**	75*	**1.4**	**1.4**	**18**	**1.9**	**600**[j]	**2.6**	6*	30*	450*
19–30 y	**770**	**85**	5*	**15**	90*	**1.4**	**1.4**	**18**	**1.9**	**600**[j]	**2.6**	6*	30*	450*
31–50 y	**770**	**85**	5*	**15**	90*	**1.4**	**1.4**	**18**	**1.9**	**600**[j]	**2.6**	6*	30*	450*
Lactation														
14–18 y	**1,200**	**115**	5*	**19**	75*	**1.4**	**1.6**	**17**	**2.0**	**500**	**2.8**	7*	35*	550*
19–30 y	**1,300**	**120**	5*	**19**	90*	**1.4**	**1.6**	**17**	**2.0**	**500**	**2.8**	7*	35*	550*
31–50 y	**1,300**	**120**	5*	**19**	90*	**1.4**	**1.6**	**17**	**2.0**	**500**	**2.8**	7*	35*	550*

NOTE: This table (taken from the DRI reports, see www.nap.edu) presents Recommended Dietary Allowances (RDAs) in **bold type** and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). RDAs and AIs may both be used as goals for individual intake. RDAs are set to meet the needs of almost all (97 to 98 percent) individuals in a group. For healthy breastfed infants, the AI is the mean intake. The AI for other life stage and gender groups is believed to cover needs of all individuals in the group, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

[a] As retinol activity equivalents (RAEs). 1 RAE = 1 µg retinol, 12 µg β-carotene, 24 µg α-carotene, or 24 µg β-cryptoxanthin. The RAE for dietary provitamin A carotenoids is twofold greater than retinol equivalents (RE), whereas the RAE for preformed vitamin A is the same as RE.

[b] As cholecalciferol. 1 µg cholecalciferol = 40 IU vitamin D.

[c] In the absence of adequate exposure to sunlight.

[d] As α-tocopherol. α-Tocopherol includes *RRR*-α-tocopherol, the only form of α-tocopherol that occurs naturally in foods, and the *2R*-stereoisomeric forms of α-tocopherol (*RRR*-, *RSR*-, *RRS*-, and *RSS*-α-tocopherol) that occur in fortified foods and supplements. It does not include the *2S*-stereoisomeric forms of α-tocopherol (*SRR*-, *SSR*-, *SRS*-, and *SSS*-α-tocopherol), also found in fortified foods and supplements.

[e] As niacin equivalents (NE). 1 mg of niacin = 60 mg of tryptophan; 0–6 months = preformed niacin (not NE).

[f] As dietary folate equivalents (DFE). 1 DFE = 1 µg food folate = 0.6 µg of folic acid from fortified food or as a supplement consumed with food = 0.5 µg of a supplement taken on an empty stomach.

[g] Although AIs have been set for choline, there are few data to assess whether a dietary supply of choline is needed at all stages of the life cycle, and it may be that the choline requirement can be met by endogenous synthesis at some of these stages.

[h] Because 10 to 30 percent of older people may malabsorb food-bound B_{12}, it is advisable for those older than 50 years to meet their RDA mainly by consuming foods fortified with B_{12} or a supplement containing B_{12}.

[i] In view of evidence linking folate intake with neural tube defects in the fetus, it is recommended that all women capable of becoming pregnant consume 400 µg from supplements or fortified foods in addition to intake of food folate from a varied diet.

[jk] It is assumed that women will continue consuming 400 µg from supplements or fortified food until their pregnancy is confirmed and they enter prenatal care, which ordinarily occurs after the end of the periconceptional period—the critical time for formation of the neural tube.

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Dietary Reference Intakes (DRIs): Recommended Intakes for Individuals, Elements

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Calcium (mg/d)	Chromium (µg/d)	Copper (µg/d)	Fluoride (mg/d)	Iodine (µg/d)	Iron (mg/d)	Magnesium (mg/d)	Manganese (mg/d)	Molybdenum (µg/d)	Phosphorus (mg/d)	Selenium (µg/d)	Zinc (mg/d)	Potassium (g/d)	Sodium (g/d)	Chloride (g/d)
Infants															
0–6 mo	210*	0.2*	200*	0.01*	110*	0.27*	30*	0.003*	2*	100*	15*	2*	0.4*	0.12*	0.18*
7–12 mo	270*	5.5*	220*	0.5*	130*	**11**	75*	0.6*	3*	275*	20*	**3**	0.7*	0.37*	0.57*
Children															
1–3 y	500*	11*	**340**	0.7*	**90**	**7**	**80**	1.2*	**17**	**460**	**20**	**3**	3.0*	1.0*	1.5*
4–8 y	800*	15*	**440**	1*	**90**	**10**	**130**	1.5*	**22**	**500**	**30**	**5**	3.8*	1.2*	1.9*
Males															
9–13 y	1,300*	25*	**700**	2*	**120**	**8**	**240**	1.9*	**34**	**1,250**	**40**	**8**	4.5*	1.5*	2.3*
14–18 y	1,300*	35*	**890**	3*	**150**	**11**	**410**	2.2*	**43**	**1,250**	**55**	**11**	4.7*	1.5*	2.3*
19–30 y	1,000*	35*	**900**	4*	**150**	**8**	**400**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.5*	2.3*
31–50 y	1,000*	35*	**900**	4*	**150**	**8**	**420**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.5*	2.3*
51–70 y	1,200*	30*	**900**	4*	**150**	**8**	**420**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.3*	2.0*
> 70 y	1,200*	30*	**900**	4*	**150**	**8**	**420**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.2*	1.8*
Females															
9–13 y	1,300*	21*	**700**	2*	**120**	**8**	**240**	1.6*	**34**	**1,250**	**40**	**8**	4.5*	1.5*	2.3*
14–18 y	1,300*	24*	**890**	3*	**150**	**15**	**360**	1.6*	**43**	**1,250**	**55**	**9**	4.7*	1.5*	2.3*
19–30 y	1,000*	25*	**900**	3*	**150**	**18**	**310**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.5*	2.3*
31–50 y	1,000*	25*	**900**	3*	**150**	**18**	**320**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.5*	2.3*
51–70 y	1,200*	20*	**900**	3*	**150**	**8**	**320**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.3*	2.0*
> 70 y	1,200*	20*	**900**	3*	**150**	**8**	**320**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.2*	1.8*
Pregnancy															
14–18 y	1,300*	29*	**1,000**	3*	**220**	**27**	**400**	2.0*	**50**	**1,250**	**60**	**13**	4.7*	1.5*	2.3*
19–30 y	1,000*	30*	**1,000**	3*	**220**	**27**	**350**	2.0*	**50**	**700**	**60**	**11**	4.7*	1.5*	2.3*
31–50 y	1,000*	30*	**1,000**	3*	**220**	**27**	**360**	2.0*	**50**	**700**	**60**	**11**	4.7*	1.5*	2.3*
Lactation															
14–18 y	1,300*	44*	**1,300**	3*	**290**	**10**	**360**	2.6*	**50**	**1,250**	**70**	**14**	5.1*	1.5*	2.3*
19–30 y	1,000*	45*	**1,300**	3*	**290**	**9**	**310**	2.6*	**50**	**700**	**70**	**12**	5.1*	1.5*	2.3*
31–50 y	1,000*	45*	**1,300**	3*	**290**	**9**	**320**	2.6*	**50**	**700**	**70**	**12**	5.1*	1.5*	2.3*

NOTE: This table presents Recommended Dietary Allowances (RDAs) in **bold type** and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). RDAs and AIs may both be used as goals for individual intake. RDAs are set to meet the needs of almost all (97 to 98 percent) individuals in a group. For healthy breastfed infants, the AI is the mean intake. The AI for other life stage and gender groups is believed to cover needs of all individuals in the group, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

SOURCES: *Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride* (1997); *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc* (2001); and *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate* (2004). These reports may be accessed via http://www.nap.edu.

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Dietary Reference Intakes (DRIs): Tolerable Upper Intake Levels (UL[a]), Vitamins

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Vitamin A (µg/d)[b]	Vitamin C (mg/d)	Vitamin D (µg/d)	Vitamin E (mg/d)[c,d]	Vitamin K	Thiamin	Ribo-flavin	Niacin (mg/d)[d]	Vitamin B_6 (mg/d)	Folate (µg/d)[d]	Vitamin B_{12}	Pantothenic Acid	Biotin	Choline (g/d)	Carote-noids[e]
Infants															
0–6 mo	600	ND[f]	25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7–12 mo	600	ND	25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Children															
1–3 y	600	400	50	200	ND	ND	ND	10	30	300	ND	ND	ND	1.0	ND
4–8 y	900	650	50	300	ND	ND	ND	15	40	400	ND	ND	ND	1.0	ND
Males, Females															
9–13 y	1,700	1,200	50	600	ND	ND	ND	20	60	600	ND	ND	ND	2.0	ND
14–18 y	2,800	1,800	50	800	ND	ND	ND	30	80	800	ND	ND	ND	3.0	ND
19–70 y	3,000	2,000	50	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
> 70 y	3,000	2,000	50	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
Pregnancy															
14–18 y	2,800	1,800	50	800	ND	ND	ND	30	80	800	ND	ND	ND	3.0	ND
19–50 y	3,000	2,000	50	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
Lactation															
14–18 y	2,800	1,800	50	800	ND	ND	ND	30	80	800	ND	ND	ND	3.0	ND
19–50 y	3,000	2,000	50	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND

[a] UL = The maximum level of daily nutrient intake that is likely to pose no risk of adverse effects. Unless otherwise specified, the UL represents total intake from food, water, and supplements. Due to lack of suitable data, ULs could not be established for vitamin K, thiamin, riboflavin, vitamin B_{12}, pantothenic acid, biotin, carotenoids. In the absence of ULs, extra caution may be warranted in consuming levels above recommended intakes.

[b] As preformed vitamin A only.

[c] As α-tocopherol; applies to any form of supplemental α-tocopherol.

[d] The ULs for vitamin E, niacin, and folate apply to synthetic forms obtained from supplements, fortified foods, or a combination of the two.

[e] β-Carotene supplements are advised only to serve as a provitamin A source for individuals at risk of vitamin A deficiency.

[f] ND = Not determinable due to lack of data of adverse effects in this age group and concern with regard to lack of ability to handle excess amounts. Source of intake should be from food only to prevent high levels of intake.

SOURCES: *Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride* (1997); *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids* (2000); and *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc* (2001). These reports may be accessed via http://www.nap.edu.

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Dietary Reference Intakes (DRIs): Tolerable Upper Intake Levels (UL[a]), Elements

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Arsenic[b]	Boron (mg/d)	Calcium (g/d)	Chromium	Copper (µg/d)	Fluoride (mg/d)	Iodine (µg/d)	Iron (mg/d)	Magnesium (mg/d)[c]	Manganese (mg/d)	Molybdenum (µg/d)	Nickel (mg/d)	Phosphorus (g/d)	Potassium	Selenium (µg/d)	Silicon[d]	Sulfate	Vanadium (mg/d)[e]	Zinc (mg/d)	Sodium (g/d)	Chloride (g/d)
Infants																					
0–6 mo	ND[f]	ND	ND	ND	ND	0.7	ND	40	ND	ND	ND	ND	ND	ND	45	ND	ND	ND	4	ND	ND
7–12 mo	ND	ND	ND	ND	ND	0.9	ND	40	ND	ND	ND	ND	ND	ND	60	ND	ND	ND	5	ND	ND
Children																					
1–3 y	ND	3	2.5	ND	1,000	1.3	200	40	65	2	300	0.2	3	ND	90	ND	ND	ND	7	1.5	2.3
4–8 y	ND	6	2.5	ND	3,000	2.2	300	40	110	3	600	0.3	3	ND	150	ND	ND	ND	12	1.9	2.9
Males, Females																					
9–13 y	ND	11	2.5	ND	5,000	10	600	40	350	6	1,100	0.6	4	ND	280	ND	ND	ND	23	2.2	3.4
14–18 y	ND	17	2.5	ND	8,000	10	900	45	350	9	1,700	1.0	4	ND	400	ND	ND	ND	34	2.3	3.6
19–70 y	ND	20	2.5	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	ND	400	ND	ND	1.8	40	2.3	3.6
>70 y	ND	20	2.5	ND	10,000	10	1,100	45	350	11	2,000	1.0	3	ND	400	ND	ND	1.8	40	2.3	3.6
Pregnancy																					
14–18 y	ND	17	2.5	ND	8,000	10	900	45	350	9	1,700	1.0	3.5	ND	400	ND	ND	ND	34	2.3	3.6
19–50 y	ND	20	2.5	ND	10,000	10	1,100	45	350	11	2,000	1.0	3.5	ND	400	ND	ND	ND	40	2.3	3.6
Lactation																					
14–18 y	ND	17	2.5	ND	8,000	10	900	45	350	9	1,700	1.0	4	ND	400	ND	ND	ND	34	2.3	3.6
19–50 y	ND	20	2.5	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	ND	400	ND	ND	ND	40	2.3	3.6

[a] UL = The maximum level of daily nutrient intake that is likely to pose no risk of adverse effects. Unless otherwise specified, the UL represents total intake from food, water, and supplements. Due to lack of suitable data, ULs could not be established for arsenic, chromium, silicon, potassium, and sulfate. In the absence of ULs, extra caution may be warranted in consuming levels above recommended intakes.

[b] Although the UL was not determined for arsenic, there is no justification for adding arsenic to food or supplements.

[c] The ULs for magnesium represent intake from a pharmacological agent only and do not include intake from food and water.

[d] Although silicon has not been shown to cause adverse effects in humans, there is no justification for adding silicon to supplements.

[e] Although vanadium in food has not been shown to cause adverse effects in humans, there is no justification for adding vanadium to food and vanadium supplements should be used with caution. The UL is based on adverse effects in laboratory animals and this data could be used to set a UL for adults but not children and adolescents.

[f] ND = Not determinable due to lack of data of adverse effects in this age group and concern with regard to lack of ability to handle excess amounts. Source of intake should be from food only to prevent high levels of intake.

SOURCES: *Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride* (1997); *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc* (2001); and *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate* (2004). These reports may be accessed via http://www.nap.edu.

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Dietary Reference Intakes (DRIs): Estimated Energy Requirements (EER) for Men and Women 30 Years of Age[a]

Food and Nutrition Board, Institute of Medicine, National Academies

Height (m [in])	PAL[b]	Weight for BMI[c] of 18.5 kg/m^2 (kg [lb])	Weight for BMI of 24.99 kg/m^2 (kg [lb])	EER, Men[d] (kcal/day)		EER, Women[d] (kcal/day)	
				BMI of 18.5 kg/m^2	BMI of 24.99 kg/m^2	BMI of 18.5 kg/m^2	BMI of 24.99 kg/m^2
1.50 (59)	Sedentary	41.6 (92)	56.2 (124)	1,848	2,080	1,625	1,762
	Low active			2,009	2,267	1,803	1,956
	Active			2,215	2,506	2,025	2,198
	Very active			2,554	2,898	2,291	2,489
1.65 (65)	Sedentary	50.4 (111)	68.0 (150)	2,068	2,349	1,816	1,982
	Low active			2,254	2,566	2,016	2,202
	Active			2,490	2,842	2,267	2,477
	Very active			2,880	3,296	2,567	2,807
1.80 (71)	Sedentary	59.9 (132)	81.0 (178)	2,301	2,635	2,015	2,211
	Low active			2,513	2,884	2,239	2,459
	Active			2,782	3,200	2,519	2,769
	Very active			3,225	3,720	2,855	3,141

[a] For each year below 30, add 7 kcal/day for women and 10 kcal /day for men. For each year above 30, subtract 7 kcal/day for women and 10 kcal/day for men.
[b] PAL = physical activity level.
[c] BMI = body mass index.
[d] Derived from the following regression equations based on doubly labeled water data:

Adult man: EER = 662 – 9.53 × age (y) + PA × (15.91 × wt [kg] + 539.6 × ht [m])
Adult woman: EER = 354 – 6.91 × age (y) + PA × (9.36 × wt [kg] + 726 × ht [m])

Where PA refers to coefficient for PAL

PAL = total energy expenditure ÷ basal energy expenditure

PA = 1.0 if PAL ≥ 1.0 < 1.4 (sedentary)
PA = 1.12 if PAL ≥ 1.4 < 1.6 (low active)
PA = 1.27 if PAL ≥ 1.6 < 1.9 (active)
PA = 1.45 if PAL ≥ 1.9 < 2.5 (very active)

Dietary Reference Intakes (DRIs): Acceptable Macronutrient Distribution Ranges

Food and Nutrition Board, Institute of Medicine, National Academies

Macronutrient	Range (percent of energy)		
	Children, 1–3 y	Children, 4–18 y	Adults
Fat	30–40	25–35	20–35
n-6 polyunsaturated fatty acids[a] (linoleic acid)	5–10	5–10	5–10
n-3 polyunsaturated fatty acids[a] (α-linolenic acid)	0.6–1.2	0.6–1.2	0.6–1.2
Carbohydrate	45–65	45–65	45–65
Protein	5–20	10–30	10–35

[a] Approximately 10% of the total can come from longer-chain *n*-3 or *n*-6 fatty acids.

SOURCE: *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids* (2002).

Dietary Reference Intakes (DRIs): Recommended Intakes for Individuals, Macronutrients
Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Total Water[a] (L/d)	Carbohydrate (g/d)	Total Fiber (g/d)	Fat (g/d)	Linoleic Acid (g/d)	α-Linolenic Acid (g/d)	Protein[b] (g/d)
Infants							
0–6 mo	0.7*	60*	ND	31*	4.4*	0.5*	9.1*
7–12 mo	0.8*	95*	ND	30*	4.6*	0.5*	**13.5**
Children							
1–3 y	1.3*	**130**	19*	ND	7*	0.7*	**13**
4–8 y	1.7*	**130**	25*	ND	10*	0.9*	**19**
Males							
9–13 y	2.4*	**130**	31*	ND	12*	1.2*	**34**
14–18 y	3.3*	**130**	38*	ND	16*	1.6*	**52**
19–30 y	3.7*	**130**	38*	ND	17*	1.6*	**56**
31–50 y	3.7*	**130**	38*	ND	17*	1.6*	**56**
51–70 y	3.7*	**130**	30*	ND	14*	1.6*	**56**
> 70 y	3.7*	**130**	30*	ND	14*	1.6*	**56**
Females							
9–13 y	2.1*	**130**	26*	ND	10*	1.0*	**34**
14–18 y	2.3*	**130**	26*	ND	11*	1.1*	**46**
19–30 y	2.7*	**130**	25*	ND	12*	1.1*	**46**
31–50 y	2.7*	**130**	25*	ND	12*	1.1*	**46**
51–70 y	2.7*	**130**	21*	ND	11*	1.1*	**46**
> 70 y	2.7*	**130**	21*	ND	11*	1.1*	**46**
Pregnancy							
14–18 y	3.0*	**175**	28*	ND	13*	1.4*	**71**
19–30 y	3.0*	**175**	28*	ND	13*	1.4*	**71**
31–50 y	3.0*	**175**	28*	ND	13*	1.4*	**71**
Lactation							
14–18 y	3.8*	**210**	29*	ND	13*	1.3*	**71**
19–30 y	3.8*	**210**	29*	ND	13*	1.3*	**71**
31–50 y	3.8*	**210**	29*	ND	13*	1.3*	**71**

NOTE: This table presents Recommended Dietary Allowances (RDAs) in **bold** type and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). RDAs and AIs may both be used as goals for individual intake. RDAs are set to meet the needs of almost all (97 to 98 percent) individuals in a group. For healthy infants fed human milk, the AI is the mean intake. The AI for other life stage and gender groups is believed to cover the needs of all individuals in the group, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.
[a] *Total* water includes all water contained in food, beverages, and drinking water.
[b] Based on 0.8 g/kg body weight for the reference body weight.

Dietary Reference Intakes (DRIs): Additional Macronutrient Recommendations
Food and Nutrition Board, Institute of Medicine, National Academies

Macronutrient	Recommendation
Dietary cholesterol	As low as possible while consuming a nutritionally adequate diet
Trans fatty acids	As low as possible while consuming a nutritionally adequate diet
Saturated fatty acids	As low as possible while consuming a nutritionally adequate diet
Added sugars	Limit to no more than 25% of total energy

SOURCE: *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids* (2002).

Dietary Reference Intakes (DRIs): Estimated Average Requirements for Groups

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	CHO (g/d)	Protein (g/d)	Vit A (µg/d)[a]	Vit C (mg/d)	Vit E (mg/d)[b]	Thiamin (mg/d)	Ribo-flavin (mg/d)	Niacin (mg/d)[c]	Vit B_6 (mg/d)	Folate (µg/d)[a]	Vit B_{12} (µg/d)	Copper (µg/d)	Iodine (µg/d)	Iron (mg/d)	Magnes-ium (mg/d)	Molyb-denum (µg/d)	Phos-phorus (mg/d)	Sele-nium (µg/d)	Zinc (mg/d)
Infants																			
7–12 mo		10												6.9					2.5
Children																			
1–3 y	100	11	210	13	5	0.4	0.4	5	0.4	120	0.7	260	65	3.0	65	13	380	17	2.5
4–8 y	100	15	275	22	6	0.5	0.5	6	0.5	160	1.0	340	65	4.1	110	17	405	23	4.0
Males																			
9–13 y	100	27	445	39	9	0.7	0.8	9	0.8	250	1.5	540	73	5.9	200	26	1,055	35	7.0
14–18 y	100	44	630	63	12	1.0	1.1	12	1.1	330	2.0	685	95	7.7	340	33	1,055	45	8.5
19–30 y	100	46	625	75	12	1.0	1.1	12	1.1	320	2.0	700	95	6	330	34	580	45	9.4
31–50 y	100	46	625	75	12	1.0	1.1	12	1.1	320	2.0	700	95	6	350	34	580	45	9.4
51–70 y	100	46	625	75	12	1.0	1.1	12	1.4	320	2.0	700	95	6	350	34	580	45	9.4
> 70 y	100	46	625	75	12	1.0	1.1	12	1.4	320	2.0	700	95	6	350	34	580	45	9.4
Females																			
9–13 y	100	28	420	39	9	0.7	0.8	9	0.8	250	1.5	540	73	5.7	200	26	1,055	35	7.0
14–18 y	100	38	485	56	12	0.9	0.9	11	1.0	330	2.0	685	95	7.9	300	33	1,055	45	7.3
19–30 y	100	38	500	60	12	0.9	0.9	11	1.1	320	2.0	700	95	8.1	255	34	580	45	6.8
31–50 y	100	38	500	60	12	0.9	0.9	11	1.1	320	2.0	700	95	8.1	265	34	580	45	6.8
51–70 y	100	38	500	60	12	0.9	0.9	11	1.3	320	2.0	700	95	5	265	34	580	45	6.8
> 70 y	100	38	500	60	12	0.9	0.9	11	1.3	320	2.0	700	95	5	265	34	580	45	6.8
Pregnancy																			
14–18 y	135	50	530	66	12	1.2	1.2	14	1.6	520	2.2	785	160	23	335	40	1,055	49	10.5
19–30 y	135	50	550	70	12	1.2	1.2	14	1.6	520	2.2	800	160	22	290	40	580	49	9.5
31–50 y	135	50	550	70	12	1.2	1.2	14	1.6	520	2.2	800	160	22	300	40	580	49	9.5
Lactation																			
14–18 y	160	60	880	96	16	1.2	1.3	13	1.7	450	2.4	985	209	7	300	35	1,055	59	10.9
19–30 y	160	60	900	100	16	1.2	1.3	13	1.7	450	2.4	1,000	209	6.5	255	36	580	59	10.4
31–50 y	160	60	900	100	16	1.2	1.3	13	1.7	450	2.4	1,000	209	6.5	265	36	580	59	10.4

NOTE: This table presents Estimated Average Requirements (EARs), which serve two purposes: for assessing a dequacy of population intakes, and as the basis for calculating Recommended Dietary Allowances (RDAs) for individuals for those nutrients. EARs have not been established for vitamin D, vitamin K, pantothenic acid, biotin, choline, calcium, chromium, fluoride, manganese, or other nutrients not yet evaluated via the DRI process.

[a] As retinol activity equivalents (RAEs). 1 RAE = 1 µg retinol, 12 µg β-carotene, 24 µg α-carotene, or 24 µg β-cryptoxanthin. The RAE for dietary provitamin A carotenoids is two-fold greater than retinol equivalents (RE), whereas the RAE for preformed vitamin A is the same as RE.

[b] As α-tocopherol. α-Tocopherol includes *RRR*-α-tocopherol, the only form of α-tocopherol that occurs naturally in foods, and the *2R*-stereoisomeric forms of α-tocopherol (*RRR*-, *RSR*-, *RRS*-, and *RSS*-α-tocopherol) that occur in fortified foods and supplements. It does not include the *2S*-stereoisomeric forms of α-tocopherol (*SRR*-, *SSR*-, *SRS*-, and *SSS*-α-tocopherol), also found in fortified foods and supplements.

[c] As niacin equivalents (NE). 1 mg of niacin = 60 mg of tryptophan.

[d] As dietary folate equivalents (DFE). 1 DFE = 1 µg food folate = 0.6 µg of folic acid from fortified food or as a supplement consumed with food = 0.5 µg of a supplement taken on an empty stomach.

SOURCES: *Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride* (1997); *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc* (2001), and *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids* (2002). These reports may be accessed via www.nap.edu.

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Note: Italicized *f*'s and *t*'s refer to figures and tables