Electronic Medical Records and Personal Health Records:
A Call for the Creation and Inclusion of a Nutrition Dataset

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Overview

Nutrition plays a critical role in maintaining health and in preventing and treating chronic disease. As the US health care system moves to an electronic platform for health records and information management, it is paramount that nutrition be a fundamental part of the basic design and infrastructure. This document proposes a set of elements for nutrition evaluation to be included in electronic medical records (EMRs) and personal health records (PHRs) in the United States. It describes the nutritional data that ideally should be electronically captured on all adult patients at any medical encounter, and also describes electronic standards for more extensive nutritional evaluations.

The purpose of these standards is to improve the capture of important nutrition and health information and facilitate data exchange between health care systems, health care professionals and patients.

Introduction

Professional medical society[1,2] and federal mandates[3] prompt utilization of electronic medical/health records (EMR) to help medical professionals track patient care, reduce errors and improve health outcomes. Substantial inducements are and will be increasingly offered to providers who not only adopt health information technology systems but who implement information technology systems to address lifestyle contributors to increased incidence of disease and/or poor health outcomes. Use of systems that are based on Department of Health and Human Services (DHHS) approved interoperability standards, and that are routinely and systematically updated, is a given.[3] Also, the Certification Commission for Healthcare Information Technology (CCHIT) has implemented certification programs for ambulatory and inpatient EMR systems based on meeting a critical set of technical and functional requirements.

Excessive/inadequate food and nutrient consumption, inadequate physical activity, excessive alcohol consumption and cigarette smoking are primary contributors to our nation's poor health. While EMRs and personal health records (PHRs) have typically incorporated a standardized list of information to track lifestyle measures, such as smoking habits/status and efforts related to smoking cessation,[3-5] there is no standardized "nutrition database" that has been routinely built into EMRs and PHRs. There is a gap in standardized information regarding nutritional health (anthropometric, biochemical, behavioral, cultural, functional, physiologic and psychosocial, etc. parameters) and a lack of specifications to routinely capture, collate, incorporate and share nutrition information and coordination of nutritional care across all health domains.

A value-added model of shared care must incorporate the physician-guided, evidence-based care with referral to professionals with the education, training, time and expertise to address lifestyle issues seamlessly in the office and larger community/cultural environment. The patient's role as the ultimate determinant of the degree to which the health care recommendations are incorporated into personal lifestyles must be acknowledged. The collection, coordination and

transfer of health information across EMR and PHR systems will facilitate shared care and improve health care expectations and outcomes, and eventually lower costs across the continuum of care. A workgroup (see page 11) was established in 2007, with representatives of the American Academy of Family Physicians and American Dietetic Association, to delineate and ensure the inclusion of nutrition information in electronic medical and personal health information systems for adults as follows:

1) Determine recommendations for a nutrition dataset to be included in an EMR.

2) Determine recommendations for a nutrition dataset to be included in a PHR.

3) Determine standard alert and report specifications related to nutritional health to be included in EMRs and PHRs: parameters and data trends useful in the identification of patients at increased nutritional risk, standards of care/nutrition resources to address the needs of those so identified, and outcomes monitoring to document quality care.

Nutrition Data Set for Inclusion in EMRs

EMRs typically contain demographic, lifestyle and history information on each individual that presents for care, such as age, gender, ethnicity, relevant family and past medical history, medications, supplements, alcohol/cigarette use and psychosocial and socioeconomic history. This standard information, collected on initial assessment, is important for evaluation purposes but alone it is not enough to provide for an adequate nutrition screen that identifies individuals that need a full nutrition assessment and perhaps a nutrition care referral. In order to document a complete nutrition assessment, an EMR needs to be able to combine demographic, medical history and lifestyle indices with a separate and distinct dataset on nutrition. There must also be a section that allows entry of free-text dedicated to the nutrition history and physical exam. This would facilitate documentation of a narrative (by the physician [EMR] and/or patient [EMR/PHR]). A free–text

option for the history and physical exam would accommodate the delineation of a clear, complete, patient-specific, chronologic account of the concerns or problems that prompted the physician to provide or prescribe, or the patient to seek nutritional care. A free-text option would allow for differences in practitioner/patient documentation needs and/or preferences.[6]

Based on literature review and input from the workgroup, the recommended parameters for a nutrition data set for adults to include in an EMR are as follows:

- **Height and weight, measured.**[7] It is important to be able to track changes in adult height and weight over time to prevent/delay the development of, for example, osteoporosis (in which loss of height is an early warning sign), or overweight/obesity and its related comorbidities (hypertension, diabetes, dyslipidemia, selected cancers, etc.).

- **Body Mass Index (BMI)** (calculated from height/weight measurements). A BMI above or below the established norms is suggestive of increased risk of poor nutritional status and chronic, diet-related disease.[7]

- **Waist Circumference**, <88 cm (35 inches) for women or <102 cm (40 inches) for men, measured when BMI is < 35 kg/m². Excessive accumulation of abdominal fat is associated with increased risk of diet-related diseases such as diabetes, hypertension, the dislipidemias, etc. Waist circumference tends to lose its incremental predictive value when BMI exceeds 35 kg/m². Waist circumference is measured in a horizontal plane around the abdomen at the level of the iliac crest. The tape measure should be snug, but should not compress the skin, and should be parallel to the floor. The measurement is made at the end of normal expiration.[7]

- **Blood pressure**, measured, recorded and assessed according to established norms.[8] Development of hypertension is associated with overweight/obesity, excessive sodium and calorie intakes and poor diet quality.

- **Fasting lipoprotein profile** (total cholesterol, low density lipoprotein [LDL] cholesterol, high density lipoprotein, [HDL] cholesterol and triglyceride), measured, recorded and assessed according to established norms.[9] High intakes of saturated and trans fats and cholesterol are associated with the dislipidemias and the development of coronary artery disease.

- **High sensitivity C-reactive protein**, measured, recorded and assessed in relevant populations according to established norms.[10] If a person's cardiovascular risk score — judged by a "global risk assessment" (frequently included in EMRs) — is in the intermediate range (10-20 percent in 10 years), this test may help predict a cardiovascular or stroke event and can help direct further evaluation and support the need for medical nutrition therapy and/or other forms of preventive intervention.

- **Serum albumin**[11] should be measured in frail older Americans or other acute/chronically ill adults with a history of poor food intake. Food intake is assessed by standard questions such as 24 hour recall and/or food habits/preferences, ability to access, purchase, prepare, consume and store foods that comprise an adequate diet, level of food security and reliance on food assistance programs to meet basic food/nutrition needs.

- **Lifestyle habits** assessment (i.e., type, duration and frequency of physical activity; tobacco products use; alcohol type and frequency of consumption; frequency/duration of use of nutritional supplements, herbs, botanicals and devices; etc.)

- **Level of physical fitness** (type, duration and intensity of physical activity) according to established norms.[12,13]

- **Referral** to a registered dietitian or qualified nutrition specialist that facilitates feedback to the referring provider and prompts to support the nutrition care plan developed. Documentation of the referral outcome by the registered dietitian or qualified nutrition professional and communication back to the referring provider using the International Dietetics and Nutrition Terminology[14] to document the nutrition care provided.

Nutrition Data Set for Inclusion in PHRs

Recommendations for the nutrition data set to be included in a PHR are more expansive than those listed for an EMR. The American public is increasingly encouraged to participate in the management of its personal health, to ask questions, and to assess/self-manage lifestyle parameters that contribute to health outcomes. Also, a personal, portable record of medical care received is recommended. Thus, in addition to the EMR nutrition dataset that should be seamlessly integrated into the individual's PHR, the following elements are recommended to be included in the nutrition data set for a PHR:

- **Daily food/nutrient intake** tracking including vitamins/minerals and other nutrition supplements. Also, a mechanism for alerting the individual to excessive/inadequate consumption according to established national norms for adults should be included with the suggestion to seek professional advice if indicated. Several resources are available to be included as links (i.e., www.mypyramid.gov). [15,16]

- **Food and nutrition supplement/drug interaction alerts.** Users should be prompted when nutrition supplementation (vitamins, minerals, herbs, botanicals, etc.) may lead to

adverse drug interactions or other adverse health outcomes and that thus should be shared with their health care provider(s).

■ **Tracking of physical activity** and other lifestyle parameters critical to health maintenance. [17,18]

■ **Disease-specific information and tools** for people who have been diagnosed with a chronic, diet-related disease or for people who have been encouraged to improve their lifestyle as a preventive measure. Examples include American Academy of Family Physicians (www.familydoctor.org), American Dietetic Association (www.eatright.org), American Heart Association (www.americanheart.org), American Diabetes Association (www.diabetes.org), Mayo Clinic (www.mayoclinic.com) and Medline Plus (www.medlineplus.gov).

■ Information and guidelines on how to evaluate the legitimacy of **online health resources**.[19, 20]

■ Information and guidelines on to how to find a **registered dietitian**/qualified nutrition provider.[21]

■ Information about how to access **nutrition services covered by third party payers**, links to Centers for Medicare and Medicaid Services (CMS)[22] and other relevant third party payers.

Communication Across Personal and Professional Domains

The workgroup's recommendation is that all EMRs and PHRs should adopt a standardized nutrition language, such as that developed by the American Dietetic Association,[14] to facilitate and manage the collection, storage and retrieval of nutrition information that can be shared across personal and clinical health care domains to enable patients, caregivers and providers to collaboratively prevent and/or manage acute and chronic disease. Use of a standardized language will facilitate

the integration of general clinical knowledge and important clinical guidelines for improved health outcomes (such as anthropometric data, normative standards, vitamin/mineral use, alcohol use, drug–nutrient interactions, clinical guidelines, test indications/utility, etc.) with the patient's personal medical history and current health status and provide decision support mechanisms for both clinicians (EMRs) and patients (PHRs) to ensure quality care.

The goal for electronic medical and personal health records is for patients, physicians, registered dietitians, nurses and others concerned with nutrition to seamlessly exchange both unstructured and structured data across health information domains, which is critical to the effective and cost efficient delivery of high quality, fully integrated nutrition care. In the immediate timeframe, a standardized nutrition data set would facilitate data collection and synchronization from multiple sources (clinical and personal). Additions to a basic nutrition dataset could be made as clinical guidelines and terminologies change and become recognized and approved for widespread use.

Summary

Although there is no single definitive test or measurement predictive of optimal nutritional health, the indices proposed for inclusion in EMRs and PHRs as the nutrition dataset have been individually validated and are recommended for widespread use in the general adult population. The indices proposed are simple, practical and readily obtainable in community and clinical settings. The workgroup believes that the recommended list of nutrition data elements form a reasonable starting point for the introduction and future expansion of nutrition and lifestyle information in electronic medical and personal health records.

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EMR Nutrition Data Set Indicators: Units of Measurement

Nutrition Indicator	Unit of Measurement	Comments
Measured Height	**U.S.:** inches **Metric:** centimeters	Metric measures are not yet routinely used in U.S. clinical practice.
Measured Weight	**U.S.:** pounds **Metric:** kilograms	Metric measures are not yet routinely used in U.S. clinical practice.
Interpretation of Percent Weight Change	**Time** **Significant(%)** **Severe(%)** 1 week 1–2 > 2 1 month 5 >5 3 months 7.5 >7.5 6 months 10 >10 1 year 20 >20	
Body Mass Index (BMI)	**U.S. Conversion Formula:** $[weight(pounds)/height(inches)2] \times 703$ **Metric Conversion Formula:** $weight(kg)/height(M)^2$	Metric measures are not yet routinely used in U.S. clinical practice.
Classification of weight by BMI	**BMI** **Obesity Class** <18.5 Underweight 18.5–24.9 Normal 25.0–29.9 Overweight 30.0–34.9 Obesity Class I 35.0–39.9 Obesity Class II > 40 Obesity Class III	2008 Physician Quality Reporting Initiative Definition of Normal Weight for adults age >65 BMI 22–30. Values outside this range denote under/overweight.
Waist Circumference	**Men** **U.S.:** ≤40 inches **Metric:** ≤102 centimeters **Women** **U.S.:** ≤35 inches **Metric:** ≤88 centimeters	Metric measures are not yet routinely used in U.S. clinical practice.
Blood Pressure	**Systolic** **Diastolic** **Category** <120 <80 Normal 120-139 80-89 Prehypertension >140 >90 Hypertension <130 <80 Diabetic Norms	Adults ages 18 and older.

Lipids	LDL Cholesterol (mg/dl)+	Risk Category	Target goals based on determination of cardiovascular (CVD) risk, presence of CVD or increased CVD risk factors decreases the target level of concern.
	<100	Optimal	
	100–129	Near Optimal	
	130–159	Borderline High	
	160–189	High	
	≥190	Very High	
	<100	Diabetic Optimum	+International Conversion Units not in widespread clinical use in the U.S.
	Total Cholesterol (mg/dl)	**Risk Category**	
	<200	Desirable	
	200–239	Borderline High	
	>240	High	
	HDL Cholesterol (mg/dl)	**Risk Category**	
	<40	Low	
	>60	High	
	>50	Diabetic Optimum	
	Triglycerides (mg/dl)	**Risk Category**	
	<150	Normal	
	150–199	Borderline High	
	200–499	High	
	>500	Very High	
	<150	Diabetic Optimum	
C-reactive Protein (CRP)	**CRP Level ★ (mg/L)+**	**Risk Category**	Obtain based on presence of CVD, increased CVD risk.
	<1.0	Low	★ Normal CRP levels may vary from lab to lab.
	>1.0–3.0	Average	+International Conversion Units not in widespread clinical use in U.S.
	>3.0	High	
Serum Albumin	**Albumin Level ★ (g/dl)+**	**Nutrition Status**	Measure in frail elderly
	4.5-≥3.5	Acceptable	★Normal levels may vary from lab to lab
	<3.5-≥2.7	Mild Deficit	+International Conversion Units not in widespread clinical use in U.S.
	<2.7-≥2.1	Moderate Deficit	
	<2.1	Severe Deficit	
Physical Activity/ Fitness Minimum Recommendations	**Activity Type**	**Duration**	
	Brisk walk	30 min/most days	
	Jogging/running	20 min/most days	
	Resistance/ strength building	2 days/week, 6-8 exercises, 8-12 repetitions /exercise	

Tobacco Use	**Cigarette Smoking** Yes No Number packs/day if yes **Smokeless Tobacco** Yes No Amount/day if yes	
Alcohol Use (23)	**Gender** **Category** **Men:** <2 drinks/day Acceptable >4 drinks/day At risk >14 drinks/week At risk **Women:** <1 drink/day Acceptable >3 drinks/day At risk >7 drinks/week At risk	U.S. Dietary Guidelines and National Institutes of Alcohol Addiction and Abuse parameters.
Food Intake	**Food Intake Frequency by Food Group** **Food Group** **Amount/Day** Whole Grains 3-4 oz equivalence Vegetables 2–3 cups Fruit 1.5-2 cups Milk 3 cups equivalence Meat/Beans 5-6.5 oz equivalence Oils 5–7 tsp Discretionary★ 195–510 calories (★Calories determined by age and activity level)	U.S. Dietary Guidelines
Dietary Supplements Use (24)	**Vitamins** Multivitamins Yes No Frequency: Days/week **Single Vitamins** Type (A, D, E, K, B-complex, Folate, B6, B12, C Dose (variable units) Frequency: Days/week **Minerals** Type (Calcium, Potassium, Magnesium, Iron, Other) Dose (mg or mEq) Frequency: Days/week **Meal Replacements** Type Dose (Cans/day) Frequency (Days/week)	

Dietary Supplements Use (24) continued	**Sports Nutrition Supplements** Beverages Type Amount (Ounces) Frequency (days/week) Creatine Amount (mg/day) Frequency (Days/week) Stimulant Type Amount (mg/day) Frequency (days/week) **Fish Oil** Type Amount (g/day) Frequency (Days/week) **Glucosamine/Chondroitin** Type Dose (mg/mg) Frequency (days/week)	
Herbs/Botanicals (25)	Use: Yes No Single Herb Echinacea Ginko Ginger Garlic Ginseng Kava–Kava Soy St. John's Wort Ragweed Peppermint Dose (variable units) Frequency: (days/week) Herbal Mixture Product Name/Content Dose (variable units) Frequency (days/week) Homeopathic Preparation Product Name/Content Dose (variable units) Frequency (days/week)	

Oral Health Status	Multiple missing teeth	Yes	No	
	Rotten teeth	Yes	No	
	Dentures	Yes	No	
	Fit	Well	Poorly	
	Dry mouth	Yes	No	
	Bleeding/sore gums	Yes	No	
	Visit to Dentist			
	Within last 12 months	Yes	No	
	In last 2 years	Yes	No	
	Never been	Yes	No	
Functional status (food related ADLs/IADLs)	Able to eat/chew	Yes	No	
	Swallowing problems	Yes	No	
	Able to cook	Yes	No	
	Able to shop for food	Yes	No	
	Able to manage money	Yes	No	
	Transportation access	Yes	No	
Socioeconomic Status	Food stamps	Yes	No	
	Meals On Wheels	Yes	No	
	Congregate dining	Yes	No	
	Food bank use	Yes	No	
	Enough money to buy foods needed	Yes	No	
Registered Dietitian (RD) Referral	**Nutrition Education/Counseling Needs**			
	Special diet prescribed	Yes	No	
	Followed	Yes	No	
	Involuntary weight Gain/loss	Yes	No	
	Poor appetite	Yes	No	
	Chronic constipation	Yes	No	
	Chronic diarrhea	Yes	No	
	Dehydration	Yes	No	
Report of RD Referral to Provider (PCP)	**Date of RD visit** Medical diagnosis Nutrition/diet prescription Nutrition assessment Nutrition diagnosis Nutrition intervention initiated Nutrition monitoring/evaluation parameters Scheduled Follow-up: (number of weeks/months)			American Dietetic Association's Standardized Language.

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