



# HHS Public Access

Author manuscript

*J Acad Nutr Diet.* Author manuscript; available in PMC 2019 December 01.

Published in final edited form as:

*J Acad Nutr Diet.* 2018 December ; 118(12): 2223–2234. doi:10.1016/j.jand.2017.08.114.

## Food Insecurity and the Nutrition Care Process: Practical Applications for Dietetics Practitioners

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### Keywords

food supply; medical nutrition therapy; chronic disease; food assistance; food insecurity

*Food insecurity*, defined as a household condition involving the “limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways”,<sup>1</sup> affects one out of eight U.S. households<sup>2</sup> and exists in every county across the nation.<sup>3</sup> Dietetics practitioners working in clinical as well as community settings will likely encounter clients affected by food insecurity during their career. The Nutrition Care Process (NCP) is a systematic problem-solving method to guide critical thinking and evidence-based decision making for addressing nutrition-related problems experienced by individuals, groups, and communities, including food insecurity.<sup>4</sup> Beginning with an overview of food insecurity, including its nutrition implications and screening options for at-risk populations, this article describes how dietetics practitioners can use food insecurity-informed critical thinking skills during each step of the NCP. Two case examples of dietetics practitioners implementing these considerations in their daily

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### Author contributions

M.S.W. conceptualized this paper and oversaw preliminary and final development of the paper in its entirety. K.C.W. conducted interviews with dietitians highlighted in the program spotlights and contributed to development of the full manuscript. C.R. contributed to the introduction, children and adolescent sections of the paper, provided expert consultation, and identified dietitian case studies for the program spotlights.

practice with individuals and communities are presented to illustrate these applications, followed by dietetics-oriented action items to support the delivery of food insecurity-informed nutrition care.

## **Food Insecurity: Nutritional Implications and Screening Options for At-Risk Populations**

### **Nutritional Implications**

Food security status operates on a spectrum to describe quality and quantity of household food supply, which is subsequently categorized as high, marginal, low, and very low food security; the latter two conditions are classified as food insecure (Figure 1).<sup>2</sup> The health and nutrition-related consequences of food insecurity on household members are often cumulative as food insecurity severity increases. Household food insecurity is linked to many nutrition-related outcomes due to its effects on dietary quality and quantity,<sup>5</sup> associations with mental and physical health,<sup>6</sup> and impacts disease self-management capabilities of affected members.<sup>7</sup> These outcomes may contribute to disability, which can further reduce household resources due to health care costs and adult unemployment, leading to a vicious cycle of compromised food supply.<sup>8</sup> A brief overview of select nutrition implications for adult- and child-household members affected by household food insecurity is presented below.

### **Adults**

Dietary patterns of adults experiencing household food insecurity reflect low consumption of fruits and vegetables, dairy products, iron, zinc, vitamin E, and vitamin B<sub>6</sub>,<sup>9</sup> with common serum deficiencies including iron, vitamin B<sub>12</sub>, calcium, magnesium, vitamin A, vitamin C, carotenoids, and folate.<sup>10</sup> These deficiencies can result in anemia, low bone density, and general poor health. Food insecurity is inconsistently associated with obesity among women, which may result from the metabolic consequences of cyclical food restriction and consumption of energy-dense foods as a strategy to lower food costs.<sup>11–13</sup> Food insecurity may contribute to the development of metabolic syndrome<sup>14</sup> and is associated with many chronic diseases,<sup>15</sup> such as type 2 diabetes and hypertension.<sup>16</sup> Household food insecurity can also compromise disease self-management abilities, including glycemic control among diabetics.<sup>7,17</sup>

### **Children and adolescents**

Iron deficiency disproportionately affects children living in food insecure households, which can impair motor skill, language and cognitive development, socioemotional state, attentiveness, and school performance.<sup>18</sup> Household food insecurity is associated with greater odds of child hospitalization and fair to poor health status.<sup>19</sup> Children who live in households with very low food security at any point between birth and toddler years, especially if they are born at a low birth weight, have greater odds of obesity before kindergarten than their food secure peers.<sup>20</sup> Furthermore, repeated episodes of hunger in childhood may affect future chronic disease development.<sup>18</sup> Similar to adult household members, teenagers may sometimes restrict or go without food to protect younger siblings.<sup>21</sup>

Without proper nutrition intake, food insecurity undermines adolescent physical and emotional growth, stamina, academic achievement and job performance.<sup>21</sup>

### **Food insecurity screening options for at-risk populations**

Nutrition screening identifies patients who may need special interventions and should be informed by the risk characteristics of the population being screened.<sup>22</sup> While screening is most often implemented by individuals outside of the nutrition services team, dietetics practitioners should provide input on the selection of screening questions and referral procedures.<sup>22</sup> Food insecurity screening considerations for at-risk populations are summarized in Table 1.

Researchers typically use the 10-item U.S. Adult Food Security Survey Module that can include an additional 8 items for assessing households with children;<sup>2</sup> however, shorter screening options are available for clinical and community practice settings. The American Academy of Pediatrics<sup>23</sup> and the American Association of Retired Persons<sup>24</sup> endorse a two-question screening tool with 97% sensitivity and 74% specificity for household food insecurity. Answering “often true” or “sometimes true” to either question below indicates potential household food insecurity:<sup>25</sup>

1. Within the past 12 months, we worried whether our food would run out before we got money to buy more.  Often True  Sometimes True  Never True
2. Within the past 12 months, the food we bought just didn't last and we didn't have money to buy more.  Often True  Sometimes True  Never True

When potential household food insecurity is identified, screening protocols should include follow-up procedures for client linkage to food assistance programs and an additional referral to a qualified dietetics practitioner when household food insecurity may be contributing to nutrition-related health status. The dietetics practitioner can then proceed with assessing nutritional risk in the context of food insecurity as the first step of the NCP, followed by diagnosis, intervention, and monitoring/evaluation.<sup>4</sup> Critical thinking questions and considerations related to the delivery of care for food insecure clients for each step of the NCP are detailed in Table 2.

## **Applying the Nutrition Care Process when Food Insecurity is Identified**

### **Assessment**

Nutrition assessment is an ongoing process of collecting and analyzing client data in order to inform the nutrition diagnosis.<sup>4</sup> When the dietetics practitioner identifies a client who is at risk for food insecurity through positive screening results, the practitioner can apply their knowledge of food insecurity's possible psychosocial, behavioral, nutritional and physical health consequences to inform data collection during the five domains of nutrition assessment (Table 2). To guide critical thinking, the dietetics practitioner should first determine the severity of household food insecurity to then consider how the degree of compromised food supply may be affecting food intake (Figure 1). Probing questions during the patient interview can be used to assess how food insecurity is affecting level of food intake, meal patterns, or other eating behaviors. If the dietetics practitioner suspects the

intake domain is being affected, he or she can then explore remaining assessment domains to determine if data are clustering to reflect food insecurity as an underlying cause for nutrition problem(s).

## Diagnosis

Nutrition diagnosis identifies the nutrition problem to be addressed by the dietetics practitioner through nutrition intervention and is organized into a statement with the following structure: “Problem” [related to] “Etiology” [as evidenced by] “Signs/Symptoms” (PES).<sup>4</sup> By gathering information during the client interview to assess how the degree of household food insecurity is affecting dietary intake or clinical domain nutrition problems, the dietetics practitioner can effectively identify how food insecurity is functioning as a cause or contributing risk factor of the nutrition problem in the “etiology” statement. An example food insecurity-informed nutrition diagnosis from the intake domain is as follows:

- Inconsistent carbohydrate intake related to erratic food availability and cyclical food restriction, as evidenced by estimated total carbohydrate intake ranging between 15 and 90 grams per meal and glucose logs demonstrating frequent episodes of hypo- and hyperglycemia.

If no intake or clinical domain nutrition problem is identified, yet food insecurity is suspected to be contributing to nutritional risk, then a nutrition problem from the “food safety and access domain” can be used. For example:

- Limited access to food related to recent loss of financial resources and ineligibility for federal nutrition assistance programs as evidenced by low supply of food in the home.

Example food insecurity-related diagnoses from each of the three diagnosis domains are listed in Table 2.

## Intervention

A nutrition intervention is designed “to resolve or improve the nutrition diagnosis or nutrition problem” and its selection should be informed by the etiology of the problem, whenever possible.<sup>4</sup> Since food insecurity results from poor food access among other factors, interventions usually include coordination of nutrition care to facilitate linkage to food assistance or other financial resources, but can also span food and nutrient delivery, nutrition education, and nutrition counseling (Table 2). Planning interventions in a multi-staged design by first prioritizing stabilization of household food supply and limiting nutrition education to survival information, followed by the subsequent establishment of long-term behavior change goals, will likely help improve the client’s ability to adhere to nutrition recommendations.

## Monitoring and Evaluation

Nutrition monitoring and evaluation aims to quantify client progress toward resolving the nutrition diagnosis through the achievement of intervention-related goals.<sup>4</sup> Thus, outcomes for monitoring and evaluation are chosen based on the nutrition diagnosis and intervention.<sup>4</sup> Example outcomes for food insecure clients may include food assistance program

participation and satisfaction, improvement in quality and quantity of food intake according to nutrition prescription, improvements in body composition, and improvements in laboratory values related to nutritional status and disease management. Special considerations for food insecure populations during monitoring and evaluation are described in Table 2.

## **Registered dietitian nutritionists at work: Applying the NCP for the care of food insecure populations in individual and community-based settings**

The NCP can be applied to individuals, groups, and communities affected by food insecurity.<sup>4</sup> The following case studies illustrate how dietetics professionals can effectively deliver food-insecurity informed care to at-risk populations at the individual and community-levels.

### **Tulsa CARES: Nutrition Assistance for Individuals with HIV**

Tulsa CARES is a non-profit organization in Tulsa, Oklahoma, delivering social services, including mental health, housing, health care navigation, care coordination, and nutrition, to people affected by HIV/AIDS.<sup>26</sup> Staffed by a registered dietitian nutritionist (RDN), nutrition and dietetic technician, registered (NDTR), and certified dietary manager, the Tulsa CARES nutrition program provides disease-appropriate groceries, prepared meals, and nutrition education to over 300 clients annually. Approximately two-thirds (67%) of clients served annually are food insecure. Conversations with Tulsa CARES dietitian, Melissa Cejda, MHA, RDN/LD, CDE (March 2017), informed this program spotlight.

As the program's RDN, Cejda partners with local HIV healthcare providers to accept external MNT referrals based on food insecurity or other nutrition concerns. Tulsa CARES also internally screens all existing clients for food insecurity during new client intake and annual reassessment appointments using a self-administered version of the 6-item Short Form Food Security Survey Module.<sup>1</sup> Positive screenings result in a referral to the RDN or NDTR, which initiates the NCP for a more thorough assessment of client food needs.

Cejda notes that many clients living in food insecure households have other social and medical problems, such as mental health co-morbidities, substance use, diabetes, or HIV-associated wasting, all of which inform her data collection priorities during nutrition assessment. All patients receive a Nutrition-Focused Physical Exam to assess for malnutrition and lipodystrophy, including muscle mass or body fat depletion, which Cejda notes can occur as a result of HIV infection and be exacerbated by food insecurity. After completing her nutrition assessment, Cejda commonly identifies nutrition diagnoses of inadequate protein intake, excessive carbohydrate intake, and limited access to food.

Cejda's approach to nutrition intervention typically involves a combination of food direct assistance, nutrition education, and nutrition counseling. Tulsa CARES' on-site food pantry allows Cejda to assist clients with selecting foods that reinforce nutrition intervention goals, such as meeting protein needs or balancing macronutrient intake. The food pantry is intentionally stocked with nutrient-dense foods, such as low-sodium canned vegetables and beans, frozen fruits and vegetables, lean meats, low-fat dairy and alternatives, dried beans,

and whole grain products to better meet the nutrition intervention needs of clients. Nutrition supplement assistance for individuals with identified micronutrient deficiencies or muscle wasting are also available. When working with clients affected by food insecurity, Cejda observes that, “Your nutrition intervention is often going to be simpler, and you may need to work with the client to prioritize one realistic, achievable goal at a time, as opposed to multiple goals at once. Some of my interventions and recommendations will be changed based on the degree of a client’s access to food, which can limit their readiness or ability to make dramatic eating changes compared to someone who is food secure.” For HIV-positive patients dealing with multiple diagnoses, such as diabetes, Cejda also includes interventions that set realistic goals to improve comorbidities. “[For diabetic clients], I often emphasize for patients to eat consistent meals at consistent times to prevent hypoglycemia and take their medicine on time. Education on food sources of carbohydrate and economic ways to balance these foods with lean protein and healthy fat is also essential.”

Cejda and her team monitor and evaluate clients over time for food security status and health outcome improvements, such as BMI, body composition, blood pressure, and updated lab work received through partnerships with healthcare providers. On a personal level, Cejda defines client success through subjective measures as well, such as “improved quality of life, feeling better, and less daily worry”.

### **Just Say Yes to Fruits and Vegetables: How Community Programs Can Apply the NCP**

Public health and community dietetics practitioners are often charged with planning nutrition programs for priority populations, a process that can be guided by the NCP.<sup>27</sup> One example is New York State’s Just Say Yes (JSY) to Fruits and Vegetables program, a Supplemental Nutrition Assistance Program (SNAP) Educational Initiative (SNAP-Ed).<sup>28</sup> As a SNAP-Ed funded initiative, JSY is an obesity prevention program designed to promote healthy diets and active lifestyles to SNAP recipients and eligible families through the provision of behaviorally-focused nutrition education and obesity prevention strategies.<sup>28</sup> Its initiatives include the development and adoption of policies and systems that facilitate and support environmental changes to improve healthy food access and consumption. Conversations with Paula Brewer, MS, RDN, CDN (March 2017), JSY Program Director, informed this program spotlight.

The assessment step for JSY involved collecting aggregate data.<sup>27</sup> Brewer and her team gathered state-wide and national data from sources including the United States Department of Agriculture, Feeding America, and U.S. studies of food insecurity to identify obesity, diabetes, high blood pressure, and suboptimal dietary patterns<sup>29</sup> as key disparities affecting the target population. Program planners then progressed to the second step of the NCP: diagnosing the community problem. They emphasized a prevention approach and prioritized goals for fruit and vegetable consumption and general healthful eating, since diets high in fruits and vegetables may help prevent obesity and hypertension<sup>30</sup>, while green, leafy vegetables are particularly helpful in the prevention of type 2 diabetes.<sup>31</sup>

According to Brewer, the intervention step included development of a two-pronged, evidence-based intervention: “Education so that people have the knowledge, the confidence, and the skill to improve their dietary intake, [and] working on the emergency food

environment to increase access to healthier food.” To implement this intervention, JSY partnered with New York’s emergency food network. At partner food pantries, JSY RDNs or other trained nutrition educators deliver 45-minute, healthy eating workshops for food pantry clients. JSY partners with local food banks to help establish nutrition policies that improve the quality of food offered. Further, JSY operates a healthy pantry demonstration initiative in which pilot food pantries are strategically designed to encourage shoppers to take healthful products.

Brewer mentioned that expanding program monitoring and evaluation is a priority. Program administrators currently evaluate client intention to change behavior. Future evaluation plans include measures of fruit and vegetable intake and self-efficacy. JSY assesses their healthy pantry initiative using a process evaluation following the RE-AIM model.<sup>32</sup>

Through the implementation of general healthful eating programs and initiatives in direct collaboration with food banks, JSY illustrates how the NCP can be applied to address nutrition problems at the community level for populations affected by food insecurity.

## Conclusion

At some point in their careers, dietetics practitioners working in both clinical and community settings will likely encounter individuals, groups, or populations who are at nutritional risk due to a limited food supply. Multiple action items can be implemented by these providers to support the delivery of food insecurity-informed client care (Table 3). By further considering how food insecurity may be influencing nutrition-related health outcomes and behaviors, dietetics practitioners can apply critical thinking skills along each step of the NCP. These approaches can result in a more personalized, client-centered response to improve many of the health disparities experienced by food insecure populations.

## Acknowledgments

The authors would like to thank Peggy Turner, MS, RDN/LD, FAND, Kim Prendergast RD, MPP, Melissa Cannon, RD, and Hilary Seligman, MD, MAS for reviewing drafts of this manuscript and providing critical comments. The authors also thank the dietitians featured in this article’s program spotlights for sharing their expertise.

Funding:

Development time for this publication was supported by the Centers for Disease Control and Prevention under Award Number 3U48DP004998-01S1 and by the National Institute of Mental Health of the National Institutes of Health under Award Number 2R25MH083635 to the American Psychological Association, Tiffany G. Townsend and Velma McBride Murry. The content is solely the responsibility of the authors and does not necessarily represent the official views of the CDC or the NIH.

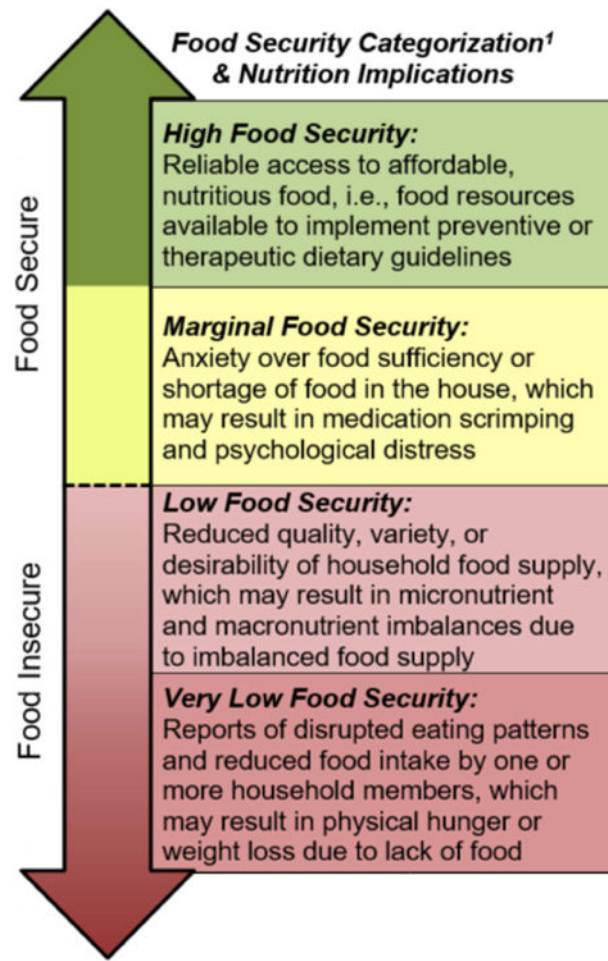
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**Figure 1.** Household food security definitions and possible nutrition implications associated with characteristics of household food supply. Note that nutrition implications are cumulative as food security becomes compromised, beginning with marginal food security.<sup>1</sup> Adapted from: Bickel G, Nord M, Price C, Hamilton W, Cook J. Guide to measuring household food security, Revised 2000. Alexandria VA: U.S. Department of Agriculture, Food and Nutrition Service; 2000.

**Table 1**

## Food Insecurity Screening Considerations for the Dietetics Practitioner

Food Insecurity Screening		
Who can screen?	Who should be screened?	Possible actions
<ul style="list-style-type: none"> <li>Community providers (e.g., school nurses, social workers, senior living administrators)</li> <li>Clinical providers working in both inpatient and outpatient settings (e.g., care coordinators, disease management and discharge planning teams)</li> <li>Dietetics professionals working in community or clinic settings</li> </ul>	<p>Populations at higher risk for food insecurity include:</p> <ul style="list-style-type: none"> <li>Income groups near or below 185% of the poverty line<sup>1</sup></li> <li>Rural households<sup>1</sup></li> <li>Single adult-headed households with and without children<sup>1</sup></li> <li>Hispanic<sup>1</sup>, black<sup>1</sup>, and American Indian households<sup>2</sup></li> <li>Low-income households with a disabled adult<sup>3</sup> or member living with certain chronic health conditions<sup>4</sup>, such as HIV, diabetes, or mental illness</li> <li>Persons accessing Supplemental Nutrition Assistance Program (SNAP)<sup>1</sup> or the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) Program<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>Linkage by community health worker, social worker, or nurse case manager to federal food assistance programs and/or charitable food providers</li> <li>Referral to dietetics practitioner to initiate the Nutrition Care Process for additional nutrition assessment, diagnosis, intervention, and monitoring/evaluation</li> </ul>

<sup>1</sup>Coleman-Jensen A, Rabbitt MP, Gregory CA, Singh A. Household food security in the United States in 2015. United States Department of Agriculture; 2016. Economic Research Report 215;

<sup>2</sup>Gundersen C. Measuring the extent, depth, and severity of food insecurity: an application to American Indians in the USA. J Popul Econ. 2008;21(1):191–215;

<sup>3</sup>Coleman-Jensen A, Nord M. Food insecurity among households with working-age adults with disabilities. USDA-ERS; 2013;

<sup>4</sup>Tarasuk V, Mitchell A, McLaren L, McIntyre L. Chronic physical and mental health conditions among adults may increase vulnerability to household food insecurity. J Nutr. 2013;143(11):1785–1793

**Table 2**

The Nutrition Care Process (NCP): Step-by-Step Critical Thinking Questions and Considerations when Delivering Care to Clients Living in Food Insecure Households

<b>NCP Step 1: Nutrition Assessment</b>	
<b>Critical Thinking Questions and Additional Considerations for Each Assessment Domain</b>	<b>Possible Indicators of a Nutrition Problem with Food Insecurity-related Etiology (Non-Exhaustive List)</b>
<p><b>Food- and nutrition related history</b>  <i>Food and nutrient intake, food and nutrient administration, medication, complementary/alternative medicine use, knowledge/beliefs, food and supplies availability, physical activity, nutrition quality of life<sup>1</sup></i></p> <ul style="list-style-type: none"> <li>• Is food insecurity situational or chronic? i.e., Has there been a recent change in usual food intake?</li> <li>• Is the degree of household food insecurity marginal, low, or very low? Based on this level of severity, how does household food supply affect typical meal patterns and food groups consumed? i.e., Are meals being skipped? Are the same low-cost foods being consumed during most days, such as cereals or pastas?</li> <li>• Does the 24-hr food recall reflect usual intake? If not, how does intake vary throughout the month as food supply changes? Does food intake during the month provide an adequate and balanced supply of carbohydrate, protein, and fat relative to nutritional needs?</li> <li>• Are foods being modified in a way that will alter their typical nutritional value? i.e., watering down of food and beverages</li> <li>• Is food insecurity affecting ability to properly take medications as prescribed? i.e., Do prescribed medications require being taken with food? Do these medications cause hypoglycemia or other adverse reactions if taken without food?</li> <li>• Is the patient's current knowledge of planning meals and snacks, food preparation and cooking, or selection of low-cost healthful foods limiting his/her ability to maximize nutrition within existing food budget and food access constraints?</li> <li>• How might food insecurity affect patient readiness to learn, readiness for nutrition behavior change, disease self-management capacity, and nutrition-related quality of life?</li> <li>• Do geographic barriers exist that may prohibit nutrition and physical activity? i.e., Can patient regularly access a grocery store? Is food access limiting ability to include affordable fresh products regularly in the diet? Are there locations near residence that are safe for regular physical activity?</li> <li>• Other than a grocery store, where is patient acquiring food? i.e., hunting, gardening, obtaining discarded or expired foods, charitable food programs</li> <li>• Are sources of acquired foods safe to eat?</li> <li>• Are utilities consistently available? i.e., running water, electricity for refrigerator, gas for stove</li> <li>• Is patient eligible for any federal or charitable food assistance programs in which they are not yet participating?</li> </ul>	<p><b>Food and Nutrient Intake (1)</b>                      Energy intake (1.1.1)</p> <ul style="list-style-type: none"> <li>• Total energy intake</li> </ul> <p>Food and beverage intake (1.2.1)</p> <ul style="list-style-type: none"> <li>• Amount of food; Meal/Snack Pattern</li> <li>• Types of food/meals; Food variety</li> </ul> <p>Macronutrient intake (1.5.1)</p> <ul style="list-style-type: none"> <li>• Total fat; Saturated fat; Omega 3 fatty acids</li> <li>• Total protein intake</li> <li>• Total carbohydrate intake; Total fiber intake</li> <li>• Simple sugar carbohydrate intake</li> <li>• Estimated total glycemic load</li> </ul> <p>Micronutrient intake (1.6.1)</p> <ul style="list-style-type: none"> <li>• Vitamins (e.g., vitamin E, B6)</li> <li>• Minerals (e.g., iron, zinc)</li> </ul> <p><b>Medication Use (3)</b></p> <ul style="list-style-type: none"> <li>• Misuse of medication</li> </ul> <p><b>Knowledge/Beliefs/Attitudes (4)</b>                      Food and Knowledge/Skill (4.1)                      Beliefs and attitudes (4.2)</p> <ul style="list-style-type: none"> <li>• Readiness to change nutrition-related behaviors; Self-efficacy; Emotions</li> </ul> <p><b>Behavior (5)</b>  <i>Adherence (5.1)</i></p> <ul style="list-style-type: none"> <li>• Self-reported; Nutrition visits</li> <li>• Self-management</li> </ul> <p><i>Bingeing and purging behavior (5.3)</i></p> <ul style="list-style-type: none"> <li>• Binge eating behavior</li> </ul> <p><b>Factors Affecting Access to Food and Food/Nutrition Related Supplies (6)</b>  <i>Food/nutrition program participation (6.1)</i></p> <ul style="list-style-type: none"> <li>• Eligibility for and participation in government or community programs</li> </ul> <p><i>Safe food/meal availability (6.2)</i></p> <ul style="list-style-type: none"> <li>• Availability of shopping facilities</li> <li>• Procurement of safe food</li> <li>• Appropriate meal preparation facilities</li> <li>• Availability of safe food storage</li> <li>• Identification of safe food</li> </ul> <p><i>Safe water availability (6.3)</i></p>

<b>NCP Step 1: Nutrition Assessment</b>	
<b>Critical Thinking Questions and Additional Considerations for Each Assessment Domain</b>	<b>Possible Indicators of a Nutrition Problem with Food Insecurity-related Etiology (Non-Exhaustive List)</b>
	<ul style="list-style-type: none"> <li>• Availability of potable water</li> </ul> <p><i>Food and nutrition-related supplies availability (6.4)</i></p> <ul style="list-style-type: none"> <li>• Access to food and nutrition-related supplies, such as glucometer testing strips, lancets</li> </ul> <p><b>Physical Activity and Function (7)</b> <i>Factors affecting access to physical activity (7.4)</i></p> <ul style="list-style-type: none"> <li>• Neighborhood safety; walkability</li> <li>• Proximity to parks/green space</li> <li>• Access to physical activity facilities/programs</li> </ul> <p><b>Nutrition-Related Patient/Client-Centered Measures (8)</b> <i>Nutrition quality of life (8.1)</i></p>
<p><b>Anthropometric Measurements</b> <i>Height, weight, body mass index (BMI), growth pattern indices/percentile ranks, and weight history<sup>1</sup></i></p> <ul style="list-style-type: none"> <li>• Has patient experienced unintentional weight change, including increase or decrease? E.g., Reduced quality of foods consumed may lead to overconsumption of energy-dense foods and result in weight gain, while reduced quantity of intake may result in weight loss; cyclical changes in food intake may result in obesity, especially in women</li> <li>• Has patient experienced changes in body composition? E.g., High intake of processed foods may result in large waist circumference; imbalanced food supply or reduced quantity of intake may result in lean muscle mass loss</li> </ul>	<p>Body composition/growth/weight history (1.1)</p> <ul style="list-style-type: none"> <li>• <u>Weight</u>: Usual stated body weight (UBW); UBW %</li> <li>• <u>Weight change</u>: Weight gain; Weight loss; Weight change %</li> <li>• <u>Body Mass</u>: Body mass index</li> <li>• <u>Body compartment estimates</u>: Body fat percentage; Mid arm/upper arm muscle circumference; Waist circumference; Bone mineral density</li> </ul>
<p><b>Biochemical Data, Medical Tests, and Procedures</b> <i>Lab data (e.g., electrolytes, glucose) and tests (e.g., gastric emptying time, resting metabolic rate)<sup>1</sup></i></p> <ul style="list-style-type: none"> <li>• High intake of energy-dense, high glycemic foods, or processed foods may result in high TG or low HDL</li> <li>• Long-term reduction in quality or quantity of foods consumed may result in micronutrient deficiencies</li> <li>• While total protein intake is typically adequate among members in food insecure households, very low food security may lead to inadequate protein consumption and compromised protein status</li> </ul>	<p>Glucose/endocrine profile (1.5)</p> <ul style="list-style-type: none"> <li>• Glucose; Hemoglobin A1c</li> </ul> <p>Lipid profile (1.7)</p> <ul style="list-style-type: none"> <li>• Triglycerides; Cholesterol, HDL</li> </ul> <p>Mineral profile (1.9)</p> <ul style="list-style-type: none"> <li>• Zinc</li> </ul> <p>Nutritional anemia profile (1.10)</p> <ul style="list-style-type: none"> <li>• MCV; Iron; Folate; Ferritin; B12</li> <li>• Protein profile (1.11)</li> <li>• Prealbumin</li> </ul> <p>Vitamin profile (1.13)</p> <ul style="list-style-type: none"> <li>• Vitamin A; Vitamin C; Carotenoids; Folate; B12</li> </ul>
<p><b>Nutrition-focused physical examination findings</b> <i>Physical appearance, muscle and fat wasting, swallow function, appetite, and affect<sup>1</sup></i></p> <ul style="list-style-type: none"> <li>• Based on the chronicity of household food insecurity and its effects on diet history, do exam findings suggest possible micronutrient deficiencies or body composition changes related to reduced quality or quantity of food intake? Note: Food insecure populations tend to have lower intakes of vitamins A, C, and B6, folate, calcium, iron, zinc, and magnesium than food secure populations<sup>2,3</sup></li> </ul>	<p>Nutrition-Focused Physical Findings (1.1)</p> <ul style="list-style-type: none"> <li>• <u>Overall findings</u>: Obesity; Cachexia</li> <li>• <u>Adipose</u>: Central adiposity</li> <li>• <u>Eyes</u>: Pale conjunctiva; Keratomalacia/Bitot's spots</li> <li>• <u>Hair</u>: Alopecia</li> <li>• <u>Hand and nails</u>: Beau's lines; Koilonychia; Ridged nails</li> <li>• <u>Mouth</u>: Cheliosis</li> <li>• <u>Teeth</u>: Impaired dentition or ill-fitting dentures</li> </ul>

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NCP Step 1: Nutrition Assessment	
Critical Thinking Questions and Additional Considerations for Each Assessment Domain	Possible Indicators of a Nutrition Problem with Food Insecurity-related Etiology (Non-Exhaustive List)
<ul style="list-style-type: none"> <li>Are teeth or dentures impacting ability to eat? Note: Food insecure populations are more likely to experience impaired oral health<sup>4</sup></li> </ul>	<ul style="list-style-type: none"> <li><u>Tongue</u>: Beefy red tongue; Glossitis</li> <li><u>Muscles</u>: Muscle atrophy</li> <li><u>Skin</u>: Perifollicular hemorrhages; Pale complexion; Follicular hyperkeratosis; Petechiae; Impaired wound healing</li> <li><u>Vital Signs</u>: Blood pressure</li> </ul>
<p><b>Client history</b> <i>Personal history, medical/health/family history, treatments and complementary/alternative medicine use, and social history<sup>4</sup></i></p> <ul style="list-style-type: none"> <li>While most persons with food insecurity live at or below 185% of the federal poverty line, households earning above this income threshold can also experience food insecurity.<sup>5</sup> Note that one-quarter of food insecure households do not meet the income requirements for federal assistance programs.<sup>6</sup></li> <li>Tobacco use is common in food insecure households.<sup>7</sup> Tobacco may be used as a coping mechanism for stress and cessation may be difficult until life circumstances stabilize.</li> <li>Households that include a disabled adult<sup>8</sup> or that are headed by a single parent<sup>5</sup> are more likely to experience food insecurity, regardless of income.</li> <li>Young children are often least affected nutritionally by household food insecurity at the expense of adult, older child, and adolescent food supply.<sup>3</sup></li> <li>Determinants of household food insecurity, other than income, include ability to access food retailers and physically prepare foods.</li> <li>Does the patient have a medical diagnosis that...may be caused by inadequate or imbalanced dietary intake? ...requires consistent food supply for daily management?</li> <li>Food insecurity is independently associated with hypertension<sup>9</sup>, diabetes<sup>9</sup>, HIV<sup>10</sup>, and depression.<sup>11</sup> Populations with these conditions experience higher rates of food insecurity compared to populations without these conditions.</li> <li>Besides household food insecurity, what other psychosocial, socioeconomic, functional or behavioral factors might be further affecting nutrition problems?</li> <li>Is monthly food budget adequate to support food costs for nutritional needs? Can patient afford basic food preparation supplies to support behavior change, such as knives and cutting boards?</li> <li>Is patient choosing between food and medicine? i.e., Not refilling or scrimping medication due to limited resources?</li> </ul>	<p><b>Personal History (1)</b> Personal data (1.1)</p> <ul style="list-style-type: none"> <li>Age</li> <li>Gender; Sex</li> <li>Race; Ethnicity</li> <li>Language</li> <li>Literacy; Education</li> <li>Role in family</li> <li>Tobacco use</li> <li>Physical disability</li> <li>Mobility</li> </ul> <p><b>Medical/Health History (2)</b> Patient/client or family nutrition-oriented medical/health history (2.1)</p> <ul style="list-style-type: none"> <li><u>Cardiovascular</u>: Hypertension</li> <li><u>Endocrine/Metabolism</u>: Diabetes; Metabolic syndrome</li> <li><u>Immune</u>: HIV-positive diagnosis</li> <li><u>Psychological</u>: Depression</li> </ul> <p><b>Social History (3)</b></p> <ul style="list-style-type: none"> <li>Socioeconomic factors: Economic constraints; Access to medical care; Diverts food money to other needs</li> <li>Living/housing situation: Lives alone; Single parent</li> <li>Geographic location of home: Urban, rural; Other: food desert</li> <li>Occupation: Student; Retired; Other: Disabled</li> <li>History of recent crisis: Job loss</li> <li>Daily stress level: Mental tension</li> </ul>
NCP Step 2: Nutrition Diagnosis	
Critical Thinking Questions and Additional Considerations related to Terminology and Documentation of Nutrition Problem(s)	Possible Diagnoses with Food Insecurity-related Etiology (Non-Exhaustive List)
<p><b>Intake</b> <i>Too much or too little of a food or nutrient compared to actual or estimated needs<sup>1</sup></i></p> <ul style="list-style-type: none"> <li>Low food security may lead poor overall dietary quality due to selection of low-cost, energy-dense foods.<sup>12</sup></li> </ul>	<p><b>Energy Balance (1)</b></p> <ul style="list-style-type: none"> <li>Inadequate energy intake</li> <li>Excessive energy intake</li> </ul> <p><b>Oral or Nutrition Support Intake (2)</b></p>

<b>NCP Step 1: Nutrition Assessment</b>	
<b>Critical Thinking Questions and Additional Considerations for Each Assessment Domain</b>	<b>Possible Indicators of a Nutrition Problem with Food Insecurity-related Etiology (Non-Exhaustive List)</b>
<ul style="list-style-type: none"> <li>Very low food security may lead to inadequate energy or protein intake due to severe restrictions in total food supply.</li> </ul>	<ul style="list-style-type: none"> <li>Inadequate oral intake</li> </ul> <p><b>Fluid Intake (3)</b></p> <ul style="list-style-type: none"> <li>Inadequate fluid intake</li> </ul> <p><b>Nutrient (5)</b></p> <ul style="list-style-type: none"> <li>Inadequate protein-energy intake</li> <li>Imbalance of nutrients</li> </ul> <p><b>Fat and Cholesterol (5.5)</b></p> <ul style="list-style-type: none"> <li>Excessive fat intake</li> <li>Intake of types of fats inconsistent with needs</li> </ul> <p><b>Protein (5.6)</b></p> <ul style="list-style-type: none"> <li>Inadequate protein intake</li> </ul> <p><b>Carbohydrate and Fiber (5.8)</b></p> <ul style="list-style-type: none"> <li>Inadequate carbohydrate intake</li> <li>Excessive carbohydrate intake</li> <li>Inconsistent carbohydrate intake</li> <li>Inadequate fiber intake</li> </ul> <p><b>Vitamin (5.9)</b></p> <ul style="list-style-type: none"> <li>Inadequate vitamin intake</li> </ul> <p><b>Mineral (5.10)</b></p> <ul style="list-style-type: none"> <li>Inadequate mineral intake</li> </ul> <p><b>Multi-nutrient (5.11)</b></p> <ul style="list-style-type: none"> <li>Predicted inadequate nutrient intake</li> </ul>
<p><b>Clinical</b> <i>Nutrition problems that relate to medical or physical conditions<sup>1</sup></i></p> <ul style="list-style-type: none"> <li>If malnutrition due to food insecurity is suspected, evaluate assessment findings according to clinical characteristic criteria for “Malnutrition in the Context of Social or Environmental Circumstances”<sup>13</sup></li> </ul>	<p><b>Biochemical (2)</b></p> <ul style="list-style-type: none"> <li>Altered nutrition-related laboratory values</li> </ul> <p><b>Weight (3)</b></p> <ul style="list-style-type: none"> <li>Underweight; Unintended weight loss</li> <li>Overweight/obesity; Unintended weight gain</li> </ul> <p><b>Malnutrition Disorders (4)</b></p> <ul style="list-style-type: none"> <li>Malnutrition</li> </ul>
<p><b>Behavioral-Environmental</b> <i>Knowledge, attitudes, beliefs, physical environment, access to food, or food safety<sup>1</sup></i></p> <ul style="list-style-type: none"> <li>Improving stability of household food supply will likely be a fundamental requirement for addressing intake and clinical problems that are related to food insecurity.<sup>14</sup></li> <li>If the etiology of an intake- or clinical-problem is food insecurity-related, specify what aspects of food insecurity are affecting the intake- or clinical-problem. If no intake or clinical problem is identified, then a nutrition problem related to “food safety and access” can be defined.</li> </ul>	<p><b>Knowledge and Beliefs (1)</b></p> <ul style="list-style-type: none"> <li>Not ready for diet/lifestyle change</li> <li>Limited adherence to nutrition-related recommendations</li> <li>Undesirable food choices</li> </ul> <p><b>Physical Activity and Function (2)</b></p> <ul style="list-style-type: none"> <li>Poor nutrition quality of life</li> </ul> <p><b>Food Safety and Access (3)</b></p> <ul style="list-style-type: none"> <li>Intake of unsafe food</li> <li>Limited access to food</li> <li>Limited access to nutrition-related supplies</li> </ul>

<b>NCP Step 1: Nutrition Assessment</b>	
<b>Critical Thinking Questions and Additional Considerations for Each Assessment Domain</b>	<b>Possible Indicators of a Nutrition Problem with Food Insecurity-related Etiology (Non-Exhaustive List)</b>
	<ul style="list-style-type: none"> <li>Limited access to potable water</li> </ul>
<b>Step 3: Nutrition Intervention</b>	
<b>Critical Thinking Questions and Additional Considerations related to Domains</b>	<b>Possible Interventions to Address Food Insecurity-related Problem Etiology or Signs/Symptoms (Non-Exhaustive List)</b>
<b>Food and Nutrient Delivery</b> <i>Individualized approach for food/nutrient provision.<sup>1</sup></i> <ul style="list-style-type: none"> <li>Identify low-cost foods that are good sources of iron, folate, calcium, magnesium, zinc, and vitamins A, B<sub>6</sub>, B<sub>12</sub>, and C to prevent deficiencies common in food insecure populations.</li> <li>Consider physician order for a once-per-day multivitamin-mineral to ensure micronutrient needs are met, which may be covered by Medicare or Medicaid. For uninsured patients, identify several low-cost daily multivitamin-mineral options for patient consideration, if indicated.</li> <li>Inform provider of any medications that may result in adverse reactions due to food insecurity to identify potential alternatives for use until food supply is reliable.</li> </ul>	<b>Meals and Snacks (1)</b> <ul style="list-style-type: none"> <li>General/healthful diet</li> <li>Carbohydrate modified diet: Consistent carbohydrate diet</li> </ul> <b>Nutrition Supplement Therapy (3)</b> <i>Vitamin and Mineral Supplement Therapy (3.2)</i> <ul style="list-style-type: none"> <li>Multivitamin/mineral supplement therapy</li> </ul> <b>Nutrition-Related Medication Management (6)</b> <ul style="list-style-type: none"> <li>Prescription medication</li> </ul>
<b>Nutrition Education</b> <i>Formal process to instruct or train patients/clients in a skill or to impart knowledge to help patients/clients voluntarily manage or modify food, nutrition and physical activity choices and behavior to maintain or improve health.<sup>1</sup></i> <ul style="list-style-type: none"> <li>While the primary cause of food insecurity is typically inadequate household resources, patients may benefit from education and skill-development in the areas of: grocery list development, budget planning, preparing recommended foods, label reading, or cooking with limited resources</li> <li>Patients may be unable to apply comprehensive changes to diet, such as the purchase of new kinds of foods. Evaluate patient resources and identify feasible, high-leverage goals.</li> <li>Consider harm reduction principals such as washing canned vegetables to reduce sodium and elimination of non-essential foods, such as sugar-sweetened beverages.</li> </ul>	<b>Nutrition Education – Content (1)</b> <ul style="list-style-type: none"> <li>Priority modifications</li> <li>Survival information</li> <li>Other or related topics (e.g., menu planning, meal purchasing)</li> </ul> <b>Nutrition Education – Application (2)</b> <ul style="list-style-type: none"> <li>Skill development (e.g., cooking skills/preparation)</li> </ul>
<b>Nutrition Counseling</b> <i>A supportive process, characterized by a collaborative counselor–patient/client relationship to establish food, nutrition and physical activity priorities, goals, and individualized action plans that acknowledge and foster responsibility for self-care to treat an existing condition and promote health.<sup>1</sup></i> <ul style="list-style-type: none"> <li>Goals for clients in food insecure households will need to take into account individual food budget or food access limitations in order to be attainable.</li> <li>Cooperatively brainstorm creative solutions to common issues such as living in a food desert, having a small grocery budget, or lack of food preparation equipment.</li> </ul>	<b>Strategies (2)</b> <ul style="list-style-type: none"> <li>Goal setting</li> <li>Problem solving</li> </ul>
<b>Coordination of Nutrition Care</b> <i>Consultation with, referral to, or coordination of nutrition care with other providers, institutions, or agencies that can assist in treating or managing nutrition-related problems.<sup>1</sup></i> <ul style="list-style-type: none"> <li>If care is being provided presently in the clinical setting, what community-based nutrition programs could assist with transition of care to better ensure food insecurity is addressed?</li> </ul>	<b>Collaboration and Referral of Nutrition Care (1)</b> <i>Collaboration with other nutrition professionals</i> <ul style="list-style-type: none"> <li>Collaboration with other providers (e.g., social workers)</li> <li>Referral to other providers</li> <li>Referral to community agencies/programs (e.g., WIC, SNAP, charitable food programs, housing)</li> </ul>



<b>NCP Step 1: Nutrition Assessment</b>	
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<ul style="list-style-type: none"> <li>If care is being provided presently in the community setting, what other social service programs could be leveraged to help to build household resources in order to stabilize household food supply?</li> <li>Are there misperceptions about federal food assistance programs that should be addressed to better ensure referral completion by the patient?</li> </ul>	<p>assistance, employment programs) <i>Discharge and Transfer of Nutrition Care to New Setting or Provider</i></p> <ul style="list-style-type: none"> <li>Discharge and transfer to another nutrition and dietetics practitioner (e.g., inpatient clinical to community nutritionist)</li> <li>Discharge and transfer to community agencies/ programs</li> </ul>
<b>Step 4: Monitoring and Evaluation</b>	
<b>Special Considerations for Food Insecure Populations</b>	
<b>Monitor outcomes</b>	
<ul style="list-style-type: none"> <li>Obtain multiple contact methods for clients to use during future follow-up contact efforts.</li> <li>For clients with low-literacy issues, use “teach-back” or other appropriate technique to re-confirm patient/client understanding of nutrition care plan at follow-up.</li> <li>Complete data-sharing agreements with social service providers to obtain follow-up information on completion of referrals.</li> <li>Recognize that life circumstances may be erratic, which may result in lack of progress toward goals.</li> <li>Evaluate progress using a client-centered approach.</li> </ul>	
<b>Measure outcomes</b>	
<ul style="list-style-type: none"> <li>Nutrition care indicators should be based on findings during the previous steps of the NCP.</li> <li>Re-assess household food security status using a standardized tool to quantify change in food security.</li> <li>Re-assess for changes in quantity, quality, and patterns of food intake, where applicable. For example, outcomes might include amount of food (e.g., servings of fruits and vegetables per day) or total carbohydrate (distribution at meals) consumed.</li> </ul>	
<b>Evaluate outcomes</b>	
<ul style="list-style-type: none"> <li>Compare current findings with previous status, intervention goals, and/or reference standards.</li> </ul>	

<sup>1</sup>Academy of Nutrition and Dietetics. Nutrition Terminology Reference Manual (eNCPT): Dietetics language for nutrition care. <http://ncpt.webauthor.com/>. Accessed August 9, 2017;

<sup>2</sup>Kirkpatrick SI, Tarasuk V. Food insecurity is associated with nutrient inadequacies among Canadian adults and adolescents. *J Nutr.* 2008;138(3):604–612;

<sup>3</sup>Hanson KL, Connor LM. Food insecurity and dietary quality in US adults and children: a systematic review. *Am J Clin Nutr.* 2014;100(2):684–692;

<sup>4</sup>Muirhead V, Quinonez C, Figueiredo R, Locker D. Oral health disparities and food insecurity in working poor Canadians. *Community Dent Oral Epidemiol.* 2009;37(4):294–304;

<sup>5</sup>Coleman-Jensen A, Rabbitt MP, Gregory CA, Singh A. Household food security in the United States in 2015. United States Department of Agriculture;2016. Economic Research Report 215;

<sup>6</sup>Gunderson C, Dewey A, Crumbaugh AS, et al. Map the meal gap 2016. Chicago, IL: Feeding America; 2016;

<sup>7</sup>Cutler-Triggs C, Fryer GE, Miyoshi TJ, Weitzman M. Increased rates and severity of child and adult food insecurity in households with adult smokers. *Arch Pediatr Adolesc Med.* 2008;162(11):1056–1062;

<sup>8</sup>Coleman-Jensen A, Nord M. Food insecurity among households with working-age adults with disabilities. 2013;

<sup>9</sup>Seligman HK, Laraia BA, Kushel MB. Food insecurity is associated with chronic disease among low-income NHANES participants. *Journal Nutr.* 2010;140(2):304–310;

<sup>10</sup> Anema A, Weiser SD, Fernandes KA, et al. High prevalence of food insecurity among HIV-infected individuals receiving HAART in a resource-rich setting. *AIDS Care*. 2011;23(2):221–230;

<sup>11</sup> Hanson KL, Olson CM. Chronic health conditions and depressive symptoms strongly predict persistent food insecurity among rural low-income families. *J Health Care Poor Underserved*. 2012;23(3):1174–1188;

<sup>12</sup> Leung CW, Epel ES, Ritchie LD, Crawford PB, Laraia BA. Food insecurity is inversely associated with diet quality of lower-income adults. *J Acad Nutr Diet*. 2014;114(12):1943–1953.e1942;

<sup>13</sup> White JV, Guenter P, Jensen G, Malone A, Schofield M. Consensus Statement: Academy of Nutrition and Dietetics and American Society for Parenteral and Enteral Nutrition. *J Parenter Enteral Nutr*. 2012;36(3):275–283;

<sup>14</sup> Satter E. Hierarchy of Food Needs. *J Nutr Educ Behav*. 2007;39(5, Supplement):S187–S188.

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**Table 3**

Action items for dietetics practitioners to support the delivery of food insecurity-informed client care

<ul style="list-style-type: none"><li>• Ensure food insecurity screening systems are in place if working with at-risk population(s)</li><li>• Use food insecurity screening data to aid critical thinking during the assessment process</li><li>• Be aware of the impact of household food insecurity on client health and ability to implement nutrition and medical treatment plans</li><li>• Include food assistance program referrals, food budgeting education, and cooking skill development as components of interventions, when indicated</li><li>• Maintain a current listing of charitable food programs and eligibility criteria for federal nutrition assistance programs for distribution to clients, when indicated</li><li>• Engage physician-, social worker-, and administrator-stakeholders to explore local food bank-health care collaborations, such as medically-tailored food distributions or mobile produce markets in the healthcare setting</li><li>• Modify goals as needed when monitoring client progress and evaluating outcomes according to changes in client resources and behavior-change capabilities</li></ul>
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