Applying the Nutrition Care Process: Nutrition Diagnosis and Intervention

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Abstract

The Nutrition Care Process (NCP) was accepted by the dietetics profession in 2003 and is being implemented in all settings where dietitians provide direct patient care. Standardized terminology is being developed to describe the activities of registered dietitians (RDs) within each of the four steps of the NCP: Nutrition Assessment, Nutrition Diagnosis, Nutrition Intervention, and Nutrition Monitoring and Evaluation. RDs providing nutrition support to complex or critically ill patients have questions about how to apply the NCP and standardized language to their patients. This article provides a brief overview of the NCP and a case illustrating how standardized language can be applied to a postoperative intensive care unit (ICU) patient whose course changes over time.

Introduction

The NCP is a four-step approach to nutrition problem solving and care that is designed to guide and illuminate the work of RDs. Since its adoption by the dietetics profession in 2003, three of the fours steps of the process — diagnosis, intervention, and monitoring and evaluation — have been elaborated in book form (1). Standardized terminology describing nutrition diagnosis was introduced in 2005 (2). A second book that included nutrition diagnosis and intervention terminology was released in 2006 (3). A third book, *International Dietetics and Nutrition Terminology Reference Manual*, which includes the monitoring and evaluation step of the NCP, was released in 2007 (4).

Many RDs are familiar with the NCP, and some are incorporating standardized language into medical record documentation. As a result, nutrition support dietitians have questions about how to apply the NCP to critically ill patients receiving enteral (EN) and parenteral nutrition (PN). The dynamic nature of the critical care unit and sheer volume of data that RDs incorporate into the decision making process present challenges in identifying the nutrition diagnosis, describing the intervention, and determining the monitoring and evaluation using the standardized language of dietetics. The purpose of this article is to illustrate how the nutrition diagnosis, intervention, and monitoring steps of the NCP can be applied to a critically ill patient.

Background

Standardized or controlled vocabularies are used in medicine and nursing to describe diagnosis and treatment for those within and outside the medical profession. Examples of controlled vocabularies familiar to dietitians include the Common Procedure Terminology (CPT) and the International Classification of Diseases (ICD-9) terminologies developed for use by physicians (5,6). Nurses may use one of several standardized languages, and physical therapists have also developed a controlled vocabulary to describe their patient care activities (7,8). All of these terminologies ultimately should combine to identify the contributions of health professionals within the electronic medical record. The International Dietetics and Nutrition Terminology is being developed to identify the unique contributions of RDs within the universal electronic medical record.

Controlled vocabularies serve several important purposes besides their role in meeting the federal mandate for electronic medical records. The terms and codes are easily incorporated into laws and regulations. Because they are uniform descriptors, they may facilitate productivity, efficacy, and reimbursement data collection. In educational settings, controlled vocabularies are used to organize information presented to students. In the clinical environment, standardized language facilitates clear, consistent documentation of care delivered, communication between health-care professionals, and continuity as patients move from one location to another. Such vocabularies clearly distinguish the unique activities of each profession, thereby reducing the opportunities for miscommunication, overlapping activities, and interprofessional conflict.

Widespread implementation of the NCP and use of standardized language also should aid benchmarking data collection and may serve as the basis for identifying homogenous populations for research. A standardized approach to describing care is especially valuable to RDs working in nutrition support where the multifaceted nature of the data evaluated may be underappreciated by those who focus on the number of patients seen rather than the complexity of care delivered.

Nutrition Diagnosis

The most unique feature of the NCP is the nutrition diagnosis. The 60 nutrition diagnosis terms and definitions were developed to describe nutrition problems that can be treated independently by the dietitian (4). Thus, they are distinct from the terms physicians use to describe medical diagnoses. However, RDs and physicians use a similar process of diagnostic reasoning to derive diagnoses from their respective domains (9). Like medical diagnoses, nutrition diagnostic terms have a specific definition; unique etiologies, signs, and symptoms; and a code number that may be used for linking to data in an electronic medical record. Unlike medical diagnoses, nutrition diagnoses typically resolve following intervention by the dietitian.

Once the RD "makes" a nutrition diagnosis, the term is incorporated into a nutrition diagnosis statement or PES statement composed of three parts: a problem (P), etiology (E), and signs and symptoms (S) (Table 1). Within the PES statement, the diagnosis is a nutrition problem that will resolve with the dietitian's intervention. The etiology is the "root" cause of the nutrition problem. It may be improved or eliminated with the nutrition intervention. The signs and symptoms are monitored by the dietitian to determine progress toward resolving the nutrition diagnosis. For example, the nutrition support dietitian may calculate the carbohydrate intake of a critically ill patient with hyperglycemia, rule out excessive carbohydrate intake as a nutrition diagnosis, and suggest the need for an increased insulin dose.

Diagnosing nutrition problems and writing a PES statement that is both correct and meaningful is a rigorous task. It involves validating assessment data, clustering and comparing signs and symptoms to develop differential diagnoses, and systematically eliminating them until a diagnosis is derived from the signs and symptoms.

Nutrition Intervention

The nutrition intervention is defined as a specific action that remedies a nutrition diagnosis and consists of two components: the plan and the implementation. The first step in planning nutrition intervention is the nutrition prescription. The prescription is based on best available evidence and the clinical judgment of the RD. It is not the current nutrition order, but rather an individualized statement of the needs of the patient at a given moment in time. In critically ill patients, the nutrition prescription may be adjusted frequently as medical diagnoses (e.g., acute renal failure, hepatic encephalopathy), treatments (e.g., surgical procedures, medications), and the patient's condition (e.g., wound healing, weaning from the ventilator) change.

An example of a nutrition prescription for a critically ill patient might be as simple as 1,800 kcal and 65 g protein. It might be expanded to include specific amounts of fat, vitamins, minerals, fluids, and bioactive substances. Ideally, the nutrition prescription is based on the latest evidence-based standards, but where data are lacking, the RD applies clinical judgment and institutional tradition to the nutrition prescription.

The RD implements one of 13 nutrition interventions that are designed to reduce the gap between the patient's current and ideal intake. Each nutrition intervention consists of a definition, a unique number, and a reference sheet describing the details of the intervention and usual application. Nutrition support dietitians are strongly identified with enteral and parenteral nutrition (NC-2), which they individualize to meet the nutrition prescription by manipulating formula volume and composition. Nutrition support dietitians may also prescribe medical food supplements (ND-3.1) and participate in nutrition-related medication management (ND-6). The purpose of the nutrition intervention ultimately is to correct the nutrition diagnosis, remove the etiology, or reduce the signs and symptoms.

Nutrition Monitoring and Evaluation

The monitoring and evaluation step of the NCP is defined as the review and measurement of the patient/client's status at a scheduled or preplanned follow-up point with regard to the nutrition diagnosis, intervention/plans goals, and outcomes (1). Evaluation is the systematic comparison of current findings with previous status, interventions, goals, or a reference standard. Almost 50 monitoring and evaluation strategies have been identified in the nutrition monitoring and evaluation step of the NCP. Effectiveness of the intervention is monitored by changes in the signs and symptoms listed in the PES statement. In Table 1, the intervention (potassium supplementation ND-3.2) should resolve the nutrition diagnosis and can be monitored using the sign (serum potassium level) in the PES statement.

For critically ill patients or others receiving nutrition support, the diagnosis may resolve, but the monitoring and evaluation portion of the NCP continues for the duration of the nutrition intervention. The monitoring and evaluation step incorporates changes from baseline in biochemical and medical tests, anthropometric data, intake and output, and other familiar nutrition support monitoring parameters. Thus, the fourth step of the NCP incorporates the familiar components of the nutrition support dietitian's assessment in a more systematic approach that enables measurement of nutrition outcomes and ultimate demonstration of the RD's effectiveness.

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Table 1. General Format for the Three-part Nutrition Diagnostic Statement (PES Statement) With a Sample Statement

General Format
problem (P) related to **etiology (E)** as evidenced by **signs and symptoms (S)**

Sample PES statement
(P) Inadequate intake of potassium **(NI 55.1)** related to **(E)** increased urinary losses with amphotericin B administration, as evidenced by **(S)** declining serum potassium levels.

Sample Nutrition Prescription
Increase potassium intake to 2 mEq/kg each day.

Sample Nutrition Intervention
Mineral (potassium 40 mEq/day) supplements **(ND-3.2)** as needed to maintain serum potassium levels within normal limits.

Sample Nutrition Monitoring and Evaluation
Monitor potassium intake (FI-6.2); serum potassium level (S-2.2)

Note: The (P), (E), (S) and numbers for the nutrition diagnostic term (NI 55.1), nutrition intervention term (ND-3.2), and nutrition monitoring and evaluation terms (FI-6.2 and S-2.2) are included for the convenience of the reader; they are not necessarily recorded in the medical record.

Application

The NCP is designed for use with individual patients as well as groups and populations. The remainder of this article illustrates how the NCP and standardized language may be applied over several days. The case is presented using the assessment, diagnosis, intervention, monitoring, and evaluation (ADIME) format. Table 2 contains general guidelines for incorporating key features of the NCP into some popular documentation formats. The examples of chart notes also contain diagnostic, intervention, and monitoring and evaluation terms from the *International Dietetics and Nutrition Terminology Reference Manual* (4). These terms should not be adapted or modified because they are designed to describe and capture the RD's activities related to the NCP.

The following case provides an example of how the standardized language of dietetics and the ADIME format can be used for medical record documentation. The author appreciates that some RDs would provide a much more detailed note, while others would limit their documentation to information unavailable elsewhere in the medical record. The intent is not to specify a level of detail, but to provide sufficient detail to describe the case. The interventions and monitoring and evaluation parameters selected reflect the author's personal practice philosophy, which includes an evidence-based approach to patient management. Of course, nutrition support practice varies widely and others might use a different approach to problems presented. The reader is encouraged to set aside differences in opinion on how the patient is managed and focus on how the standardized terminology may be applied.

Table 2. General Guidelines for Incorporating the Nutrition Care Process Into Six Common Documentation Formats

ADIME	PGIE
A = Assessment	P = Problem
D = Diagnosis or	Diagnosis or
PES* statement	PES* Statement
I = Intervention	G = Goal
Nutrient Prescription	Nutrient Prescription
Nutrition Intervention	I = Intervention
Goal	Nutrition Intervention
M = Monitoring	Goal
E = Evaluation	E = Evaluation
SOAP	**DAR**
S = Subjective	D = Data
O = Objective	Diagnosis or
A = Assessment	PES* Statement
Diagnosis or	A = Action
PES* Statement	Nutrient Prescription
Nutrient Prescription	Nutrition Intervention
P = Plan	Goal
Nutrition Intervention	R = Response
Goal	
PIE	**DAR-O**
P = Problem	D = Data
Diagnosis or	Diagnosis or
PES* Statement	PES* Statement
I = Intervention	A = Action
Nutrition Intervention	Nutrient Prescription
E = Evaluation	Nutrition Intervention
	Goal
	R = Response
	O = Output

*PES=Problem, Etiology, Signs and Symptoms where Problem is a diagnostic term and Etiology, Signs and Symptoms are derived from the corresponding reference sheet for the diagnostic term.

Case

HF is a 27-year-old previously healthy male who was admitted to the intensive care unit (ICU) following emergency surgery for a ruptured appendix. He weighed 82 kg on admission and was at ideal weight for his height of 6 ft 1 in. His temperature was 100.4°F, and his white blood cell count was elevated (14×10^3/mcL) on admission. Other laboratory findings were unremarkable. On hospital day 2, HF was being weaned from the ventilator and expected to transfer out of the ICU later in the day. The intravenous (IV) fluids of D5.45 saline were running at 125 mL/h. Because all patients admitted to the ICU are automatically seen by an RD, a note must be entered into his medical record before the patient is transferred to the floor. Cumulative patient data are shown in Table 3.

Initial Assessment and Diagnosis

As part of the initial assessment, the RD reviewed the medical record for biochemical data, the results of medical tests and procedures, and anthropometric measures. Because HF was on a ventilator, the food/nutrition and client history was limited to a brief conversation with family members, who stated that he was eating well until 2 days prior to admission. Given the elevated blood glucose value, the RD inquired about a history of diabetes, which was negative.

<u>Nutrition Diagnostic Reasoning</u>

The RD reviewed the assessment data and compared the findings with potential nutrition diagnoses. Because of the elevated blood glucose value, the RD evaluated the dextrose content of the IV fluids and determined that it

Table 3. Cumulative Patient Data From Admission Through Hospital Day 10

	Hospital Day 1	Hospital Day 2	Hospital Day 3	Hospital Day 4	Hospital Day 5	Hospital Day 6	Hospital Day 7	Hospital Day 8	Hospital Day 9	Hospital Day 10
CHEMISTRY										
Sodium (mEq/L)	135	134	132	132	130	132	133	133	137	135
Potassium (mEq/L)	3.4	4.1	4.8	3.2	4.4	3.9	3.7	4.6	4.7	4.6
Chloride (mEq/L)		111	113	102	103	101	102	100	100	99
Carbon dioxide (mEq/L)		17	17	23	21	20	18	17	18	19
Blood urea nitrogen (mg/dL)				21	24	26	25	31	37	46
Creatinine (mg/dL)				0.8	0.7	1.1	1.2	1.5	1.7	2.0
Blood glucose (mg/dL)		184	136	237	140	132	125	145	130	136
Magnesium (mEq/L)	1.9	2.1	2.4	1.6	1.7	1.6	1.2	1.4	1.8	2.0
Phosphorus (mg/dL)	4.3	4.2	4.0	3.9	4.0	4.1	4.2	4.0	3.8	2.6
Calcium (mg/dL)	8.1	7.9	8.0	7.8	7.6	8.1	8.2	8.0	7.9	7.8
Intake and Output										
Weight (kg)	83	86	87	94	96	100	99	98	97	97
Intake (L) (all sources)	5.1	3.4	7.8	4.7	3.0	3.6	2.8	2.4	2.4	2.4
Output (L) (all sources)	1.8	2.0	1.0	1.6	1.6	2.5	3.1	3.0	3.0	1.6
MEDICATIONS										
Vancomycin 1 g q12 h IV		•	•	•	•	•	•	•	•	•
Insulin drip (titrate to keep blood glucose <150 mg/dL)					•	•	•	•	•	•
Propofol 20 mcg/kg/min IV					•	•	•	•	•	
Amphotericin B 50 mg qd IV					•	•	•	•	•	•

IV=intravenous

was likely insufficient to contribute to hyperglycemia. The elevated blood glucose concentration appeared to be a transient stress response following surgery, and the RD confirmed that the surgeons had addressed the hyperglycemia by ordering insulin coverage. Because the hyperglycemia was not nutrition-related, the dietitian ruled out excessive carbohydrate intake (NI-53.3).

Clearly, HF was well nourished. The RD did not identify any significant nutrition problems except that he was NPO. However, the patient would have a diet ordered in time for the evening meal. In this case, the RD could simply decline to diagnose a nutrition problem by recording the data from the nutrition assessment, then writing "the patient has no nutrition diagnosis at this time." This statement would be substantiated by published guidelines that clearly state that a previously healthy patient could easily tolerate up to 7 days without nutrient intake (10). However, the ruptured appendix made HF a candidate for postoperative complications, and a return to the ICU was a reasonable expectation. Because HF had been eating well prior to admission and had been NPO for less than 24 hours, the RD diagnosed inadequate protein-energy intake (NI-5.3), primarily because the definition of the diagnosis refers to changes in physiologic needs of short or recent duration (3).

Determining the Nutrition Prescription

The nutrition prescription concisely states individualized recommended dietary intake. It is based on current reference standards and dietary guidelines adjusted for the patient's health condition and nutrition diagnosis (3). The level of detail for the nutrient prescription can be adjusted based on the patient's condition as well as practice standards, institutional convention, and clinical judgment. Thus, the requirements for lipid, carbohydrate, and individual nutrients could be specified as needed. For HF, the RD based the calorie and protein prescription on published standards (10). The recently released evidence-based guideline for critically ill patients also could be used,

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especially if a long-term ICU stay was anticipated (11).

Nutrition Intervention

The nutrition intervention is designed to treat the nutrition diagnosis or its etiology. In this case, inadequate protein-energy intake will be alleviated with a general diet (ND-1), which will be ordered as soon as the patient is weaned from the ventilator. Once the diet is ordered, the dietetic technician registered (DTR) can verify that the patient is eating and report any identified problems to the RD. Table 4 illustrates a sample initial note in the ADIME format that incorporates the nutrition diagnosis, prescription, nutrition

Table 4. **Initial Note Hospital Day 2**

NUTRITION ASSESSMENT

Biochemical Data, Medical Tests and Procedures

WNL except blood glucose of 184 mg/dL and WBC of 10,000 cells/mm^3

134 | 111 | 21 / 184
4.1 | 17 | 0.8 \

Anthropometric Measurements

Ht. 6'1"; current weight is 86 kg; up from 82 kg on admission.

Physical Exam Findings

Deferred

Food and Nutrition History

Eating well prior to admission; no known nutrient modifications. Currently NPO; receiving D5.45 saline at 125 mL/hr providing 510 calories and 210 mEq Na. I&O + 6 L since admission.

Client History

Medical history: negative for diabetes. Surgical history: appendectomy for ruptured appendix last PM. Per MD, patient to wean from ventilator and transfer from ICU today. Regular diet to be ordered on extubation.

NUTRITION DIAGNOSIS

#1 Problem **Inadequate calorie and protein intake (NI-5.3)**
Etiology **related to** insufficient GI access
Signs/Symptoms **as evidenced by** calorie intake 35% of required and no protein intake
#2 Problem ____
Etiology ____
Signs/Symptoms ____
#3 Problem ____
Etiology ____
Signs/Symptoms ____

NUTRITION INTERVENTION

Nutrition Prescription

The patient/client's individualized recommended dietary intake of energy and/or selected foods or nutrients based upon current reference standards and dietary guidelines and the patient/client's health condition and nutrition diagnosis. (specify)

General diet providing 2,050 calories and 100 grams of protein.

Intervention #1 Order general diet **(ND-1)**
Goal (s) Adequate PO intake

Intervention #2 ____
Goal (s) ____

Intervention #3 ____
Goal (s) ____

NUTRITION MONITORING AND EVALUATION

Indicator, e.g., self-monitoring ability	*Criteria, e.g., intake amount, mg/dL*
#1 **Energy intake (F1.1.1)**	#1 Consumes >2,000 kcal/day
#2 **Protein intake (FI-5.2.1)**	#2 Consumes >90 grams of protein per day
#3	#3

Note: Terms in bold text are drawn directly from the *International Dietetics and Nutrition Terminology Reference Manual.* They are defined within the language and should not be modified. The codes (numbers in parenthesis) are included for the convenience of the reader, but it is not necessary to include them in the medical record.

intervention, and monitoring and evaluation.

Follow-up on Hospital Day Four

HF was transferred to the floor as planned, but on hospital day 3, his temperature reached 102°F, and he complained of abdominal pain. That afternoon, he underwent small bowel resection for ischemic necrosis. Results of the operation included a temporary diverting ileostomy. His ileocecal valve and colon were intact, with about 200 cm of small bowel in continuity and the remaining segment excluded by the diverting colostomy.

On hospital day 4, the RD found that HF weighed 94 kg. His skin was warm and dry to the touch, and he had +2 pedal edema. Bowel sounds were inaudible, and an ileostomy bag was in place, but there was no drainage. Nasogastric (NG) tube output was about 100 mL over the previous 8-hour shift. Ventilator settings were intermittent ventilation of 24 breaths/min, FiO_2 of 80%, and 6 cm of positive end-expiratory pressure. The maximum temperature was 100.6°F. Blood cultures were positive for *Staphylococcus epidermis* and *Escherichia coli*. He was receiving D5.45 lactated Ringer at 125 mL/hr. Vancomycin and amphotericin B were started postoperatively. An insulin drip was started according to unit protocol, and a multiple vitamin infusion was ordered.

Nutrition Diagnostic Reasoning

The RD recognized that HF had developed sepsis, according to the widely used criteria of the American Academy of Chest Physicians (12), and considered a second nutrition diagnosis: increased nutrient needs (NI-5.1) (3). However, the definition of increased needs is "increased need for a specific nutrient compared to established reference standards." Because there was no evidence that HF required more calories or protein than specified in reference standards for a critically ill patient with sepsis, that diagnosis was rejected (13).

The RD noticed a marginally low serum sodium concentration, but quickly rejected inadequate mineral intake (sodium) (NI-55.1) because HF had a cumulative input and output that was positive by almost 15 L, no extraordinary sodium losses, and a sodium intake from his IV fluids in excess of his requirements (3,10). The RD attributed the hyponatremia to the cumulative input and output, which resulted from medically necessary IV fluids administered during surgery and the postoperative stress response. She elected to monitor the serum sodium, which she knew would normalize with postoperative diuresis. She suggested on rounds a reduction in the current IV fluid rate, documented the positive cumulative input and output in the assessment, and adjusted the nutrition intervention to reflect the need for maximally concentrated formula.

The RD also noticed the sharp increase in serum glucose concentration and evaluated HF for a diagnosis of altered nutrition-related laboratory value, glucose (NC-2.2) (3). However, the carbohydrate intake of 150 g (1.2 mg/kg/min) was far below the recommended maximum of 472 g (4 mg/kg/min per day) (14), and this diagnosis was ruled out. A diagnosis of excessive carbohydrate intake (NI-53.2) was ruled out for the same reason. The elevated blood glucose was attributed to impaired glucose metabolism commonly seen in sepsis, and the amount of insulin administered via a continuous insulin infusion (insulin drip) was increased per unit protocol.

The RD also noticed the magnesium value of 1.6 mg/dL. She evaluated the patient's recent magnesium intake and noted that HF had not received magnesium supplementation since admission. He was asymptomatic, but likely had increased urinary losses of magnesium associated with amphotericin administration, which would continue for several more days. The RD added inadequate mineral intake (magnesium) (NI-55.1) to the list of diagnoses because HF had a lower-than-recommended intake based on physiologic needs, which is consistent with the diagnostic criteria for inadequate mineral intake. She spoke with the surgeon, who ordered 2 g of magnesium sulfate IV to correct the intake deficit.

Nutrition Intervention

Consistent with unit protocol and an evidenced-based guideline, the RD continued to restrict HF to 14 to 18 kcal/kg/day for the first week in the ICU (15). During the second week, the RD might recalculate energy requirements based on the Penn State Equation: (HB (0.85)+VE(33)+Tmax(175)-6433), as recommended in the evidence-based guide for critically ill patients (16). This information would be incorporated into the nutrition prescription.

In this setting, the RD had obtained clinical privileges to place the feeding tube and write orders for EN and PN and monitoring if consulted by the physician to do so. The RD reviewed the assessment data and developed a plan of care with the surgeons. The decision was made to initiate a small bowel feeding tube because the NG suction would interfere with gastric feedings. In another patient, the RD might have placed an NG tube based on recent evidence denying a clear advantage of small bowel over NG feeding (11). The RD selected a standard formula with the highest possible protein content to balance the dextrose calories from the IV fluids and the fat calories from the propofol. Additional protein could be added if the propofol and IV fluids continued. The RD did not select an immune-enhancing formula because such formulas are not recommended for routine use (15). Table 5 shows a sample nutrition progress note.

Follow-up on Hospital Days Eight and Ten

On hospital day 8, HF weighed 98 kg. His blood glucose values were within the acceptable range established by the team managing his blood glucose and insulin. However, his renal function was declining, consistent with his clinical course of sepsis and antibiotic administration. His IV fluids were 0.45 saline at 80 mL/hr. Enteral feedings were held because he had 2 L of liquid stool in a 24-hour period. Stool output had decreased sharply since cessation of feeding 8 hours earlier. The physicians attributed the stool output to the length and/or condition of his

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Table 5. Follow-up Note for Hospital Day 4

NUTRITION ASSESSMENT

Biochemical Data, Medical Tests and Procedures

Labs:

132 | 102 | 21 / 237
3.2 | 23 | 0.8 \

calcium: 7.8; phosphorus: 3.9; magnesium: 1.6

Anthropometric Measurements

Ht. 6'1"; current weight is 94 kg; up from 82 kg on admission. 82 kg is dosing weight.

Physical Exam Findings

+ 2 edema of lower extremities
NG tube to intermittent suction
No bowel sounds
Ileostomy without drainage
T max 100.6

Food and Nutrition History

Diet NPO; 24 hour I&O + 4 L.
Cumulative I&O + 14.6 L.
Receiving D5.45 saline at 125 mL/hr. and propofol at 10 mL/hr providing 774 calories & 210 mEq Na.

Client History

Medications: vancomycin, amphotericin B, propofol, insulin drip, potassium chloride; multiple vitamin infusion. Bowel resection last PM with diverting ileostomy; intact ileocecal valve and colon.

NUTRITION DIAGNOSIS

#1 Problem **Inadequate protein-energy intake (NI-5.3)**
Etiology **related to** insufficient GI access
Signs/Symptoms **as evidenced by** calorie intake 35% of required and no protein intake

#2 Problem **Inadequate mineral intake (magnesium) (NI-55.1)**
Etiology **related to** magnesium losses with amphotericin
Signs/Symptoms **as evidenced by** serum magnesium of 1.6 mg/dL

#3 Problem ______
Etiology ______
Signs/Symptoms ______

NUTRITION INTERVENTION

Nutrition Prescription

The patient/client's individualized recommended dietary intake of energy and/or selected foods or nutrients based upon current reference standards and dietary guidelines and the patient/client's health condition and nutrition diagnosis. (specify)

Based on 82-kg dosing weight, permissive underfeeding with 2 kcal/mL feeding at 25 mL/hr to provide 1,230 kcal and 55 g protein in minimal volume. Supplement vitamins, minerals, and electrolytes to meet needs.

Intervention #1 Dietitian will insert enteral feeding tube **(ND-3.1)**
Goal (s) Enteral access

Intervention #2 Dietitian will initiate enteral feedings with standard 2 kcal/mL feeding at 25 mL/hr when tube placed (ND-2) and decrease IV fluids accordingly
Goal (s) Optimum nutrient intake by 10 PM today

Intervention #3 Dietitian will order enteral nutrition monitoring protocol
Goal (s) Identify feeding intolerance

Intervention #4 Recommend 2 g of Mg sulfate IV as discussed with surgery
Goal (s) Replete serum Mg

NUTRITION MONITORING AND EVALUATION

Indicator, e.g., self-monitoring ability	*Criteria, e.g., intake amount, mg/dL*
#1 **Enteral access (FI-3.1.1)**	#1 Placement confirmed by radiograph
#2 **Enteral formula (FI-3.1.2)**	#2 Recorded intake of 25 mL/hr of feeding
#3 **Energy intake (F1.1.1)**	#3 Recorded intake of 25 mL/hr of feeding
#4 **Protein intake (FI-5.2.1)**	#4 Recorded intake of 25 mL/hr of feeding
#5 **Total carbohydrate intake (FI-5.3.1)**	#5 Carbohydrate intake from all sources <472 g/day

For dietitians without privileges to insert the feeding tube, order the formula, and provide the monitoring protocol, the wording "Recommend post-pyloric feeding tube, etc." may be substituted.

remaining bowel and recommended that feedings be held. The RD recognized that HF had altered gastrointestinal (GI) function (NC-1.4), but also continued to have inadequate intake from enteral/parenteral nutrition (NI-2.3). The RD could revise the PES statement for the inadequate enteral/parenteral intake to include altered GI function as an etiology. However, the altered GI function was the nutrition diagnosis driving a change in therapy, and two separate diagnoses were recorded.

The RD and the surgeons were concerned that HF had suboptimal intake for most of the 8 days since admission. In some instances, the feeding would be held and subsequently restarted. However, in light of this patient's deteriorating condition, marginal GI function, and an accumulating calorie deficit, the decision was made to start PN and reinitiate enteral feedings as tolerated. The surgeons changed the central line, and the RD ordered 1 L of PN containing 60 g amino acids (0.7 g/kg) and 200 g (1.6 mg/kg/min) dextrose to be administered over 24 hours daily with electrolytes, decreased potassium, and increased acetate to accommodate declining renal function. She ordered a 250-mL bottle of 20% lipids to be administered as an IV rider over 12 hours daily. She planned to increase the feeding to goal the following day and checked to ensure that laboratory tests were ordered for monitoring. Sample follow-up documentation is found in Table 6.

On hospital day 10, HF weighed 97 kg. The RD had decreased his IV fluids to 20 mL/hr and increased his PN to goal the day before. Despite declining renal function, phosphorus concentrations declined from 4.0 to 2.6 mg/dL. His stool output had slowed to 1 L/24 hr. Blood glucose control was acceptable on the insulin drip. If blood glucose values remained below 150 mg/dL, the surgeons would consider administering octreotide for the diarrhea, but PN was scheduled to continue until the diarrhea was better controlled.

Nutrition Diagnostic Reasoning

The inadequate EN and PN has resolved with the achievement of goal feedings. Inadequate mineral intake (magnesium) resolved with ongoing magnesium supplementation in the PN. Altered GI function persisted. The decline in serum phosphorus values suggested to the RD the possibility of an altered nutrition-related laboratory value (phosphorus) (NC-2.2) (3). However, she rejected the diagnosis because the decrease in phosphorus concentrations likely represented refeeding hypophosphatemia, which is not included in NC-2.2. The diagnosis also could have been inadequate mineral intake (NI-55.1) (phosphorus). However, the RD selected imbalance of nutrients (NI 5.5) to describe more precisely the relationship between phosphorus and carbohydrate. After discussion with the surgeons, the RD supplemented the PN with an additional 20 mEq of sodium phosphate and anticipated resolution of hypophosphatemia the next day (Table 7). The RD also informed the nurse of an increase in dextrose intake and the potential for an increased insulin requirement.

On hospital day 14, HF was stable and weaned off the ventilator. A general healthful diet was ordered (ND-1), and HF was transferred out of the ICU to the care of another RD. The ICU RD signed off and transferred care to the RD on the floor (RC-2).

Conclusion

The NCP is a four-step problem-solving process that can be used to identify nutrition problems that the RD can treat independently. The standardized language is used to describe nutrition diagnoses, interventions, and monitoring and evaluation. The NCP and standardized language are designed for use by RDs caring for patients or clients of all ages and levels of complexity. Critically ill patients with myriad intercurrent medical and nutritional problems present challenges in applying the NCP that can be overcome with clear thinking that clusters detailed information used to manage critically ill patients. The NCP and standardized language of dietetics is designed to describe the nutrition problems that the RD can identify and document nutrition-related problems and their resolution. The anticipated result is improved communication with other professionals, increased visibility of the dietitian's role, and clearer documentation of the dietitian's unique contribution to patient care.

Readers are encouraged to log in to the DNS listserve to discuss this article with the author.

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(Continued on page 23)

Table 6. Follow-up Note for Hospital Day 8

NUTRITION ASSESSMENT

Biochemical Data, Medical Tests and Procedures

Labs:

133	100	31	145
4.6	17	1.5	

calcium: 7.6; phosphorus: 4.0; magnesium: 1.7

Anthropometric Measurements

Ht. 6'1"; current weight is 98 kg; up from 82 kg on admission. 82 kg is dosing weight.

Physical Exam Findings

+ 2 edema of lower extremities
+ NG tube to drainage

Food and Nutrition History

Feedings held for 2 L stool output. Diet NPO; 24 hour I&O – 1.4 L; Cumulative I&O +16.6 L; 0.45 saline at 80 mL/hr. Propofol at 10 mL/hr. Total intake over last 24 hours is approximately 400 kcal & 150 mEq Na

Client History

Medications: vancomycin, amphotericin B, propofol, insulin drip.

NUTRITION DIAGNOSIS

#1 Problem **Inadequate intake from enteral nutrition infusion (NI-2.3)**

Etiology **related to** feeding intolerance

Signs/Symptoms **as evidenced by** intake less than needs

#2 Problem **Altered GI function (NC-1.4)**

Etiology **related to** bowel resection

Signs/Symptoms **as evidenced by** 2 L stool output that declined when enteral feedings discontinued

#3 Problem

Etiology

Signs/Symptoms

NUTRITION INTERVENTION

Nutrition Prescription

The patient/client's individualized recommended dietary intake of energy and/or selected foods or nutrients based upon current reference standards and dietary guidelines and the patient/client's health condition and nutrition diagnosis. (specify)

1.5 L PN providing 100 g of protein and 340 g of dextrose over 24 hours daily with an IV rider of 250 mL of 20% lipids daily over 12 hours. Electrolytes to meet baseline needs are 80 mEq Na, 30 mEq K, 20 mmol phosphorus, 10 mEq calcium, 8 mEq Mg (with 1/3 chloride and 2/3 acetate). Will also give 10 mL MVI, 3 mL trace elements, and 40 mg famotidine daily

Intervention #1 Initiate parenteral nutrition **(ND-2)**

Goal (s) 1 L of PN containing 60 g amino acids and 200 g dextrose over 24 hours. Administer 250 mL of 20% lipids over 12 hours separately with reduced potassium (20 mEq) and increased (maximum) acetate relative to baseline.

Intervention #2 Order parenteral nutrition monitoring protocol

Goal (s) Identify feeding intolerance

Intervention #3

Goal (s)

NUTRITION MONITORING AND EVALUATION

Indicator, e.g., self-monitoring ability	*Criteria, e.g., intake amount, mg/dL*
#1 **Parenteral access (FI-3.1.1)**	#1 Parenteral access patent
#2 **Parenteral formula (FI-3.1.2)**	#2 Parenteral formula administered as ordered
#3 **Parenteral formula rate/schedule (FI-3.1.5)**	#3 Parenteral formula administered as ordered
#4 **Energy intake (F1.1.1)**	#4 Parenteral formula contains 1420 calories
#5 **Protein intake (FI-5.2.1)**	#5 Parenteral formula contains 60 g/protein
#6 **Total carbohydrate intake (FI-5.3.1)**	#6 Carbohydrate intake from all sources <472 g/day

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Table 7. **Follow-up Note for Hospital Day 10**

NUTRITION ASSESSMENT

Biochemical Data, Medical Tests and Procedures Labs: 135 | 99 | 46 / 136 4.6 | 19 | 2.0 \\ calcium: 7.6; phosphorus: 2.6; magnesium: 2.0	*Anthropometric Measurements* Ht. 6'1"; current weight is 97 kg; up from 82 kg on admission. 82 kg is dosing weight.
Physical Exam Findings + 2 edema of lower extremities + NG tube to drainage	*Food and Nutrition History* NPO; Receiving PN as ordered. 24 hour I&O + 0.8 L; cumulative I&O + 15.2; 0.45 saline at 20 mL/hr provides 35 mEq/day of Na

Client History
Vancomycin, amphotericin B, propofol, insulin drip.

NUTRITION DIAGNOSIS

#1 Problem **Inadequate intake from enteral nutrition infusion (NI-2.3)** has resolved
Etiology
Signs/Symptoms
#2 Problem **Altered GI function (NC-1.4)**
Etiology **related to** bowel resection
Signs/Symptoms **as evidenced by** 2 L stool output, which declined when enteral feedings discontinued
#3 Problem **Imbalance of Nutrients (NI-5.5)**
Etiology **related** to insufficient phosphorus to balance carbohydrate intake
Signs/Symptoms **as evidenced by** a decline in serum phosphorus level

NUTRITION INTERVENTION

Nutrition Prescription **The patient/client's individualized recommended dietary intake of energy and/or selected foods or nutrients based upon current reference standards and dietary guidelines and the patient/client's health condition and nutrition diagnosis. (specify)** 1.5 L parenteral nutrition providing 100 g of protein and 340 g of dextrose over 24 hours daily with an IV rider of 250 mL of 20% lipids daily over 12 hours. Electrolytes to meet baseline needs are 80 mEq Na, 30 mEq K, 20 mmol phosphorus, 10 mEq calcium, 8 mEq Mg (with ⅓ chloride and ⅔ acetate), 10 mL MVI, 3 mL trace elements, and 40 mg famotidine daily	**Intervention #1** Dietitian will order 1.5 L of PN with 65 g amino acids and 340 g dextrose over 24 hours daily with 250 mL of 20% lipids daily plus additional acetate and reduced potassium. **Goal (s)** PN to meet goal needs as BUN corrects **Intervention #2** Dietitian will order parenteral nutrition monitoring protocol **Goal (s)** Identify feeding intolerance **Intervention #3** Dietitian will increase the phosphorus in the PN to 39 mmol **Goal (s)** Serum phosphorus level of 4.0 mg/dL

NUTRITION MONITORING AND EVALUATION

Indicator, e.g., self-monitoring ability	*Criteria, e.g., intake amount, mg/dL*
#1 **Parenteral formula rate/schedule (FI-3.1.5)**	#1 I&O sheet reflects PN administered as ordered
#2	#2 Serum phosphorus within normal limits
#3	#3