Selection of Top 10 Quality Indicators for Nutrition Therapy

NUTRITION IN CLINICAL PRACTICE, THOUSAND OAKS, v. 27, n. 2, pp. 261-267, APR, 2012
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Nutr Clin Pract 2012 27: 261 originally published online 6 January 2012
DOI: 10.1177/0884533611432317

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What is This?
Selection of Top 10 Quality Indicators for Nutrition Therapy

Cristiane Comeron Gimenez Verotti, RD; Raquel Susana Matos de Miranda Torrinhas, MB; Ivan Ceconello, MD, PhD; and Dan Linetzky Waitzberg, MD, PhD

Abstract

Background: The identification of useful quality indicators for nutrition therapy (QINTs) is of great interest and a challenge. This study attempted to identify the 10 QINTs that best suit the practice of quality control in nutrition therapy (NT) by evaluating the opinion of experts in NT with the use of psychometric techniques and statistical tools. Methods: Thirty-six QINTs available for clinical application in Brazil were assessed in 2 distinct phases. In phase 1, 26 nutrition experts ranked QINTs by scoring 4 attributes (utility, simplicity, objectivity, low cost) to assess each QINT on a 5-point Likert scale. The top 10 QINTs were identified from the 10 best scores obtained, and the reliability of expert opinion for each indicator was assessed by Cronbach’s α. In phase 2, experts provided feedback regarding the selected top 10 QINTs by answering 2 closed questions. Results: The top 10 QINTs, in descending order, are the frequency of nutrition screening of hospitalized patients, diarrhea, involuntary withdrawal of enteral feeding tubes, feeding tube obstruction, fasting longer than 24 hours, glycemic dysfunction, estimated energy expenditure and protein needs, central venous catheter infection, compliance of NT indication, and frequency of application of subjective global assessment. Opinions were consistent among the interviewed experts. During feedback, 96% of experts were satisfied with the top 10 QINTs, and 100% had considered them in accordance with their previous opinion. Conclusion: The top 10 QINTs were identified according to their usefulness in clinical practice by obtaining adequate agreement and representativeness of opinion of nutrition experts. (Nutr Clin Pract. 2012;27:261-267)

Keywords

quality indicators; enteral nutrition; parenteral nutrition; critical illness; quality indicators, health care; outcome assessment; biostatistics

Nutrition therapy (NT) is important to correct protein-energy malnutrition and can help to prevent many adverse outcomes, including increased infection complication rate, impaired wound healing, longer length of hospital stay, higher treatment costs, and increased mortality. However, NT is not without attendant risks and adverse effects and is oriented by procedures that were systematically developed based on important scientific publications in the area and the consensual opinions of experts. One way to control protocol compliance would be through the routine practice of periodic nutrition quality control to identify possible difficulties and failures related to the application of protocols during nutrition care provided to the patient. Therefore, in addition to the effort to develop nutrition guidelines, it is also necessary to design quality indicators in nutrition therapy (QINTs) that control the correct application of these guidelines in NT.

The available guidelines comprise an elevated number of recommendations to be followed and could consequently lead to the design of an elevated number of QINTs. In 2008, the task force of clinical nutrition of the International Life Science Institute–Brazil (ILSI-Brazil) published a list of 36 QINTs and their respective national goals proposed by consensus by a group of 41 Brazilian NT specialists to attend different issues regarding national and international NT guidelines. However, in addition to the scarcity of available human and material resources, the application of the 36 QINTs to clinical practice has been hindered by the high number of QINTs proposed.

To enable the effective application of QINTs, we believe that ease of application and objectivity must be considered in addition to other factors. An excessive number of QINTs must be avoided because they may be difficult to apply...
in clinical practice, whereas the determination of a feasible number of QINTs could be practically applicable and contribute to the success of quality control in NT. Therefore, the identification of the 10 QINTs that are the most effectively useful, easily executed, and cost-effective is of great interest. We aimed to identify the top 10 QINTs, from among those clinically available in Brazil, that could be suited to the practice of quality control in NT. Our proposed method employs psychometric techniques and statistical tools to analyze the opinions of renowned nutrition experts.

Methods

Study Design

This study was approved by the Ethical Committee of Hospital das Clinicas of the University of São Paulo Medical School “CAPPesq—Comissão de Ética para Análise de Projetos de Pesquisa.” All 36 QINTs available for clinical application in Brazil (Table 1) were assessed using face-to-face interviews in 2 distinct phases. Phase 1 consisted of a structured interview of 26 nutrition experts to select the top 10 QINTs; during phase 2, the nutrition experts were asked to provide feedback regarding the selected top 10 QINTs by answering 2 closed questions.

Phase 1: Selection of the Top 10 QINTs

The assessment of the top 10 QINTs considered the categories in which the 36 studied QINTs were matched: (A) general aspects; (B) nutrition assessment; (C) indicator of NT; (D) preparation: pharmaceutical assessment, manipulation, quality control, conservation, and transport; (E) administration: ways of access; (F) administration: calories and proteins; (G) clinical and laboratory control; and (H) final assessment.

The evaluation of the 36 QINTs was made by psychometric analysis, recording the opinions of 26 health specialists who are current practitioners of enteral and parenteral NT in different centers of São Paulo city, Brazil (nutritionists, n = 10; physicians, n = 8; nurses, n = 4; pharmacists, n = 4). The opinions of these nutrition specialists were obtained via an individual interview personally applied by only 1 researcher (C.C.G.V.). During the interview, the experts were asked to score 4 attributes with which to assess each QINT (Table 2), following a 5-point Likert scale, to register the manifestation of indifference and of nullity (0 = very bad, 1 = bad, 2 = indifferent, 3 = good, and 4 = very good). The consistency or reliability of expert opinion for each indicator was assessed by Cronbach’s $\alpha$, considering good consistency in values $\geq 0.5$.13 The top 10 QINTs were initially identified from the top 10 scores (arithmetical average of the 4 assessed attributes for each QINT) obtained by the dependency of adequate reliability.

Phase 2: Feedback From Nutrition Experts

Regarding the 10 QINTs selected, the previous 26 experts were again interviewed to obtain their feedback by answering 2 closed-ended (yes or no) questions about their impressions in relation to the satisfactoriness of the 10 selected QINTs and of the QINT list’s concordance with their previous opinion.

Results

Analysis of the structured questions from phase 1 showed consistent opinions among the different specialists interviewed about the attributes of each of the 36 QINTs assessed (Cronbach’s $\alpha \geq 0.568$), except for the indicator “frequency of periodic nutrition reassessment in patients with nutrition therapy” (Cronbach’s $\alpha = 0.472$), which was the only indicator excluded from the study. Most of the 10 selected QINTs were from categories B ($n = 4$) and E ($n = 3$). None of the selected indicators were from category A, D, F, or H. Each QINT’s rank, category, description, arithmetical average of 4 assessed attributes, and value for Cronbach’s $\alpha$, as well as the values of concordance for the 10 selected QINTs, are summarized in Table 1. For phase 2, feedback was provided by 25 experts, of whom 96% reported satisfaction with the 10 QINTs selected and 100% considered the list to be in accordance with their previous opinion.

Discussion

This pilot study attempted to select 10 objective and useful QINTs that feature ease of execution (simplicity) and low cost from among the 36 that are currently being used in Brazil, by applying psychometric techniques and statistical tools, with the use of the Likert scale and Cronbach’s $\alpha$. The Likert scale is renowned for its ability to identify opposition between contraries, gradients, and intermediate situations, with an adequate relation between precision and accuracy of measurement. Cronbach’s $\alpha$ is efficient to measure the consistency or reliability of scores obtained from psychometric tests. In addition, we made a structured questionnaire for a detailed assessment of the 10 QINTs selected by the nutrition experts.

The detection of nutrition status was of great concern for experts and occupied both 1st place (screening) and 10th place (subjective global analysis [SGA]). The greater value given to nutrition screening is understandable because the detection of nutrition risk allows the healthcare and nutrition support team to take early nutrition initiatives, even in patients with apparently adequate total body weight, whereas SGA is primarily effective to recognize current malnutrition. Intestinal motility disorders were of concern.
Table 1. Classification of the 36 Quality Indicators for Nutrition Therapy, According to Nutrition Experts, After Structured Questionnaire Results

<table>
<thead>
<tr>
<th>Rank</th>
<th>Category</th>
<th>Indicator</th>
<th>Average of Attribute Scores</th>
<th>Cronbach’s α</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>Frequency of carrying out nutrition screening of hospitalized patients</td>
<td>14.2</td>
<td>0.805</td>
<td>&gt;80%</td>
</tr>
<tr>
<td>2</td>
<td>G</td>
<td>Frequency of diarrhea in patients on EN</td>
<td>14.19</td>
<td>0.596</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>3</td>
<td>E</td>
<td>Frequency of involuntary withdrawal of enteral feeding tubes</td>
<td>14.08</td>
<td>0.621</td>
<td>ICU: &lt;5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ward: &lt;10%</td>
</tr>
<tr>
<td>4</td>
<td>E</td>
<td>Frequency of tube feeding occlusion in patients on EN</td>
<td>14</td>
<td>0.671</td>
<td>&lt;5%</td>
</tr>
<tr>
<td>5</td>
<td>B</td>
<td>Frequency of digestive fasting for more than 24 hours in patients on oral nutrition or EN</td>
<td>13.77</td>
<td>0.597</td>
<td>&lt;12%</td>
</tr>
<tr>
<td>6</td>
<td>G</td>
<td>Frequency of patients with glycemic dysfunction on EN and PN</td>
<td>13.46</td>
<td>0.568</td>
<td>Hyperglycemia: Critically ill: 70%–80%; noncritically ill: 20%–30% Hypoglycemia: 5%–7%</td>
</tr>
<tr>
<td>7</td>
<td>B</td>
<td>Frequency of measurement or estimation of energy expenditure and protein needs in patients on NT</td>
<td>13.38</td>
<td>0.925</td>
<td>&gt;80%</td>
</tr>
<tr>
<td>8</td>
<td>E</td>
<td>Frequency of CVC infection in patients on PN</td>
<td>13.35</td>
<td>0.596</td>
<td>Without bacteremia: &lt;10/1000 catheters or &lt;2.5/1000 catheters (for PIC) With bacteremia &lt;5/1000 catheters</td>
</tr>
<tr>
<td>9</td>
<td>C</td>
<td>Frequency of indication compliance of NT</td>
<td>13.08</td>
<td>0.658</td>
<td>&lt;3.5%</td>
</tr>
<tr>
<td>10</td>
<td>G</td>
<td>Frequency of application of SGA in patients on NT</td>
<td>12.93</td>
<td>0.634</td>
<td>&gt;75%</td>
</tr>
<tr>
<td>11</td>
<td>B</td>
<td>Frequency of episodes of constipation in patients on EN</td>
<td>12.92</td>
<td>0.731</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>G</td>
<td>Frequency of episodes of abdominal dystension in patients on EN</td>
<td>12.88</td>
<td>0.738</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>A</td>
<td>Frequency of reduced oral intake in patients on NT</td>
<td>12.65</td>
<td>0.857</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>D</td>
<td>Frequency of patients with peripheral PN lasting more than 7 days</td>
<td>12.62</td>
<td>0.885</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>D</td>
<td>Frequency of patients on central PN lasting less than 7 days</td>
<td>12.58</td>
<td>0.879</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>E</td>
<td>Frequency of phlebitis by PVC in patients on PN</td>
<td>12.54</td>
<td>0.748</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>B</td>
<td>Frequency of periodic reassessment of patients on NT</td>
<td>12.54</td>
<td>0.472</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>E</td>
<td>Frequency of induced pneumothorax during catheter insertion</td>
<td>12.42</td>
<td>0.718</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>H</td>
<td>Frequency of nutrition dietary prescription for patients on NT at discharge</td>
<td>12</td>
<td>0.868</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>B</td>
<td>Frequency of biochemical essays during early nutrition assessments in patients on NT</td>
<td>11.96</td>
<td>0.803</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>G</td>
<td>Frequency of electrolyte changes in patients on EN and PN</td>
<td>11.92</td>
<td>0.69</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>D</td>
<td>Frequency of nonconformities related to preparation time, transportation, and storage in EN</td>
<td>11.69</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>G</td>
<td>Frequency of renal dysfunction in patients on EN and PN</td>
<td>11.69</td>
<td>0.614</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>A</td>
<td>Frequency of approach to patient’s nutrition at each level of hospital assistance (first, second, and third levels) in patients on NT</td>
<td>11.58</td>
<td>0.904</td>
<td></td>
</tr>
</tbody>
</table>

(continued)
to experts. Frequency of diarrhea in patients on enteral NT was elected to occupy the second position. Different variables of NT, such as rapid infusion of the enteral diet, bacterial contamination, and hyperosmolar formula, can contribute to the incidence of diarrhea. Diarrhea may affect from 2.3%–68% of hospitalized patients and, in addition to contributing to the occurrence of dehydration and hydroelectrolitic changes, can worsen malnutrition.21,22

The third and fourth positions of the top 10 QINTs concerned aspects related to enteral gastro/jejunal access and parenteral venous access for NT. The exit or accidental migration of enteral tube feeding can significantly contribute to the rise of infection and mortality rates because of the risk of aspiration, and its incidence can be minimized by systematic assessment of the patient by auscultation and radiography of the abdomen.23 Small-bore enteral feeding tubes may become clogged in up to 35% of patients.24 Various factors may contribute to tube occlusions; these include enteral formulation (high-viscosity or intact protein products), feeding tube materials (silicone tubes clog more frequently than polyurethane tubes), insufficient flushing, and incorrect administration of medication.25,26

Our fifth elected QINT contemplates fasting, another important aspect to be controlled in NT. Fasting time, especially in the first 24 hours after admission, is associated with increased rates of complications.27 Enteral nutrition (EN) should be started early (24–48 hours after trauma, surgery, or hospitalization and may even reach 72 hours, depending on the situation of the patient). Frequent interruption of NT during hospitalization may limit the achievement of the goals for which NT was established.28-33

The frequency of patients with glycemic dysfunction (sixth selected QINT) reinforces the importance of controlling hyperglycemia, which is the most common complication associated with parenteral NT. However, hyperglycemia could be due to

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<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>B</td>
<td>Frequency of measurement of BMI in patients on NT</td>
<td>11.38</td>
<td>0.796</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>F</td>
<td>Frequency of days of administration with insufficient quantity of protein in the total patient days on NT</td>
<td>11.31</td>
<td>0.735</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>A</td>
<td>Frequency of recovery of oral intake in patients on NT</td>
<td>11.23</td>
<td>0.742</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>G</td>
<td>Frequency of patients with high gastric residue on EN</td>
<td>11.19</td>
<td>0.808</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>F</td>
<td>Frequency of days of administration with caloric intake between 25 and 40 kcal/kg/d in total days in patients on NT</td>
<td>11.15</td>
<td>0.661</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>F</td>
<td>Frequency of days with calorie supply managed in more or less than 20% of supply prescribed in patients on EN and PN</td>
<td>11.08</td>
<td>0.798</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>B</td>
<td>Frequency of nutrition anamnesis in patients on NT</td>
<td>10.96</td>
<td>0.906</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>G</td>
<td>Frequency of hepatic dysfunction among patients on EN and PN</td>
<td>10.69</td>
<td>0.721</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>H</td>
<td>Frequency of nutrition dietary prescription in ambulatory nutrition monitoring after hospital discharge of patients on NT</td>
<td>9.23</td>
<td>0.927</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>F</td>
<td>Frequency of days of administration with a protein excess in the total of days in patients on NT</td>
<td>8.92</td>
<td>0.882</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>G</td>
<td>Frequency of patients with alterations of visceral proteins on NT</td>
<td>8.27</td>
<td>0.748</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>B</td>
<td>Frequency of protein catabolism in patients on EN and PN</td>
<td>7.65</td>
<td>0.87</td>
<td></td>
</tr>
</tbody>
</table>

BMI, body mass index; CVC, central venous catheter; EN, enteral nutrition; ICU, intensive care unit; NT, nutrition therapy; PIC, peripheral intravenous catheter; PN, parenteral nutrition; PVC, peripheral venous catheter; SGA, subjective global assessment.
other causes, as when it is associated with metabolic stress in critically ill patients. A recent examination of critically ill patients has shown that the maintenance of glycemic levels above the reference values and up to 180 mg/dL can contribute to a higher survival rate.34

The frequency of measurement or estimation of energy expenditure and protein requirements in patients undergoing NT (seventh selected QINT) may guide nutrition prescription and can prevent complications associated with overfeeding, underfeeding, and some important metabolic disorders.27

Contamination of the central venous catheter (eighth selected QINT) is one of the most feared complications of parenteral nutrition (PN) therapy; catheter contamination reaches levels of up to 30% and provides a potential source of infection.35,36

The National Nosocomial Infections Surveillance (NNIS) system of the Centers for Disease Control and Prevention (CDC) reports a median rate of catheter-related bloodstream infection in intensive care units (ICUs) of all types ranging from 1.8–5.2 per 1000 catheter-days.37

“Frequency of measurement or estimation of energy expenditure and protein requirements in patients undergoing NT” occupied the ninth position on the top 10 list. Favorable results of compliance should follow the recommendations of available protocols and guidelines.38-40

The prevalence of QINTs from categories B and E in the list of the top 10 selected QINTs indicates a major concern among professional NT specialists regarding nutrition status assessment and aspects related to enteral gastrojejunal access and parenteral venous access in NT. In fact, in-hospital malnutrition is common. Over 10 years, the Brazilian National Survey of Nutrition41 has identified malnutrition, which is associated with higher rates of morbidity and mortality, in 48.1% of hospitalized patients. The rates of malnutrition among hospitalized patients currently found in Brazil are similar to those reported globally.42 The selection and monitoring of the routes to nutrition access are also important to guarantee adequate energy-protein offerings in adequate time and volume and to avoid complications directly related to access type.43

We should note that our top 10 QINTs have been chosen based on the opinions of experts in São Paulo, the most affluent city in South America, and may not be suitable for universal use. Therefore, it would be advisable that each country should develop its own QINTs contemplating their own goals based on its internal nutrition guidelines and adapted for local characteristics of healthcare and public health policy. Regarding the goals of our selected top 10 QINT, those proposed by ILSI for Brazilian clinical application are described in Table 2.

Our top 10 list includes QINTs that are potentially useful for clinical practice performed by a health professional without the use of any expensive or technological resources. In addition, the brevity of this list increases its applicability. The agreement of 96% and the representativeness of opinion of 100% of interviewed experts for these 10 selected QINTs demonstrate that the methodology of selecting quality indicators currently developed by us is efficient, which may contribute to the design of quality indicators from different areas by other groups who want to attend to the emerging importance attributed to quality indicators.

In conclusion, we suggest the clinical application of the selected top 10 list of quality indicators is likely to improve and/or enable the quality of NT and therefore contribute to lower NT-associated complication rates, which negatively influence the incidence of morbidity and mortality. Achievement of this goal will support the importance that is being attributed to QINTs, and its verification is the next step to be approached by our team.

Acknowledgments

The authors acknowledge the significant contribution of the Clinical Nutrition Task Force, ILSI-Brazil, as well as all participating Brazilian nutrition experts and thank Julio C. Pereira, MD, PhD, for statistical supervision.

References


