THE CANADIAN NUTRITION SCREENING TOOL: Validity and Reliability

Laporte M 1, Keller H2, Payette H3, Allard JP4, Duerksen D5, Bernier P6, Jeejeebhoy K7, Gramlich L8, Davidson B9, Vesnaver E10 and Teterina A 1

1 Vitalité Health Network, New Brunswick 2 University of Waterloo, Ontario 3 University of Sherbrooke, Québec 4 University of Toronto, Ontario University of Manitoba, Manitoba Women's General Hospital, Québec 5 St Michael's Hospital, Ontario 6 University of Alberta, Alberta 7 Canadian Nutrition Society, Ontario 8 University of Guelph, Ontario 9 University of Toronto, Ontario

Rationale

Nutrition screening is a process to identify individuals who are nutrition risk or malnourished and to determine if further assessment to diagnose and treat malnutrition is needed. In the Nutrition Care in Canadian Hospitals (NCCH) study, conducted by the Canadian Malnutrition Task Force (CMTF), 45% of medical and surgical patients were found malnourished on admission to hospital, based on the subjective global assessment (SGA) (Allard et al. 2015). This high prevalence demonstrated the need for an appropriate nutrition screening tool that was quick and easy to use, as well as valid and reliable. The objectives of the study were:

1) To develop a simple nutrition screening tool, the Canadian Nutrition Screening Tool (CNST), and validate it against subjective global assessment (SGA).

2) To test the CNST for validity and inter-rater reliability in the ‘real-world’ hospital setting by having non-nutrition personnel conduct the screening.

Methods

Development of CNST:

1014 patients from 18 Canadian hospitals (medical and surgical wards only); trained site coordinators:
• Screened patients using CNST
• Conducted SGA
• Measured weight and height to calculate body mass index (BMI)
• Collected prospective data to determine predictive validity of CNST using nutrition related outcomes (e.g. length of stay)

Criterion validity and inter-rater reliability of CNST:

• At 3 NCCH study sites, about 160 untrained nursing personnel (one diet technician) were trained to complete CNST on 150 patients
• SGA conducted by dietitian or trained nutrition researcher was the gold-standard comparison for the nutrition status

Results

Final version of the CNST

<table>
<thead>
<tr>
<th>Date</th>
<th>Admission</th>
<th>Rescreening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask the patient the following questions*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Have you lost weight in the past 6 months WITHOUT TRYING to lose this weight?
If the patient reports a weight loss but gained 1 kg loss, consider it no weight loss.

Have you been eating less than usual FOR MORE THAN A WEEK?

Two “YES” answers indicate nutrition risk

* If no patient in order to answer the question, a knowledgeable informant can be used to obtain the information. If the patient is uncertain regarding weight loss, ask if getting a new diet may be reason.

Development of CNST

In the first part of the study, the 3-question version of CNST (weight loss, decrease food intake, body mass index (BMI)) was completed by nutrition professionals, and results compared against SGA score.

Sensitivity: 91.7% (Excellent) This indicates that the CNST correctly identified patients at nutrition risk or malnourished 91.7% of the time.

Specificity: 74.8% (High) This indicates that the CNST correctly identifies patients who are not at nutrition risk or malnourished 74.8% of the time.

Predictive Validity of CNST

CNST had good predictive validity of adverse outcomes associated with malnutrition.

Outcome | Association
--- | ---
Longer length of stay | P<0.001, mean 8 d (risk) vs. 6 d (no risk)
30-day readmission | χ²=5.92; P-value=0.02
Mortality (in hospital or within 30 days of discharge) | χ²=5.92; P-value=0.02

Criterion Validity and Inter-Rater Reliability

In the second part of the study, the CNST was completed by non-nutrition professionals.

Sensitivity: 72.9% (High) This indicates that the CNST correctly identified patients at nutrition risk or malnourished 72.9% of the time.

Specificity: 85.9% (High) This indicates that the CNST correctly identifies patients who are not at nutrition risk or malnourished 85.9% of the time.

Inter-rater Reliability: 94.3%, Kappa=0.88 (Excellent) This indicates that the CNST can produce stable and consistent results and that different raters agree 94.3% of the time regarding the screening decision.

Conclusions

CNST is a quick (<5 minutes to complete) and easy to use tool, which has good validity and reliability when compared to the gold standard SGA. High validity and reliability continues despite the exclusion of BMI and inclusion of this indicator promotes feasibility. The ease of use of CNST makes it applicable to the ‘real world’ as it will be non-nutrition professionals who will likely conduct nutrition screening at hospital admission. This 2-question screening tool is important for identifying patients who are at nutrition risk or malnourished. However, screening is only effective when it is paired with an appropriate referral system which allows for nutrition assessment and malnutrition diagnosis and subsequent treatment.

References


Criterion Validity and Inter-Rater Reliability (con’t)

<table>
<thead>
<tr>
<th>3 questions</th>
<th>Final Version without BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(including BMI)</td>
<td>(2 questions)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rater 1</th>
<th>Rater 2</th>
<th>Rater 1</th>
<th>Rater 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n=129)</td>
<td>(n=140)</td>
<td>(n=123)</td>
<td>(n=133)</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>72.6%</td>
<td>66.7%</td>
<td>72.9%</td>
</tr>
<tr>
<td>Specificity</td>
<td>85.1%</td>
<td>80.8%</td>
<td>85.9%</td>
</tr>
<tr>
<td>Positive predictive value (PPV)</td>
<td>81.2%</td>
<td>78.7%</td>
<td>82.7%</td>
</tr>
<tr>
<td>Negative Predictive value (NPV)</td>
<td>77.0%</td>
<td>69.6%</td>
<td>77.5%</td>
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</table>

PPV: Percentage of patients screened at high nutrition risk or malnourished who are identified by the criterion (SGA) to be malnourished

NPV: Percentage of patients screened as not at nutrition risk or malnourished who are identified by the criterion (SGA) to not be malnourished

Based on the first rater values, both specificity and sensitivity were > 70%, which is the requirement for adequate tool performance, regardless of BMI being included. Thus to promote feasibility, the final CNST excludes BMI.

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