Nutrition Care Process Quality Evaluation and Standardization Tool: The Next Frontier in Quality Evaluation of Documentation

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ABSTRACT

Documentation is essential for communicating care between credentialed nutrition and dietetics practitioners and other health care providers. A validated tool that can evaluate quality documentation of the Nutrition Care Process (NCP) encounter, including progress on outcomes is lacking. The aim of the NCP Quality Evaluation and Standardization Tool (QUEST) validation study is to revise an existing NCP audit tool and evaluate it when used within US Veterans Affairs in all clinical care settings. Six registered dietitian nutritionists revised an existing NCP audit tool. The revised tool (NCP-QUEST) was analyzed for clarity, relevance, and reliability. Eighty-five documentation notes (44 initial, 41 reassessment) were received from eight volunteer Veterans Affairs sites. Five of six registered dietitian nutritionists participated in the interrater reliability testing blinded to each other's ratings; and two registered dietitian nutritionists participated in intrarater reliability reviewing the same notes 6 weeks later blinded to the original ratings. Results showed moderate levels of agreement in interrater reliability (Krippendorff's $\alpha = .62$ for all items, .66 for total score, and .52 for quality category rating). Intrarater reliability was excellent for all items ($\alpha = .86$ to .87 for all items; .91 to .94 for total score and.74 to .89 for quality category rating). The NCP-QUEST has high content validity (Content Validity Index = 0.78 for item level, and 0.9 for scale level) after two cycles of content validity review. The tool can facilitate critical thinking, improved linking of NCP chains, and is a necessary foundation for quality data collection and outcomes management. The NCP-QUEST tool can improve accuracy and confidence in charting.
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The Nutrition Care Process (NCP) is defined as a systematic problem-solving method that credentialed nutrition and dietetics practitioners use to resolve nutrition problems and provide quality nutrition care.[1] The NCP consists of four interrelated steps: Nutrition Assessment (NA) and Reassessment, Nutrition Diagnosis (ND), Nutrition Intervention (NI), and Nutrition Monitoring and Nutrition Evaluation (NE).[2,3]

A practitioner applies clinical reasoning to determine a nutrition diagnosis.[4] This involves a significant amount of critical thinking. Documenting each step of the NCP lays out the clinical reasoning or judgment where the logical continuity and the linking between the steps becomes apparent. The six clinical judgment components of critical thinking are: collecting evidence, determining diagnosis, determining etiology, establishing goals, determining and implementing interventions, and measuring and evaluating patient outcomes.[4] The essential continuity in NCP has been referred to as "the NCP chains concept" or "chains framework."[4-6] The NCP chain links are the evidence–diagnosis link, the diagnosis–etiology link, the etiology–intervention link, the intervention–goal link and the diagnosis–outcome link.[5] Quality documentation should include all six NCP components that create the five NCP links encompassed by the four NCP steps.[5]

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The Veterans Health Administration (VA) is the nation's largest integrated health care system serving more than 1,700 hospitals, clinics, community living centers, domiciliary, readjustment counseling centers, and other facilities. The VA employs nearly 2,000 credentialed nutrition and dietetics practitioners. All VA facilities were mandated to implement the NCP in 2011 with the oversight of appointed experts known as the VA Advancing Practice Nutrition Consultants (APNCs).

Hakel-Smith and colleagues[6] published the first NCP audit tool (brief), which was validated by five experts and reliability was tested on a small scale.[6] Lövestam and colleagues[7] updated the first NCP audit tool and produced a 14-question instrument that was also validated (the Diet-NCP-Audit).[7] The Diet-NCP-Audit tool has high content validity and moderate to high reliability in Sweden. The Diet-NCP-Audit tool evaluates the initial assessment but does not address fully the follow-up (reassessment).[7] Around 2003, Sherri L. Jones, then clinical nutrition manager at University of Pittsburgh Medical Center Shadyside Hospital, had designed a group of questions to assess the quality of documented nutrition diagnosis as a routine competency check of University of Pittsburgh Medical Center dietitians. To reflect developing practice, this group of questions was later (2008-2012) enhanced by Sherri L. Jones and Demetra Pratt to include 25 scorable questions covering the full NCP (Assessment and Reassessment). This tool (known as the comprehensive NCP audit tool) was used at University of Pittsburgh Medical Center, and Pratt

used it to audit charts at the VA in Memphis, TN (personal communication with Jones and Pratt, March 2021). The first NCP audit tool (brief version), and the extensive (comprehensive) version were both reviewed and updated in 2019 by Nancy Hakel-Smith, Demetra Pratt, and Academy of Nutrition and Dietetics (Academy) staff. These updated but not validated NCP audit tools (brief and comprehensive) are available to Academy members.[8] Despite the various NCP audit tools (Table 1), there is no updated and validated tool to evaluate the use of the NCP in its current evolved form.[9] In 2018, VA dietitians had also created a scorable NCP audit tool based on the most recent NCP updates to include all aspects of the NCP, including the linking chains. The tool was used to evaluate dietetic interns' documentation for assessment of the NCP competency. This unvalidated VA tool has been shared widely with nutrition educators. The next iteration of the VA tool, the NCP Quality Evaluation and Standardization Tool (QUEST) audit instrument, is presented here. The NCP-QUEST aims to evaluate all NCP components and links, especially outcomes as a result of continuous care (via evaluation of the full monitoring and evaluation step), new elements of the NCP Terminology such as status labels, and explicit documentation of the etiology category.

A research priority of the Academy's Research International and Scientific Affairs is to support utility and application of emerging technologies, information management and knowledge management, and processes to inform and advance nutrition and dietetics programming and practice. In this article, the Academy's Research International and Scientific Affairs Data Science Center (DSC) and the VA's APNC describe the revision and validation of the NCP-QUEST audit instrument.

METHODS

Selection of Registered Dietitian Nutritionists-Considered Subject Matter Experts in NCP

The VA appoints five clinical registered dietitian nutritionists (RDNs) and one lead RDN to serve as APNCs. The APNCs represent RDNs from six regions in the United States from varied health care center complexities. The APNCs oversee and direct the education and training of VA RDNs on the implementation of the NCP. The APNCs have at least 10 years of experience working with the NCP. APNCs and Academy DSC staff comprised the project team that revised the NCP-QUEST audit via regular virtual meetings from April 2020 to February 2021.

Revision of the NCP Audit Tool

Evaluation of the audit instrument was a multistep process, starting with the initial revision of the instrument the VA had developed for interns (26 questions with 18 focused on assessment and eight on reassessment), followed by tests for validity and reliability.

Specifically, the project team reviewed NCP updates and literature pertinent to quality of NCP documentation.[4-7,10] The project team analyzed questions and edits were made based

Table 1. Nutrition Care Process (NCP) quality audit tools

NCP audit tool	No. of questions	No. of clinical judgments evaluated	No. of NCP chain links evaluated	Comments
NCP audit (brief) - original, 2005[6]	6	6/6	4/5	Validated in oncology and renal patients No etiology-intervention link
Nutrition Diagnosis audit, 2006	4	3/6	2/5	Not validated Focus is on nutrition diagnosis only
Diet-NCP-Audit, 2013[7]	14	5/6	3/5	Validated in Sweden Use only with Initial notes No etiology-intervention or diagnosis-outcome links
NCP audit for VA[a] interns, 2018	26	6/6	4/5	Not validated No clear evidence-diagnosis link
NCP audit (brief) -updated, 2019	12	6/6	5/5	Not validated Standard language is not evaluated
NCP audit (comprehensive) - updated, 2019	25	6/6	5/5	Not validated Standard language is not evaluated for all components of NCP
NCP-QUEST[b], 2021 - current study	24	6/6	5/5	Validated in US veteran inpatients and outpatients

[a]VA = Veterans Affairs.
[b]NCP-QUEST = Nutrition Care Process Quality Evaluation and Standardization Tool

on NCP experience as well as current NCP guidance. Also, the final tool score categorization of the Diet-NCP-Audit was integrated.[7] Specifically, three categories indicate level of overall quality of documentation: A is higher quality, B is medium quality, and C is lower quality.[7] The cutpoints created for this quality rating were based on the overall percentage of total scores similar to the Diet-NCP-Audit tool criteria.[7] For example, the lower quality rating (level C) would include scores <50% of the maximum points possible. The NCP Outcomes Committee is responsible for updating and expanding the NCP and the NCP Terminology annually. Thus, in addition to literature review, contemporary forthcoming revisions of the NCP (now available since the time this study was active) were included. A user manual with detailed instructions, multiple examples, and scoring interpretation was developed to facilitate standardized tool application.

Content Validity and Clarity Tests of the NCP-QUEST

Once the NCP audit tool was updated, it was tested for clarity and relevance. APNCs and Academy DSC staff comprised the group of NCP expert RDNs that carried out the content validity and clarity tests. Individually, six RDNs rated relevance and clarity of each item on a scale from 1 to 4, where 1 = not relevant/not clear, and 4 = highly relevant/highly clear. Rating an item 3 or 4 was considered to mean approved validity or clarity.[7] Mean ranks, percent agreement, and item-level and scale-level content validity index (CVI) were used.[7] An item-level CVI of 0.78 and scale-level CVI 0.9 were considered evidence of excellent content validity. The updated NCP audit tool, the NCP-QUEST, underwent two cycles of CVI review.

Inter- and intrarater Reliability Tests

The next step included obtaining VA RDNs' documentation notes for reliability testing. All documentation evaluated was obtained as standard practice. The protocol for this quality improvement study was approved by the VA Research and Development Committee at the James A. Haley VA Hospital and institutional review board approval was not required. The APNCs recruited volunteers to participate via a national VA nutrition and foodservice staff call. During June 2020, volunteer sites were asked to select random RDNs' notes documented between January 2020 and March 2020 with at least one initial (or comprehensive) nutrition note and one consecutive follow-up note (reassessment). Each facility provided three inpatient nutrition encounters and three outpatient nutrition encounters providing a total of six nutrition encounters or 12 nutrition notes.

Clinical nutrition managers (CNMs) from eight VA facilities across the United States submitted 96 notes and 11 were excluded (Figure 1) resulting in 44 initial notes and 41 reassessment notes. Five of the six RDNs on the project team participated in the interrater reliability testing independently blinded to each other's ratings. Two RDNs participated in intrarater reliability, reviewing the same notes 6 weeks later blinded of their original ratings.

Statistical Analysis

Analyses were performed using SPSS version 26.0[11] with a significance level of $P = 0.05$. To evaluate all individual audit question items, quality categories and overall tool item agreement, the intraclass correlation coefficient (ICC) two-way mixed effects model with absolute agreement was calculated with both single and average measures reported. To compare to available validation findings by Lövestam and colleagues,[7] pairwise comparisons using Krippendorff's α statistic was also reported. For total scores, agreement was assessed with ICC two-way mixed effects model with consistent agreement. Percent agreement was calculated as proportion of total scores that were judged the same within each pairwise comparison.

Reliability testing can often result in conflicting results for a number of reasons, and is sometimes referred to as the paradoxes of κ.[12] Krippendorff's α compares observed disagreement with the expected disagreement. When dichotomous values are used such as in our study (yes or no answers), if there is little disagreement the Krippendorff's α will indicate low reliability yet very high levels of percent agreement. For this reason, we reported both values for full interpretation. In addition, ICC is used in reliability testing for its ease in interpretation. The ICC is a value between 0 and 1, where values below 0.5 indicate poor reliability, between 0.5 and 0.75 indicate moderate reliability, between 0.75 and 0.9 indicate good reliability, and any value above 0.9 indicates excellent reliability.[13,14]

RESULTS

Clarity and Relevance

Once the first round of revision was complete, the NCP-QUEST tool contained 26 questions and each item in

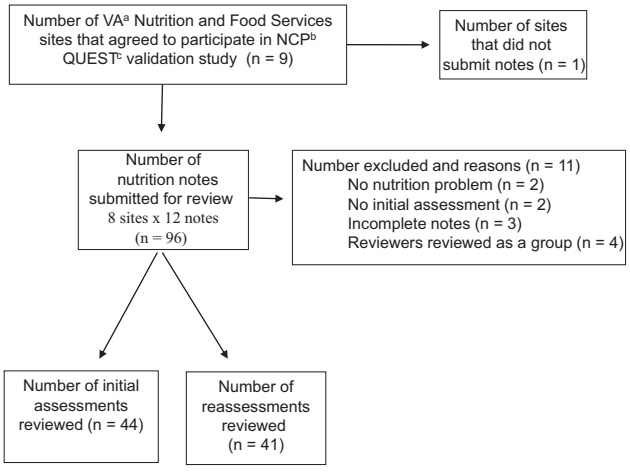

Figure 1. Site participation and nutrition note selection flowchart. [a]VA = Veterans Affairs. [b]NCP = Nutrition Care Process. [c]QUEST = Qality, Evaluation, and Standardization Tool.

the tool was evaluated. All individual items scored CVIs 0.7 to 1.0 for both clarity and relevance. Four items were below 1.0 for clarity and five items were below 1.0 for relevance. These items were further discussed and adjusted before conducting the second CVI evaluation. Based on the second evaluation, the CVI was 1.0 for clarity and 0.9 for relevance. In the final CVI review, one item had an item-level CVI of 0.8 (NE5) for clarity and all other items scored a 1.0. For relevance, three items had an item-level CVI of 0.8 (NA2, NI1, and NE5) and the remaining items scored 1.0.

Final NCP Audit Tool: The NCP-QUEST

The final NCP-QUEST tool included 24 questions (Figure 2), each worth 1 point for a maximum score of 24 points for the initial and follow-up nutrition encounter. The tool was created so that it could be used alone with an initial assessment (maximum score of 18 points) but is ideal for evaluating the full NCP by reviewing an initial nutrition assessment with a consecutive reassessment. A higher score indicates that the audited NCP encounter includes more of the NCP components. The specific breakdown and range of points for the three grades of quality (A = high, B = medium, C = low quality) is provided in the tool (Figure 2).

Interrater Reliability Results

The interrater reliability results, percent agreement, ICC and Krippendorff's α were determined for each question item separately (Table 2) and summarized for total scores and quality categories (Table 3).

When examining the NCP-QUEST, a moderate level of agreement between the five RDNs was found by both the ICC and Krippendorff's evaluations (α = .62 for all items). Total scores were also found to have moderate agreement when using the ICC test (ICC = 0.73) and Krippendorff's α (α = .66). Quality category rating had moderate agreement with ICC of 0.52, yet poor agreement when using the Krippendorff's α of .47.

When reviewing each rated item on the tool, some items did not meet the assumptions for reliability testing

Criteria	Initial assessment	Re-assessment
NA[a] Evidence − 4 points	**Yes = 1 No = 0**	**Yes = 1 No = 0**
NA 1. Documents assessment data that is outside of accepted standards, recommendations, and/or goals		
NA 2. Uses Comparative Standards in the NA that are essential to the ND[b], when applicable		
NA 3. Measurable assessment data provides evidence that a nutrition problem is present		
NA 4. Assessment data is succinct and relevant		
ND - 4 points		
ND 1. Problem: label of the PES[c] uses standardized terminology (or approved synonym)		
ND 2. Etiology: is the root cause of the ND that a nutrition provider can resolve or mitigate S/Sx[d]		
ND 3. Etiology: in addition to free text etiology, documents the etiology matrix category		
ND 4. S/Sx: provide evidence that the ND exists		
NI[e] − 6 points		
NI 1. Each NI has an action consistent with the goals of care		
NI 2. A nutrition prescription is written		
NI 3. Directs NI to resolve the etiology and/or improve the S/Sx		
NI 4. There is at least one NI for each etiology listed in PES		
NI 5. Uses standardized terminology to document NI		
NI 6. Documents a specific reassessment plan and timeline (eg, follow-up in 1 mo/discontinuation)		
NM[f] −2 points		
NM 1. Uses standardized terminology to document indicators (eg, weight, glucose, total energy estimate intake in 24 h) that reflect the S/Sx to monitor upon reassessment		
NM 2. Documents specific criteria for each indicator (eg, weight <250 lb [113 kg] within 1 mo)		
NE[g] reassessment section − 6 points		
NE 1. Restates the ND in the reassessment documentation		
NE 2. Addresses the status of ND using standardized terminology (eg, resolved/active)		

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Figure 2. Nutrition Care Process Quality Evaluation and Standardization Tool.

Criteria	Initial assessment	Re-assessment
NA[a] Evidence − 4 points	**Yes = 1 No = 0**	**Yes = 1 No = 0**
NE 3. Documents intervention success or barriers to implementation/reasons for delay in the application of each intervention		
NE 4. Reassesses the nutrition indicator/assessment data (eg, weight) from previous interaction (encounter)		
NE 5. Evaluates the goals (actions of the intervention) established at last visit using standardized terminology (eg, goal achieved, goal not achieved)		
NE 6. Documents the effectiveness of each NI or modifies NI when there is no evidence that the intervention has been effective		
OQ[h] aspects − 2 points		
OQ 1. Uses clear language in documentation		
OQ 2. All NCP links are present (when assessment and reassessment notes are available)[i]		
Total points (initial) (initial + reassessment)	0/18	0/24

Quality rating	Initial	Initial + Reassessment
Level A (high quality)	14-18	19-24
Level B (medium quality)	10-13	13-18
Level C (low quality)	≤9	≤12

(NCP-QUEST) audit tool.
[a]NA = Nutrition Assessment.
[b]ND = Nutrition Diagnosis.
[c]PES = problem/etiology/signs and symptoms.
[d]S/Sx = signs and symptoms.
[e]NI = Nutrition Intervention.
[f]NM = Nutrition Mentoring.
[g]NE = Nutrition Evaluation.
[h]OQ = Overall Quality.
[i]Initial assessment: If ND2, ND4, NI1, NI3 all have 1 point; reassessment: If ND2, ND4, NI1, NI3, NE2 all have 1 point.

Figure 2. *(continued)* Nutrition Care Process Quality Evaluation and Standardization Tool.

with an extremely low level of disagreement. In this case, the percent agreement was helpful in determining the reliability of items NA1, NA2, NA3, and ND3 because each of these items had 72% to 86% absolute agreement (all five RDNs rated the same). Overall, levels of agreement ranged from 0.06 to 0.70 for single measures and 0.28 to 0.92 for average measures. The items with the greatest disagreement included at least one item from each step of the NCP (NA4, ND2, NI1, NE3) and the overall clarity of language within documentation (overall quality item 1).

Intrarater Reliability Results

The NCP-QUEST had good intrarater reliability for all items, excellent intrarater reliability for the total score and moderate to good reliability for the quality category level. When reviewing individual items in the intrarater reliability, there was absolute agreement between both raters (90% to 100%) for all notes for each item except for the following items: ND2 (82% to 86% agreement), NI1 (75% to 89% agreement), NI4 (86% to 89%), NE3 (86% to 93%), and NE4 (80% to 87%). Table 4 displays the summary intrarater reliability findings when evaluating all items, overall total scores, and quality categories.

DISCUSSION

The NCP-QUEST audit tool is a valid and reliable tool for assessing nutrition documentation. The unique feature of this updated tool is its ability to reliably evaluate the quality of nutrition documentation using both the assessment and subsequent reassessment. Standardized documentation is the first quality improvement step in the journey to patient outcomes. Achieving documentation quality and standardization will allow for nutrition data to be extracted from the electronic health record and for critical evaluation of evidenced-based practice guidelines and course corrections.[15-20]

Tool Validity and Reliability

Similar to the findings reported by Lövestam and colleagues[7] when the previous Diet-NCP-Audit tool was evaluated in Sweden, the NCP-QUEST is valid and reliable. Lövestam and colleagues[7] had an all-item Krippendorff's $\alpha = .67$, which is slightly higher than the current study's .62, and total score Krippendorff's $\alpha = .65$ compared with the current .66. The quality group rating score was lower in the current study ($\alpha = .47$) when compared with the Diet-NCP-Audit tool evaluation ($\alpha = .74$). The number of items reviewed here is nearly 3.5 times as

Table 2. Interrater reliability for individual items in the Nutrition Care Process Quality Evaluation and Standardization Tool

Item	n	% Agreement	Average Measures ICC[a] (CI 95%)	Single Measures	Krippendorff's α (CI 95%)
NA[b]1. Documents assessment data that is outside of accepted standards, recommendations, and/or goals	220	74.4	NR[c]	NR	NR
NA2. Uses Comparative Standards in the NA that are essential to the ND[d], when applicable	220	72.1	NR	NR	NR
NA3. Measurable assessment data provides evidence that a nutrition diagnosis is present	220	74.4	NR	NR	NR
NA4. Assessment data is succinct and relevant	220	30.2	0.63 (0.40 to 0.78)	0.26 (0.12 to 0.42)	.21 (.10 to .32)
ND1. Problem label of the PES[e] uses standardized terminology (or approved synonym)	220	65.1	0.85 (0.77 to 0.91)	0.54 (0.40 to 0.67)	.53 (.43 to .62)
ND2. Etiology is the root cause of the ND that a nutrition provider can resolve or mitigate S/Sx[f]	220	46.5	0.69 (0.52 to 0.81)	0.31 (0.18 to 0.47)	.29 (.18 to .41)
ND3. Etiology: in addition to free text etiology, documents the etiology matrix category	220	86.0	NR	NR	NR
ND4. S/Sx provide evidence that the ND exists	220	67.4	0.69 (0.50 to 0.82)	0.36 (0.20 to 0.53)	.34 (.15 to .51)
NI[g]1. Each NI has an action consistent with the goals of care	220	34.8	0.52 (0.27 to 0.71)	0.18 (0.07 to 0.33)	.16 (.04 to .27)
NI2. A nutrition prescription is written	220	65.1	0.91 (0.86 to 0.95)	0.67 (0.56 to 0.78)	.67 (.59 to .74)
NI3. Directs NI to resolve the etiology and/or improve the S/Sx	220	58.1	0.68 (0.50 to 0.81)	0.30 (0.17 to 0.45)	.29 (.15 to .41)
NI4. There is at least 1 NI for each etiology listed in PES	220	58.1	0.79 (0.67 to 0.89)	0.43 (0.29 to 0.59)	.42 (.31 to .52)
NI5. Uses standardized terminology to document NI	220	62.8	0.71 (0.60 to 0.85)	0.36 (0.23 to 0.52)	.36 (.23 to .49)
NI6. Documents a specific reassessment plan and timeline (eg, follow to up in 1 month/discontinuation)	220	81.3	0.92 (0.88 to 0.95)	0.70 (0.58 to 0.80)	.69 (.59 to .78)
NM[h]1. Uses standardized terminology to document indicators (eg, weight, glucose, total energy estimate intake in 24 h) that reflect the S/Sx to monitor upon reassessment	220	72.1	0.70 (0.53 to 0.82)	0.37 (0.22 to 0.56)	.35 (.15 to .54)
NM2. Documents specific criteria for each indicator (eg, weight <250 lbs [113 kg] within 1 mo)	220	52.3	0.69 (0.52 to 0.81)	0.31 (0.18 to 0.47)	.29 (.17 to .41)
NE1. Restates the ND in the reassessment documentation	205	80.0	0.92 (0.88 to 0.96)	0.71 (0.59 to 0.81)	.70 (.61 to .78)

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Table 2. Interrater reliability for individual items in the Nutrition Care Process Quality Evaluation and Standardization Tool (*continued*)

Item	n	% Agreement	Average Measures ICC[a] (CI 95%)	Single Measures	Krippendorff's α (CI 95%)
NE[i]2. Addresses the status of ND using standardized terminology (resolved/active)	205	57.5	0.76 (0.61 to 0.86)	0.38 (0.24 to 0.54)	.37 (.23 to .49)
NE3. Documents intervention success or barriers to implementation/reasons for delay in the application of each intervention	205	40.0	0.63 (0.43 to 0.78)	0.26 (0.13 to 0.42)	.25 (.13 to .36)
NE4. Reassesses the nutrition indicator/assessment data (eg, weight) from previous interaction (encounter)	205	50.0	0.74 (0.59 to 0.85)	0.36 (0.22 to 0.52)	.35 (.24 to .45)
NE5. Evaluates the goals (actions of the intervention) established at last visit using standardized terminology (eg, goal achieved, goal not achieved)	205	72.5	0.92 (0.87 to 0.95)	0.69 (0.57 to 0.80)	.68 (.60 to .76)
NE6. Documents the effectiveness of each NI, or modifies NI when there is no evidence that the intervention has been effective	205	41.0	0.74 (0.58 to 0.85)	0.36 (0.22 to 0.53)	.34 (.23 to .44)
OQ[j]1. Uses clear language in documentation	220	41.9	0.28 (−0.08 to 0.56)	0.07 (−0.02 to 0.20)	.06 (−.09 to .21)
OQ2. All NCP links are present	220	81.4	0.70 (0.54 to 0.82)	0.32 (0.19 to 0.48)	.32 (.09 to .53)

[a]ICC = intraclass correlation coefficient.
[b]NA = Nutrition Assessment.
[c]NR = not relevant. NA1, NA2, NA3, and ND3 had >90% of all responses falling into a single nominal category, making reliability tests not appropriate because there was minimal disagreement.
[d]ND = Nutrition Diagnosis.
[e]PES = Problem, Etiology, Signs and Symptoms.
[f]S/Sx = signs or symptoms.
[g]NI = Nutrition Intervention.
[h]NM = Nutrition Monitoring.
[i]NE = Nutrition Evaluation.
[j]OQ = Overall Quality.

many as the items evaluated in the Diet-NCP-Audit Tool. As with the Diet-NCP-Audit tool, item reliability for the NCP-QUEST was affected by the level of subjectivity in the item. Items that scored lower on reliability in the NCP-QUEST such as NA4 (relevance of data) or NI1 (interventions consistent with goals) required a greater degree of interpretation by each rater. Items in the NCP-QUEST showing higher reliability had more specificity such as NI2 where the nutrition prescription was either present or absent; or with NI6 (reassessment plans documented), where the reassessment plan/time frame was either documented or not. The Diet-NCP-Audit tool had higher reliability than NCP-QUEST for three items: signs/symptoms provide evidence for the nutrition diagnosis, standardized terminology is used to document interventions, and the overall quality rating. Raters observed greater variability in scoring the first two of these items because the documentation may have been rated with a zero if only some of the signs/symptoms provided evidence or only some of the language was standardized. This may be due in part to a difference in scoring scales between the two studies. Lövestam and colleagues[7] scored each item on a scale of 0 to 2, whereas here the scale was 0 to 1 to reduce ambiguity and increase consistency. Increased interrater reliability may have been greater if a more granular scale had been used that essentially would allow partial credit.

The quality category evaluation of the Diet-NCP-Audit tool showed significantly higher percent agreement compared to the NCP-QUEST. However, percentage agreement is a weaker method compared with ICC and Krippendorff's α. The NCP-QUEST's overall quality aspects rating section was affected by the scores in items ND2, ND4, NI1, and NE3 because overall quality was based on the presence of all linking chains. The Diet-NCP-Audit tool used three criteria to rate overall quality: note followed Assessment, Diagnosis, Intervention, Monitoring,

Table 3. Interrater reliability of all Items, total score, and quality category rating for Nutrition Care Process Quality Evaluation and Standardization Tool

Item	n	Average Measures ICC[a] (CI 95%)	Single Measures	Krippendorff's α (CI 95%)
All items	5,280	0.89 (0.88-0.90)	0.62 (0.59-0.64)	.62 (.60-.63)
Total score	220	0.93 (0.89-0.96)	0.73 (0.63-0.82)	.66 (.60-.72)
Quality category rating[b]	220	0.84 (0.75-0.90)	0.52 (0.38-0.66)	.47 (.38-.55)

[a]ICC = intraclass correlation coefficient.
[b]A = high quality rating (>76% of highest score), B = medium quality rating (51% to 75% of highest score), and C = low quality rating (<50% of highest score).

Evaluation structure; clarity of language; and only information related to the patient's problem was documented in the assessment and then addressed in the intervention or plan.

The individual item that promoted the most confusion during the content validity evaluation and demonstrated lower inter- and intrarater reliability scores was NI1: "Each NI has an action consistent with the goals of care." This item had the lowest agreement (34.8%) and α of .16. During intrarater reliability the agreement for this item was 75% to 89%. It is important for interventions to have specific goals. However, the way clinicians perceive and document what they consider a well-crafted goal varies a great deal.[10] One reason for the low reliability might be that the question consists of two parts: both that there is a provider-client agreed on action, and that it is consistent with the goals of care. The more complexity of the question, the lower the reliability. The NCP Terminology provides granular guidance on how to formulate a nutrition problem via the PES (Problem, Etiology, Signs and Symptoms) statement. This amount of specificity does not exist in how to document a goal universally, and it may never be possible to create specificity similar to the PES. Still, efforts have been made to standardize NCP terms useful in articulating goals to improve this area (goal description, goal target value, goal timeframe, goal subject, and goal setter). This terminology work is ongoing as the NCP Outcomes Committee of the Academy monitors progress across health care disciplines.

Table 4. Intrarater reliability of Nutrition Care Process Quality Evaluation and Standardization Tool

	n	Rater 1 α or ICC[a] (95% CI)	Rater 2
All Items			
Krippendorff's α	5,280	.86 (.82-.89)	.87 (.84-.90)
ICC single measures		0.86 (0.84-0.87)	0.87 (0.85-0.88)
ICC average measures		0.92 (0.91-0.93)	0.93 (0.92-0.94)
Total score			
Krippendorff's α	220	.95 (.92-.98)	.90 (.83-.95)
ICC single measures		0.94 (0.90-0.97)	0.91 (0.84-0.95)
ICC average measures		0.97 (0.95-0.98)	0.95 (0.91-0.97)
Quality category level			
Krippendorff's α	220	.90 (.77-1.00)	.72 (.50-.95)
ICC single measures		0.89 (0.80-0.94)	0.74 (0.57-0.85)
ICC average measures		0.94 (0.89-0.97)	0.85 (0.72-0.92)

[a]ICC = intraclass correlation coefficient.

Application and use of the NCP-QUEST

Training for NCP. In addition to complementing NCP academic curricula, the NCP-QUEST can be used for competency evaluation in supervised practice settings. Whereas bridging the gap between academia and clinical practice can be challenging, CNMs can utilize the NCP-QUEST and its accompanying user manual, which provides detailed guidance on how to score each NCP-QUEST item and examples of various quality documentation.

Peer Review Tool for Nutrition and Dietetics Practitioners. A peer review process has been found to be helpful in improving the quality of documentation and sharing of best practices across health care.[21-24] The VA National Clinical Nutrition Management and Therapy Directive highly recommends that CNMs participate in peer review to maintain quality of care.[25] The NCP-QUEST and the accompanying manual can be used to assist with this peer review process. Any additional facility-specific guidance that needs to be added would only increase the interrater reliability by providing clarity on subjective items. The current study found that when using the tool by multiple RDNs from different settings the agreement for item NA1 was 58.1%, whereas when the same rater evaluated the same note 6 weeks apart the agreement was 98%. Future testing may evaluate the results by multiple RDNs from the same setting.

The ability to obtain the initial nutrition assessment and subsequent reassessment across all VA settings is a major advantage as it allowed for the NCP-QUEST tool to be validated using comprehensive nutrition documentation. The number of notes evaluated, and the inclusion of both acute and nonacute settings allows for application in several care settings. Although the validation of this tool was conducted in the VA setting and may not

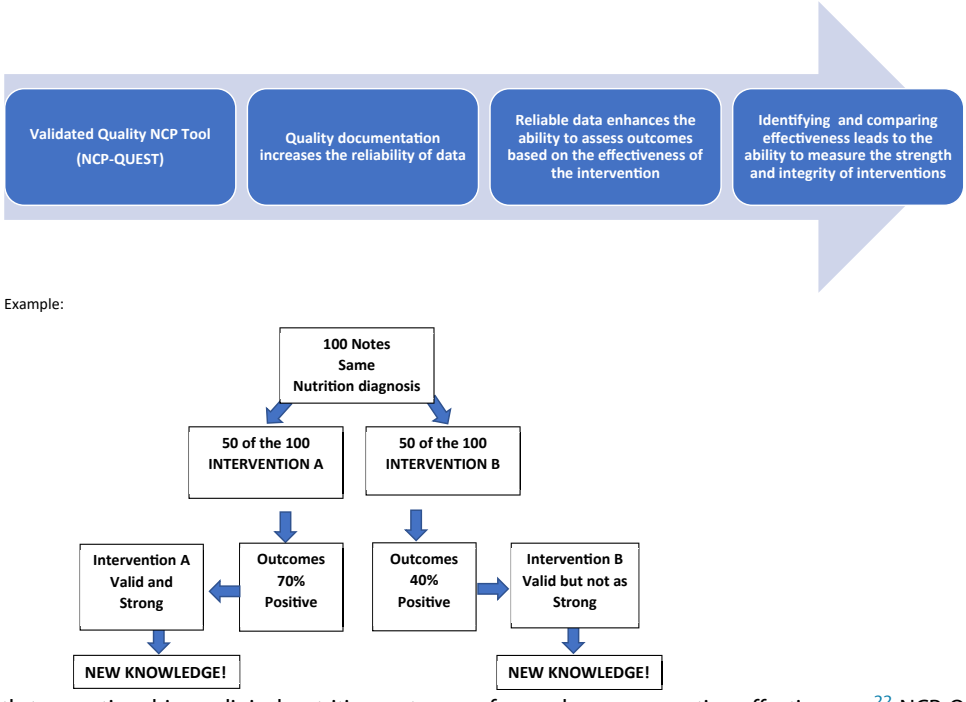

Figure 3. The path to practice driven clinical nutrition outcomes focused on comparative effectiveness.[22] NCP-QUEST = Nutrition Care Process-Quality Evaluation and Standardization Tool.

be generalizable to other practice settings, it provides a start for other validation studies in various settings and locations. Lastly, the field testing before updating and validating the NCP-QUEST improves applicability. Both the NCP-QUEST and user manual were reviewed by field clinicians outside the project team before completion. Limitations include potential selection bias because volunteers self-selected notes for review. There was no formal assessment of NCP knowledge by clinicians documenting the evaluated notes. The validation process included RDNs with significant NCP knowledge and training; therefore, the reliability of the tool with less-experienced clinicians is unknown.

Implementation and Future Directions

Effective implementation of the NCP-QUEST tool will require change management in the form of preparation, support, and education for VA nutrition and dietetics practitioners. A peer-to-peer learning format will provide a rich learning experience and will foster collaboration and more learning to occur. Planned national sessions will provide opportunities to increase clinician engagement and confidence in the NCP, which is intended to increase the effectiveness of the NCP-QUEST tool. It is imperative for CNMs to use this tool in practice and advocate for the integration of the tool in electronic health records. This can lead to greater use and automation.[26]

Quality documentation identified by the NCP-QUEST tool includes all five linking chains and provides insight into the effectiveness of the interventions (Figure 2). Specifically, item ND2 evaluates the diagnosis-etiology link, ND4 the evidence-diagnosis link, NI1 the intervention-goal link, NI3 the etiology-intervention link, and NE2 the diagnosis-outcomes link. Effectiveness of treatment can be defined by the varying degrees of strength and integrity that interventions can generate solutions to a problem.[27] To date, there have been very few outcome-focused studies on the effectiveness of real-world nutrition interventions.[17] Nursing implementation research suggests this paucity is related to the rushed aspect of bedside care and the lack of documented linking components.[9,18-20] Utilizing a rich data base from NCP documentation will serve as the foundation to evaluate the strength, integrity, and effectiveness of treatment provided.

CONCLUSIONS

Through templates and data mining, nutrition researchers will be able to identify the nutrition interventions utilized with specific nutrition diagnoses and compare the nutrition-related outcomes from nutrition interventions applied (Figure 3). When researchers can evaluate the most successful nutrition interventions from NCP documentation, then the core purpose of the NCP will be fully realized, and the next generation of the nutrition assessment movement will emerge.

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STATEMENT OF POTENTIAL CONFLICT OF INTEREST

C. Papoutsakis is an employee of the Academy of Nutrition and Dietetics, which has a financial interest in the Nutrition Care Process Terminology described here.

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AUTHOR CONTRIBUTIONS

All authors developed the manuscript concept. S. Lewis led analyses and wrote the first draft. All authors participated in data interpretation, revised different sections of the first draft of the manuscript, and reviewed and commented on subsequent drafts of the manuscript.