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ORIGINAL RESEARCH

Successful long-term maintenance following Nutrition Care Process Terminology implementation across a state-wide health-care system

Angela VIVANTI,[1,2] Therese A. O'SULLIVAN,[3] Jane PORTER[3] and Marion HOGG[4]

[1]Department of Nutrition and Dietetics, Princess Alexandra Hospital, [2]School of Human Movement and Nutrition Studies, University of Queensland, and [4]Department of Nutrition and Dietetics, Ipswich Hospital, Brisbane, Queensland, and [3]School of Medical and Health Science, Edith Cowan University, Joondalup, Western Australia, Australia

Abstract

Aim: Three years following a state-wide Nutrition Care Process Terminology (NCPT) implementation project, the present study aimed to (i) assess changes in NCPT knowledge and attitudes, (ii) identify implementation barriers and enablers and (iii) seek managers' opinions post-implementation.

Methods: Pre-implementation and three years post-implementation, all Queensland Government hospitals state-wide were invited to repeat a validated NCPT survey. Additionally, a separate survey sought dietetic managers' opinions regarding NCPT's use and acceptance, usefulness for patient care, role in service planning and continued use.

Results: A total of 238 dietitians completed the survey in 2011 and 82 dietitians in 2014. Use of diagnostic statement in the previous six months improved ($P < 0.001$). Perceptions of NCPT's importance ($P < 0.020$) and benefits of incorporating NCPT into practice ($P = 0.029$) increased. Time to complete NCPT documentation ($P < 0.013$) and access to mentors decreased ($P < 0.001$).

Other areas including enhanced attitudes, familiarity, confidence, views, knowledge and incorporation into practice were sustained ($P > 0.05$). Key elements in sustaining NCPT implementation over three years included ongoing management support, workshops/tutorials, discussion and mentor and peer support. The most valued resources were pocket guides, ongoing workshops/tutorials and mentor support. Dietetic managers held many positive NCPT views, however, opinions differed around the usefulness of service planning, safer practice, improving patient care and facilitating communication. Some managers would not support NCPT unless it was recommended for practice.

Conclusions: Immediate improvements following the NCPT implementation project were sustained over three years. Moving forward, a professional focus on continuing to incorporate NCPT into standard practice will provide structure for process and outcomes assessment.

Key words: change management, dietetic, documentation, implementation, nutrition care process terminology.

Introduction

The nutrition care process (NCP) is a standardised model developed by the American Dietetic Association (now the Academy of Nutrition and Dietetics or 'Academy') to guide dietitians in providing high-quality nutrition care.[1,2] The NCP model includes (i) assessment, (ii) diagnosis, (iii) intervention and (iv) monitoring and evaluation activities.[3,4] The International Dietetics and Nutrition Terminology (IDNT) is a standardised language that supports these four steps.[2] The inclusion of the diagnosis step is critical as it refers to a nutrition diagnosis rather than a medical diagnosis. IDNT is key for the standardisation of this step. For example, with a medical diagnosis such as diabetes, potential nutritional problems' (diagnoses) terminologies may include 'inconsistent carbohydrate intake' or 'less then optimal types of carbohydrate'. Standardised language is also available for the assessment, intervention, monitoring and evaluation of care.[1,2] Dietetic roles are clearly outlined within the NCP framework, while the IDNT includes definitions to standardise nutrition terms, thus enabling consistent communication and documentation for each stage of the NCP, including outcome measures. Since 2014, the NCP and IDNT have been collectively referred to as the nutrition care process terminology (NCPT).

Data have not yet been published regarding NCPT implementation in Australia. NCPT is supported globally by

A. Vivanti, DHSc, AdvAPD, Research & Development Dietitian
T. O'Sullivan, PhD, APD, Senior Lecturer
J. Porter, MPubHlth, AdvAPD, Student
M. Hogg, Grad Dip, APD, Director of Nutrition & Dietetics
Correspondence: A. Vivanti, Department of Nutrition and Dietetics, Princess Alexandra Hospital, Ipswich Road, Woolloongabba, QLD4102, Australia. Tel: 61 7 3176 5099, Email: angela.vivanti@health.qld.gov.au

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the International Confederation of Dietetic Associations and locally by the Dietitians Association of Australia (DAA).[5,6] Successful NCPT implementation and continued utilisation will position the profession well for greater information access and improved management during the increasing adoption of electronic medical records and health information technology systems.

Institutional change management, NCPT implementation and dietitians' views prior to and immediately following implementation have been previously reported by the current authors and others.[7,8] However, there is a lack of information nationally and internationally regarding whether changes occurring as a result of implementation are maintained, reduced or improved in the long term.

Three years following the completion of a nine-month state-wide hospital NCPT implementation project, which involved a champion approach,[8] the present study aimed to: (i) assess changes in dietitians' attitudes, familiarity, confidence, knowledge and incorporating diagnosis statements into practice; (ii) identify long-term implementation barriers and enablers; and (iii) investigate managers' perspectives regarding the implementation of NCPT. To our knowledge, this is the first study to conduct a long-term follow-up of NCPT implementation.

Methods

All hospital dietetic departments from metropolitan, regional and remote areas within the Queensland state health-care system (comprising of approximately 300 dietitians) were invited to participate. All the state's 17 health service districts participated. Covering 1.7 million square kilometres, the state health sector services a population of 4.5 million.[9] Great size diversity was evident amongst the 177 participating hospitals,[10] with 80% (n = 142) having ≤50 beds, 12% (n = 21) having between 51 and 200 beds and 8% (n = 14) having over 200 beds. The latter category incorporated three tertiary teaching hospitals housing between 580 and 950 beds.[11]

Data have been previously reported pre- and immediately post the 2011 implementation project, which used a champion and train-the-trainer approach[8] This paper reports on data collected in 2014, 3 years (36 months) following project completion. For both the initial and repeat evaluation, dietitians completed a previously described and validated attitudes, support and knowledge survey ('ASK NCP').[12] This survey included questions concerning NCPT knowledge (n = 9), familiarity (n = 4) and attitudes (n = 12); confidence and preparedness for incorporation into practice (n = 6); views regarding implementation (n = 11); and incorporating nutritional diagnoses into current practice (n = 1). A combination of open-ended, dichotomous and closed-ended questions employing a 5-point Likert scale was utilised (1, strongly agree; 2, agree; 3, neutral; 4, disagree; 5, strongly disagree). The survey also included open text fields capturing self-expressed perceived key elements to successful implementation, challenges or barriers, useful tools and any additional comments. Responses to all questions were optional.[12]

Additionally, three years post-implementation, the dietetic department managers (n = 17) from the largest hospital departments (as judged by bed number) within each of the health service districts were individually emailed and surveyed with a tool created by the authors (AV, MH) and N. Haron. Their views were sought regarding NCPT utilisation following the implementation project. This included NCPT's use and acceptance by practitioners, usefulness for aspects of patient care and service planning and potential for continued use.

The Metro-South Health Service District Human Research Ethics Committee granted ethical approval for this follow-up. District champions invited Queensland Health dietitians by email to complete an electronic survey. Gender and the years of dietetic practice were used to assess sample representativeness against DAA national membership data. Anonymous electronic surveying was completed using 'Survey Monkey' (www.surveymonkey.com, Palo Alto, CA, USA).

Surveys were completed within two weeks, with an email reminder sent in the final week. Upon provision and dissemination of the letter of invitation and the web link, the request for survey completion was achieved through group emails of dietitians in each health district. This was managed by the project champions for the initial survey and the district managers for the 36-month survey completion.

Data analysis was undertaken using IBM SPSS Statistics for Windows (Release 22.0, 2013; IBM Corp, Armonk, NY, USA). Descriptive data is presented as counts and percentages. Sample representativeness was assessed using the Chi-square test for categorical variables and the Mann–Whitney *U* test for non-parametric continuous variables. Independent sample *t*-tests assessed the significance of changes in survey responses immediately and three years after project implementation. $P < 0.05$ was considered significant.

Results

Each of the 17 state health services participated in both the immediate post-implementation and 36-month post-implementation survey. A total of 238 dietitians completed the survey in 2011 and 82 dietitians in 2014. The respondents' years of practicing dietetics (2011—median 7, range 0.5–32 years, $P < 0.69$ and 2014—median 7, range 0.5–40 years, $P < 0.52$) and gender (2011—female: 94%, 212/225, $P < 0.43$ and 2014—female: 95%, 72/76, $P < 0.66$) were similar to the overall DAA membership at the time. There was no difference evident in either the years of practicing dietetics ($P < 0.92$) or gender ($P < 0.56$) between the 2011 and 2014 respondents.

Results of attitudes and knowledge concerning NCPT immediately post-implementation and three years post-implementation are reported in Tables 1 and 2, respectively. Self-reported incorporation of problem, etiology, signs and symptoms (PES) statements into charting for six

Table 1 Attitudes, familiarity, confidence and views immediately and three years post-NCP and IDNT implementation (1, strongly agree; 2, agree; 3, neither agree or disagree; 4, disagree; 5, strongly disagree)

	Post-project 2011 (n = 238)		*Post-project 2014 (n = 82)*		
	n	*Mean (SD)*	*n*	*Mean (SD)*	P-*value*
Attitudes concerning NCP and IDNT					
I feel isolated from knowledgeable colleagues with whom to discuss the NCP/IDNT	236	4.08 (0.82)	82	3.91 (0.91)	0.115
I feel incorporating the NCP/IDNT will improve patient care	237	2.38 (0.90)	82	2.46 (1.15)	0.530
NCP/IDNT interferes with my professional autonomy	230	3.64 (0.82)	77	3.44 (0.94)	0.078
Generally, I would prefer to continue my routine rather than change	230	3.59 (0.94)	76	3.46 (0.92)	0.292
I do not feel the need to change my clinical practice	238	3.66 (0.90)	81	3.38 (0.97)	0.020[(a)]
The NCP and standardised language are applicable to my area of practice	238	1.82 (0.77)	82	1.79 (0.81)	0.757
I see the value of the NCP within my clinical practice	237	1.85 (0.74)	82	1.85 (0.85)	0.955
Incorporating NCP/IDNT into my current practice will be inconvenient	230	3.58 (0.86)	76	3.64 (0.89)	0.562
I see minimal benefit in changing my clinical documentation practice to incorporate the NCP	237	3.65 (0.99)	82	3.71 (1.02)	0.636
I don't have time to use NCP/IDNT	230	3.63 (0.78)	76	3.88 (0.73)	0.013[(a)]
I see the value of IDNT within my clinical practice	237	1.99 (0.86)	82	2.11 (1.07)	0.366
I see minimal benefit in changing my clinical documentation practice to incorporate IDNT	238	3.72 (0.93)	82	3.71 (1.09)	0.929
Familiarity with NCP and IDNT					
I am familiar with the American Dietetic Association Nutrition Care Process NCP	238	1.90 (0.76)	82	1.93 (1.04)	0.851
I am familiar with the International Dietetic and Nutrition Terminology IDNT	238	1.57 (0.55)	82	1.55 (0.74)	0.770
I am aware of the DAA recommendation to adopt the NCP and IDNT in Australia	238	1.49 (0.61)	82	1.60 (0.81)	0.264
How confident do you feel…					
to implement the NCP into your own practice?	232	1.77 (0.66)	78	1.81 (0.81)	0.658
to implement IDNT into your current practice?	232	1.74 (0.67)	78	1.68 (0.75)	0.492
in identifying nutrition diagnosis?	231	1.72 (0.59)	78	1.68 (0.66)	0.621
in writing problem etiology symptoms (PES) statements?	230	1.85 (0.65)	78	1.76 (0.69)	0.289
How prepared…					
do you feel to implement NCP and IDNT within your workplace?	222	1.67 (0.59)	76	1.74 (0.79)	0.479
How difficult…					
do you think implementation will be?	222	3.09 (0.72)	75	3.24 (0.77)	0.116
Views regarding the implementation of IDNT					
I have had sufficient training to feel knowledgeable about the NCP and IDNT	227	2.12 (0.78)	77	2.12 (0.96)	0.985
I have had sufficient training to feel comfortable implementing the NCP/IDNT into my practice	228	2.19 (0.78)	77	2.14 (0.93)	0.673
I require additional training specific to my area of practice	227	3.00 (0.88)	77	3.18 (0.97)	0.137
Information on NCP/IDNT is readily available	228	2.04 (0.64)	76	2.20 (0.80)	0.132
The implications of incorporating NCP/IDNT into practice is not clear	228	3.49 (0.82)	76	3.21 (1.00)	0.029[(a)]
I have access to NCP/IDNT mentors	228	1.76 (0.70)	76	2.25 (1.00)	<0.001[(b)]
Implementing the NCP/IDNT within my own practice is important to me	228	2.27 (0.90)	77	2.34 (1.10)	0.613
Management is supportive of implementing NCP/IDNT	227	1.68 (0.65)	77	1.75 (0.75)	0.429

Table 1 Continued

	Post-project 2011 (n = 238)		*Post-project 2014 (n = 82)*		
	n	*Mean (SD)*	*n*	*Mean (SD)*	P-*value*
My co-workers are supportive of using NCP/IDNT	226	2.02 (0.72)	77	1.92 (0.77)	0.323
There is freedom at my workplace to implement NCP/IDNT	227	2.17 (1.01)	77	2.18 (1.04)	0.940
There is insufficient time on the job to implement new ideas such as NCP/IDNT	226	3.39 (0.96)	77	3.40 (1.03)	0.946

Independent *t*-test

[(a)] Using independent sample *t*-tests, significant difference at the level of $P < 0.05$ exists between responses immediately post- and three years post-implementation.

[(b)] Using independent sample *t*-tests, significant difference at the level of $P < 0.001$ exists between responses immediately post- and three years post-implementation.

DAA, Dietitians Association of Australia; IDNT, International Dietetics and Nutrition Terminology; NCP, nutrition care process; PES, problem, etiology, signs and symptoms (a nutrition diagnosis statement).

months or more showed a dramatic increase (17.5–83.1%, $P < 0.001$). Dietitians were less likely to perceive time as a barrier for using NCPT and were increasingly likely to recognise the role of NCPT in changing clinical practice (Table 1). In addition, there was improved knowledge as indicated by a higher rate of correct multi-choice responses to the case study within the survey (Table 2).

Improvements in some areas directly following the implementation were sustained over the 36-month follow-up. There were no significant differences in the mean scores for attitudes, familiarity, confidence and views concerning NCPT[8] (Table 1). Significantly more respondents disagreed with the statement concerning not having time to use NCP/IDNT (Table 1). Correctly answered knowledge-based questions and self-reported incorporation into practice were also sustained (Table 2).

Aspects that declined during the three years post-implementation included access to mentors ($P < 0.001$), the clarity of the implications of incorporating NCPT into practice ($P < 0.029$) and the need to change clinical practice ($P < 0.02$) (Table 1). Three years post-implementation, further training, respectively support was still desired by respondents in order to feel confident about implementing NCPT within the workplace and in clinical documentation (Table 2).

The three most prevalent key elements to successful NCPT implementation remained consistent, but there was increased agreement with the free-text comments between 2011 and 2014. These included (i) ongoing support and encouragement from management (n = 20, 8.4% and n = 12, 14.6%, respectively); (ii) ongoing training and professional development such as tutorials and workshops (n = 18, 7.6% and n = 13, 15.9%); and (iii) access to mentors, peer support and discussions (n = 16, 6.7% and n = 14, 17.1%). The tools and resources that facilitated NCPT's incorporation into practice also remained consistent between 2011 and 2014 and included (i) pocket guides or easy information to carry (n = 27, 11.3% and n = 28, 34.1%); (ii) workshops, tutorials and case studies (n = 37, 15.6% and n = 17, 20.7%); and (iii) access to mentors and champions (n = 6, 2.6% and n = 6, 7.3%).

Between 2011 and 2014, comments changed concerning the key implementation challenges and barriers. In 2011, the stated key challenges and barriers included (i) training, practice and guidance for correct interpretation and use (n = 22, 9.2%); (ii) time (n = 17, 7.1%); and (iii) utilisation difficulty in certain clinical areas or situations, for example, intensive care, borderline palliative, surgical or when not applicable (n = 11, 4.6%). In 2014, the key challenges and barriers were stated as: (i) none (n = 14, 17.1%), (ii) time (n = 13, 15.9%) and (iii) jargon and length of chart entries (n = 10, 12.2%).

Results of dietetic managers' perspectives concerning NCPT utilisation three years post-implementation are reported in Table 3. Health district dietetic managers (14 respondents from 17 districts; 14/17, 82%) reported that NCPT was used by their workplace most or all the time (86%) three years after the implementation project (Table 3). The greatest users of NCPT were reported as the newest graduates (79% stating all the time), with use reducing with seniority (49% some or most of the time) (Table 3).

When dietetic managers were questioned concerning NCPT, the greatest agreement (as indicated by a majority selection of 'agree' or 'strongly agree') was around the usefulness of NCPT for demonstrating dietetic effectiveness, collecting useful data, standardising terminology, identifying and addressing the nutrition problem, improving clarity of documentation, providing a consistent framework for nutrition care, encouraging critical thinking and assisting with the introduction of electronic health records (Table 3). There was less agreement that NCPT facilitated service planning decisions and led to safer practice, with opinions varied in these areas (Table 3).

Even if NCPT was not recommended and promoted by dietetic associations, over half of the managers indicated that they would continue to use NCPT. A total of 57% (8/14) reported that they would continue to use NCPT in

Table 2 Knowledge and incorporating diagnosis statements into practice and confidence immediately and three years-post-NCP and IDNT implementation

Statement	*Post-project 2011*		*Post-project 2014*		*P-value*
Knowledge regarding NCP and IDNT (% correct responses from multi-choice options)	*n respondents*	Correct responses, n(%)	*n respondents*	Correct responses, n(%)	
What is the first step in the Nutrition Care Process (NCP)?	237	136 (57.4%)	81	46 (56.8%)	0.694
Etiology is documented in which step of the Nutrition Care Process?	236	205 (86.9%)	81	63 (77.8%)	0.075
Which is not a nutrition diagnosis?	236	232 (98.3%)	81	76 (93.8%)	0.070
Which of the following terms is the standardised term to use when describing insufficient intake?	235	231 (98.3%)	81	78 (96.3%)	0.537
Which of the following are the domains of the nutrition diagnosis in the NCP?	235	187 (79.2%)	81	62 (76.5%)	0.646
The connectors used in a PES statement are:	235	233 (99.1%)	81	77 (96.3%)	0.118
The nutrition diagnostic term can be found in which portion of the PES statement?	235	215 (91.5%)	80	71 (88.8%)	0.040[a]
Lab values or weight status may be used in which part of the PES statement?	235	196 (83.4%)	80	67 (83.8%)	0.456
Case study: Choose the response that best describes the better choice of a PES statement and the best rationale for that choice	232	106 (45.7%)	78	36 (46.2%)	0.017[a]
Incorporation of PES statements into current practice (2011 n = 229; 2014 n = 77)					
I am not currently using PES statements					
In my charting and I do not plan to use them		5 (2.2%)		2 (2.6%)	<0.001[b]
In my charting but I intend to implement them within the next three to six months		10 (4.4%)		0	
Regularly but I will fully adopt them into my practice within three months		8 (3.5%)		0	
I have incorporated PES statements					
Into my charting and I have used them for less than three months		84 (36.7%)		3 (3.9%)	
Into my charting and I have used them for three to six months		75 (32.8%)		4 (5.2%)	
Into my charting for more than six months		40 (17.5%)		64 (83.1%)	
I have used PES statements in the past but I am not currently using them		7 (3.1 %)		4 (5.2%)	
Do you feel with further training and support that you will feel confident to implement NCP and IDNT within your workplace and use for clinical documentation? (2011 n = 221; 2014 n = 75)		Yes Selected 169 (76.5%)		Yes Selected 48 (64.0%)	0.07

[a] Using Chi-square tests, significant difference at the level of $P < 0.05$ exists between responses immediately post- and three years post-implementation.

[b] Using Chi-square tests, significant difference at the level of $P < 0.001$ exists between responses immediately post- and three years post-implementation.

IDNT, International Dietetics and Nutrition Terminology; NCP, nutrition care process; PES, problem, etiology, signs and symptoms (a nutrition diagnosis statement).

some way, and 7% (1/14) reported that they would use NCPT routinely. However, 14% (2/14) of managers responded that they would be unlikely to use NCPT, and 21% (3/14) indicated that they would not use the NCPT at all if it was not recommended. Primary concerns around the use of NCPT in departments included (i) not always being responsive to individual patient needs in chronic disease management, (ii) greater time required to complete documentation and (iii) PES statements not always reflecting situations or being decipherable by colleagues. Key stated advantages included (i) a standardised language, consistent system and potential for standardised data fields with electronic medical records; (ii) mechanisms to define the nutritional rather than medical problems; and (iii) internationally respected.

Discussion

To date, this is the first study to explore long-term changes in dietitians' attitudes and knowledge following extensive NCPT implementation. Generally, positive attitudes concerning NCPT were sustained in the three years following initial implementation. In addition, concern regarding the time required to use NCPT had reduced overall, although time was still identified as an ongoing implementation challenge. Importantly, the proportion of dietitians using nutrition diagnoses in their practice had increased.

The consistency of the feedback provided by the respondents three years apart suggests that the initial NCPT implementation strategy using champion and train-the-trainer methods was effective.[8] However, the respondents also highlighted the multifaceted considerations required to achieve successful implementation. Firstly, dietitians revealed that management support and encouragement was important for successful implementation. Decreased productivity was a previously stated concern of practitioners,[8] but this concern had significantly reduced on re-evaluation. Based on what is now known from the literature, ongoing support and encouragement from management is fundamental to success.[13–15] This could indicate that managers may also benefit from support structures; discussion forums, including change management approaches[15]; and 'buddy' systems during initial stages as well as ongoing implementation.

A decline was observed in both the clarity regarding the implications of incorporating NCPT and the perceived need for dietitians to change their clinical practice. Such attitudes may alter with the increasing implementation of electronic medical records, which can facilitate easier reporting of data analysis to better inform practice.[16] Using NCPT in practice has previously been shown to be enhanced using electronic, compared with paper-based, systems.[16,17] As paper-based systems were used by most sites for the duration of the present study, it is not unexpected that NCPT's usefulness for service planning, leading to safer practice, improving patient care and facilitating communication, did not gain majority agreement. It is anticipated that electronic health records utilising NCPT may generate useful reporting on the effectiveness of dietetic treatment in a timely fashion. Once data for service planning and service evaluation can be obtained following the broader utilisation of electronic health records and informatics systems, there may be stronger agreement in these views.

The concerns of some dietetic managers regarding the time required to complete documentation may be associated with handwritten chart entries, which may also be resolved with future adoption of electronic health records. Also, the expressed concern that jargon may limit effective communication with multidisciplinary team colleagues is anticipated to be minimised by the active involvement of Australian Accredited Practising Dietitians within International NCPT committees, working parties and language formulation and review. This is because committee involvement gives the opportunity to discuss problematic or unclear terms, with agreement and provision for pseudonyms as well as inclusion within the Systematized Nomenclature of Medicine-Clinical Terms dictionary of terms. It also allows the proposal of new terms to address regional differences.

Three years after the implementation project, dietitians still reported a need for continued training and support. The decline reported in access to mentors indicates that strategies to enhance sustainability are needed in order to grow the pool of NCPT expertise and methods of access. This decline was revealed by the continuing low proportions of correct responses in several of the knowledge questions. The percentage of incorrect responses emphasises the value of including fact-based as well as opinion-based questions when evaluating implementation attainment.

Selecting an appropriate nutrition diagnosis can be a complex process and requires critical thinking (i.e. diagnostic reasoning) for the interpreting, organising and grouping of data to enable selection of the most appropriate diagnosis.[7,18] It is essential to identify the real nutrition problem in order for the practitioner to follow the NCP and select strategies that will successfully resolve the identified problem. Other professions also recognise the complexity and value of the diagnostic reasoning process.[19–21] Consequently, it may be anticipated that ongoing education and training support is required to increase confidence during NCPT implementation. Results suggest that the most effective support would focus on the areas of tools, resources and mentors, and take the form of workshops/tutorials, case studies, pocket guides and collegial support from both mentors and management colleagues.

The champions and train-the-trainer approaches used in the original implementation can also be used to provide long-term training, access to mentors and discussion forums. Appropriately skilled trainers are essential to ensure correct concept dissemination. With such an approach, previous trainers could adopt a mentoring role for future trainers, thus increasing the support and development of new trainers and offering guidance on challenging queries. Such approaches are possible through providing planned organisational training with flexibility around how the support, training and discussions are delivered.[8] Whether real or

Table 3 Dietetic managers perspectives on NCPT utilisation three years post-implementation (n = 14)

	Not at all	*Infrequently*	*On some occasions*	*Most of the time*	*All the time*
To what degree is IDNT/NCPT being used in your workplace	0	1 (7%)	1 (7%)	7 (50%)	5 (36%)
In your opinion how well is IDNT accepted and used by					
New graduates	0	0	0	3 (21%)	11 (79%)
Clinical Staff (≤5 since graduation)	0	0	2 (14%)	5 (35%)	7 (50%)
Clinical Staff (>5 years since graduation)	0	1 (7%)	4 (28%)	5 (35%)	4 (28%)
Staff in senior or leadership roles	0	3 (21%)	4 (28%)	4 (28%)	3 (21%)
Management and Service Planning	*Strongly agree*	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly disagree*
Assists with standardisation of terminology	5 (36%)	9 (64%)			
Provides a mechanism to demonstrate the effectiveness of dietetic interventions	2 (14%)	9 (64%)	1 (7%)	2 (14%)	
Increases opportunity for collection of useful data	3 (21%)	8 (57%)	2 (14%)		1 (7%)
Will be helpful with the introduction of electronic health records	5 (36%)	7 (50%)	2 (14%)		
Enables evaluation of clinical care/clinical outcomes	2 (14%)	7 (50%)	1 (7%)	1 (7%)	1 (7%)
Improves job satisfaction as dietitians can record outcomes	1 (7%)	7 (50%)	1 (7%)	3 (21%)	
Systems for ongoing care of the consumer /patient are co-ordinated and effective	2 (14%)	7 (50%)	4 (28%)	1 (7%)	
Facilitates service planning decisions (what to prioritise, where most effective)		5 (35%)	7 (50%)	1 (7%)	1 (7%)
Leads to safer practice	2 (14%)	3 (21%)	5 (36%)	3 (21%)	1 (7%)
There are no benefits to adopting NCP/IDNT		1 (7%)	1 (7%)	9 (64%)	3 (21%)
Communication and patient care					
Assists with clear objective documentation (e.g. to general practice medical officer or adverse event registration)	4 (28%)	7 (50%)	1 (7%)	1 (7%)	1 (7%)
Allows for more consistent care when patients transfer services	2 (14%)	7 (50%)	3 (21%)	2 (14%)	
Allows more concise documentation	3 (21%)	5 (36%)	2 (14%)	4 (28%)	
Facilitates communication with other health-care professionals	3 (21%)	4 (28%)	4 (28%)	1 (7%)	2 (14%)
Improves patient care	1 (7%)	4 (28%)	4 (28%)	5 (36%)	
Professional dietetic practice					
The NCP provides a consistent structure and framework for nutrition care	5 (36%)	9 (64%)			
Standardised language provides dietitians with a common vocabulary to identify nutrition problems	5 (36%)	8 (57%)		1 (7%)	
Encourages critical thinking	4 (28%)	8 (57%)	1 (7%)		1 (7%)
Addresses a patient's nutritional problem	3 (21%)	8 (56%)	2 (14%)	1 (7%)	
Assists in helping dietitians become recognised as more valuable team members		5 (36%)	3 (21%)	4 (28%)	2 (14%)

IDNT, International Dietetics and Nutrition Terminology; NCP, nutrition care process; NCPT, nutrition care process terminology.

perceived, the concepts of enhancing the language for chronic disease conditions as well as disease prevention (when no problem currently exists, but individuals are at high risk of developing a health issue) need exploration and further development in order to ensure that NCPT supports professional needs in different health settings.

The present study addressed the practical challenge of major professional organisational change across a state-wide health-care system under real workplace conditions. Long-term evaluation of this scale of NCPT implementation has not been previously reported to the authors' knowledge. However, there were several research limitations.

The response rate was lower in 2014 (n = 82) compared to 2011 (n = 238). The higher response rate in 2011 was likely because of the dedicated NCPT champions who were working at this time across the different districts. Their role was to help disseminate NCPT knowledge and training, and their presence was likely to encourage survey participation.[8] Despite the lower numbers, the respondents at both time points were representative of overall DAA members in terms of age and gender.

We were not able to ascertain if bias existed amongst the non-responding dietetic managers or respondents. The respondents were representative of the DAA national membership in terms of gender and years of practice. With a median of seven years of practice, it is presumed that many respondents did participate in the original NCPT implementation. Finally, the present study did not exclude the original project champions from the survey completion nor control for outside influences (including increased access to webinars, workshops and support materials) on knowledge, attitudes and skills through improved availability of information and access to NCPT over the study period.

The Queensland Health-based champion and train-the-trainer NCPT implementation program resulted in gains in Queensland that were sustained or improved over a 36-month period. Ongoing managerial and collegial support and encouragement were highlighted by practitioners as being ongoing needs three years following the initial implementation. Understanding the perceptions of dietetic managers is vital to continuing NCPT momentum and subsequent strengthening of the dietetic profession. It is anticipated that the benefits of NCPT in dietetic service management will become more apparent as electronic health records become more routinely utilised. Moving forward, the state-wide focus needs to include using NCPT for responding to individual treatment in a timely manner and for service outcomes assessment.

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Conflict of interest

The authors declare that there are no conflicts of interest

Authorship

AV was involved in all aspects of the study, including the design, data collection, analysis and interpretation and the writing and editing of the manuscript, TO and JP were involved in the study design, analysis and interpretation and editing of the manuscript. AV and MH were involved in the director survey development, data interpretation and manuscript editing. All authors critically reviewed the manuscript and approved the final version submitted for publication.

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