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ORIGINAL RESEARCH

The Nutrition Care Process Terminology: Changes in perceptions, attitudes, knowledge and implementation amongst Australian dietitians after three years

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Abstract

Aim: Assessing changes in dietetic perceptions, attitudes and knowledge regarding the Nutrition Care Process Terminology (NCPT) is important to determine implementation effectiveness. This study aimed to investigate changes in the perceptions and attitudes of Australian dietitians over a three-year period, identify changes in benefits and barriers to support successful NCPT implementation and determine future directions for NCPT progression.

Methods: An online survey was performed in 2011 and repeated in 2014 by recruiting members of the Dietitians Association of Australia (DAA) through an email link. The survey assessed familiarity, knowledge, attitudes, benefits, barriers, concerns and use of educational enablers around the NCPT.

Results: The survey was completed by 218 respondents in 2011 and 205 respondents in 2014. Survey respondents from both years were representative of overall DAA membership. Respondent knowledge of NCPT increased significantly over the three-years, as did confidence, preparation, access to support and training and NCPT usage. Respondent's identification of benefits to implementation increased whilst barriers reduced. Attitudes regarding NCPT implementation were conflicting.

Conclusions: Over three years, improvements were evident in NCPT knowledge, attitudes and usage. However, not all dietitians saw reason to implement NCPT in their practice, and some attitudes have become less supportive. A collective vision is required to foster positive attitudes towards the transformational professional benefits possible from NCPT. With ongoing uptake of electronic health records, the potential for NCPT to evaluate and justify dietetic interventions is increasing.

Key words: attitudes, implementation, International Dietetics and Nutrition Terminology, knowledge, Nutrition Care Process Terminology.

Introduction

The Nutrition Care Process (NCP) is a framework designed to assist dietitians in delivering high-quality nutrition care. The framework is a four-step process including nutrition assessment, diagnosis, intervention and monitoring and evaluation.[1–4] Following the introduction of the NCP, a standardised language known as the International Dietetics and Nutrition Terminology (IDNT) was developed to provide dietitians with consistent terms to use throughout nutrition assessment, diagnosis, intervention and evaluation.[4–6] The NCP and the IDNT are collectively referred to as the Nutrition Care Process Terminology (NCPT).[6]

The NCPT aims to increase documentation consistency and allow the specific identification of nutrition issues in relation to, but set apart from, medical diagnoses. In addition, the terminology may provide clear and interpretable nutritional information to other allied health professions and allow for effective ongoing evaluation of health outcomes.[2–5] Use of the NCPT is not mandatory for dietitians within Australia but is highly recommended by the Dietitians Association of Australia (DAA). Individual practitioners who value recommendations to include NCPT within clinical practice are instigating a structure by which to assess the resolution of diagnoses and the measurement of patient outcomes.[5] NCPT offers a means for establishing evidence of any benefits resulting from the patient care provided, dietetic impact on patient health outcomes and the most effective treatments within an area of practice. The adoption of the NCPT model and framework has occurred in many facilities globally, including Australia.

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Whilst the reasoning behind the introduction of the NCPT is well described, evidence of perceived benefits and potential issues in practice is lacking. Consequently, a baseline survey was completed in 2011 to assess NCPT usage, knowledge and attitudes of those working in the profession.[4] Following NCPT adoption within Australia, survey results identified issues for practice, including time for implementation of new procedures, and it is valuable to monitor how NCPT adoption progresses and how the changes affect those involved.[4,7] In addition, it is important to ensure that dietitians using the terminology have the knowledge to apply it effectively[3,6,8] and have further training as required. As the uptake of electronic health records continues, incorporation of NCPT provides a valuable tool to evaluate dietetic practice. This can include examinations such as types of common nutrition diagnoses, resolution rates of diagnoses and time to resolution. Information such as this can help demonstrate the effectiveness of dietitians across different practice situations.

To date, no studies have assessed long-term country-based changes in the knowledge and attitudes of dietitians with regards to the NCPT. This study was designed to fill this gap by undertaking a nation-wide survey[4] of Australian dietitians three years following an initial baseline survey. This study aims to identify changes in NCPT uptake and knowledge, with a focus on barriers and enablers to the effective use of the NCPT. This will provide a basis to form recommendations regarding future activities to support successful use of the NCPT and will contribute to evidence of its effects on nutrition care.

Methods

The validated 'Attitudes, Support, Knowledge, of the Nutrition Care Process' (ASK NCP) survey was utilised to gain insight into dietitians' views regarding NCP and IDNT implementation.[3] This survey has been shown to be valid and repeatable.[4] The ASK NCP survey was completed electronically using 'Survey Monkey' (www.surveymonkey.com, Palo Alto, CA). The survey was administered first in 2011 and then again in 2014 to identify the changes in dietitians' perceptions over time.

Participants were recruited through the professional body for dietitians in Australia, the DAA. Members were invited to complete the voluntary survey through an anonymous web link included in the DAA weekly electronic newsletter. The link appeared in two separate newsletters two weeks apart to maximise the response rate. The recruitment process was the same for both 2011 and 2014. The survey took approximately 20 minutes to complete, and survey completion was taken as consent. Participants could exit the survey at any time, and all responses to questions were optional. The Queensland Health Research Ethics Committee granted ethical approval for the study.

The survey contained a variety of questions ranging from those requiring qualitative responses to multiple-choice knowledge questions and close-ended questions, utilising a 5-point Likert scale (1 'strongly agree', 2 'agree', 3 'neutral', 4 'disagree', 5 'strongly disagree').

The survey included 48 questions regarding dietitians' knowledge (n = 9), familiarity (n = 1), attitudes (n = 12) and confidence and preparedness for implementation (n = 6) of the NCP and IDNT, as well as views regarding implementation (n = 11), workplace documentation method, terms incorporated into charting, and length of time since incorporating NCP and IDNT (n = 4). The survey included 'select all that apply' questions focussing on the identification of benefits, concerns and barriers as well as the use of educational resources to assist in implementation (n = 5). Themes evident from responses to the 2011 survey were added as options for 2014. As a result, the 2014 survey had two additional questions and extra options for three of the 'select all that apply' questions.

Respondents' demographics were collected during both surveys, with gender and years working as a dietitian compared against DAA membership to assess respondent representativeness.

For the 2011 survey, answers from 218 respondents were analysed from the 285 originally surveyed. Responses were excluded if they did not confirm DAA membership (n = 34), if they followed the link but did not respond to any questions (n = 31) or if they reported living overseas (n = 2). In 2014, there were 209 respondents with 205 datasets analysed. Responses were excluded if no questions were answered (n = 2) or they reported not living in Australia (n = 2).

Data analysis was completed using the Statistical Package for the Social Sciences (SPSS for Windows, Release 18, 2009; SPSS Inc. Chicago, IL, USA). Survey answers for 2011 and 2014 were compared to determine changes in responses. Questions with categorical responses were presented as counts and percentages and were assessed using Pearson's Chi-squared test. Continuous variables were assessed for normality of the response data. Independent sample *t*-tests were used for data with normal distribution, and the Mann-Whitney *U* test was used for nonparametric data. A *P*-value of < 0.05 was considered significant.

Results

Respondents for 2011 were representative of DAA membership for the same year for both gender (2011: female 95.8%, DAA: female 92.6% $P = 0.079$) and years practicing as a dietitian (2011: median 7, range 0–36 years DAA: median 7, range 0–60 years $P = 0.887$). This was also the case for the 2014 respondents (2014: female: 95.6% DAA: 92.6% $P = 0.106$; 2014: median 8, range 0–44 years DAA: median 7, range 0–60 years, $P = 0.202$). The respondents from 2011 and 2014 were comparable in terms of gender ($P = 0.926$), years practicing ($P = 0.411$), geographical location ($P = 0.228$), work status ($P = 0.806$) and DAA membership category ($P = 0.379$) (Table 1).

Between 2011 and 2014, statistically significant improvements were found with regards to NCPT familiarity, confidence, preparation, support, knowledge, charting, benefits

Table 1 Demographics of 2011 and 2014 ASK NCP survey[4] respondents

Category	*2011 n (%)*	*2014 n (%)*	*P-value*
Gender			
Female	205 (96)	196 (96)	0.93
Years practicing as a dietitian			
0–5	87 (41)	72 (36)	0.41
6–10	45(21)	59 (29)	
>11	78 (37)	72 (36)	
Geographical location			
Metro/large urban	134 (63)	140 (69)	0.23
Regional	56 (26)	39 (19)	
Rural or isolated	24 (11)	25 (12)	
Work status			
Full time	128 (61)	119 (59)	0.81
Part time	76 (36)	75 (37)	
Contract/locum	7 (3)	9 (4)	
Membership category			
Paid work more than 20 hours a week	160 (74)	164 (81)	0.38
Paid work up to 20 hours a week	43 (20)	32 (16)	
Currently not working	6 (3)	3 (2)	
Retired	0 (0)	0 (0)	
Student	7 (3)	4 (2)	

ASK NCP: Attitudes, Support, Knowledge in Nutrition Care Process.

and use of educational resources. There was improvement in familiarity with the DAA's recommendations to incorporate the NCP and IDNT in Australia ($P < 0.001$, Table 2). Comparison of 2011 and 2014 respondents also showed a move towards finding the implications of incorporating the NCP and IDNT into practice more clear ($P = 0.02$, Table 2). Further improvements were seen in confidence to implement NCP ($P < 0.001$) and preparation to implement the NCP and IDNT ($P = 0.003$) (Table 2).

In terms of support, respondents reported greater access to information and mentors and felt less isolated from knowledgeable colleagues (Table 2). There were improvements in training, with more respondents feeling comfortable and knowledgeable and less requiring additional area-specific training (Table 2). Knowledge regarding the NCP and IDNT improved, with increased percentage of correct responses, which were statistically significant for eight of the nine knowledge questions (Table 3). There was an increase in the use of educational enablers such as presentations, workshops, readings sent out, department meetings, self-directed readings, webinars and use of the DAA website (Table 3).

There was also a significant rise in the use of nutrition diagnoses utilising Problem Etiology, Signs and Symptoms (PES) statements, with 59.5% of 2014 respondents reporting using PES statements in charting for at least three months (Table 3). The number of respondents incorporating assessment, intervention and monitoring and evaluation into charting also increased significantly (Table 3).

There were significant increases in all implementation benefits identified, with the largest benefits being consistent structure for nutrition care and provision of a standardised language (Table 3). In addition, implementation barriers were reduced in terms of lack of knowledge, resources and training and support (Table 3).

No significant changes were seen when comparing 2011 and 2014 responses with regards to concerns, difficulty of implementation, importance of NCPT to practice and time as a barrier. Five of six implementation concerns remained constant, including percentage of respondents having no concerns (Table 3). With regards to difficulty, respondents from both years agreed that the NCPT implementation would be difficult, but they also agreed that it is important to their practice (Table 2). In 2011, time was identified as a barrier for approximately 40% of respondents, and this remained constant into 2014, making it the biggest barrier identified for that year (Table 2).

Comparison of 2011 and 2014 responses also saw changes that were less supportive of the NCP and IDNT implementation with regards to attitudes towards changing practice and improving patient care, clinical documentation and concerns with PES statements. For 2014, fewer respondents agreed that they felt the need to change practice and that the implementation of the NCPT would improve patient care. There was increased agreement that respondents would prefer to continue with routine rather than change. With regards to clinical documentation, more respondents saw minimal benefit in incorporating the NCP and IDNT. The number of those agreeing that they saw no benefit in incorporating the NCP/IDNT increased as well as those concerned that other health professionals will not read PES statements (Table 3). Therefore, less supportive attitudes were seen in 2014 when compared to 2011 regarding changing practice and patient care, as well as benefits of incorporating into clinical documentation and concerns that other health professionals will not read PES statements.

Discussion

For the first time, this nation-wide study identifies changes in knowledge, attitudes, benefits and concerns of Australian dietitians regarding the NCPT over three years. The study showed improvements in dietitians' familiarity, knowledge, confidence and preparation regarding the NCPT, as well as increases in educational resources, training and support and PES statement usage. A decrease in implementation barriers and concerns were also observed. However, the study also highlighted some conflicting attitudes following implementation.

Many positive changes around NCPT have occurred in three years. Our results showed significant increases in NCPT use, including the adoption of diagnoses (PES) statements and NCP terms while charting. Multiple factors

Table 2 2011 and 2014 responses to questions of the ASK NCP survey[4] statements regarding familiarity, attitudes, confidence and views concerning implementation of NCP and IDNT.

Statement	*N*	*Mean (SD)* 2011 Total N = 218	*Mean (SD)* 2014 Total N = 205	*P-value*
Familiarity with NCP and IDNT				
(1 Strongly agree, 2 Agree, 3 Neutral, 4 Disagree, 5, Strongly disagree)				
I am aware of the DAA recommendation to adopt the NCP and IDNT in Australia	2011 = 216 2014 = 201	**1.95 (0.85)**	**1.62 (0.75)**	**<0.001**
Attitudes regarding NCP and IDNT				
(1 Strongly agree, 2 Agree, 3 Neutral, 4 Disagree, 5, Strongly disagree)				
The NCP and IDNT are applicable to my practice	2011 = 218 2014 = 204	1.99 (0.94)	1.91 (0.92)	0.38
I see the value of the NCP within my clinical practice	2011 = 216 2014 = 204	1.97 (0.86)	1.97 (0.10)	0.97
I see minimal benefit in changing my clinical documentation practice to incorporate the NCP	2011 = 217 2014 = 203	**3.70 (0.89)**	**3.49 (1.08)**	**0.03**
I see the value of IDNT within my clinical practice	2011 = 216 2014 = 204	2.17 (0.95)	2.24 (1.08)	0.49
I see minimal benefit in changing my clinical documentation practice to incorporate IDNT	2011 = 215 2014 = 204	**3.71 (0.90)**	**3.48 (1.10)**	**0.02**
I do not feel the need to change my clinical practice	2011 = 215 2014 = 203	**3.69 (0.87)**	**3.48 (1.05)**	**0.02**
I feel isolated from knowledgeable colleagues with whom to discuss the NCP/IDNT	2011 = 215 2014 = 203	**2.88 (1.19)**	**3.36 (1.26)**	**<0.001**
I feel incorporating the NCP/IDNT will improve patient care	2011 = 216 2014 = 203	**2.28 (0.91)**	**2.58 (1.11)**	**0.003**
NCP/IDNT interferes with my professional autonomy	2011 = 212 2014 = 203	3.65 (0.85)	3.60 (0.91)	0.56
Generally I would prefer to continue my routine rather than change	2011 = 213 2014 = 204	**3.68 (0.95)**	**3.49 (0.96)**	**0.04**
I don't have time to use the NCP/IDNT	2011 = 213 2014 = 204	3.71 (0.81)	3.62 (0.93)	0.26
Incorporating NCP/IDNT into my current practice will be inconvenient	2011 = 212 2014 = 204	3.53 (0.90)	3.44 (1.05)	0.32
Confidence regarding the NCP and IDNT				
(1 Very confident, 2 Somewhat confident, 3 Unsure, 4 Not confident)				
How confident do you feel to implement the Nutrition Care Process into your own practice?	2011 = 218 2014 = 189	**2.88 (0.98)**	**2.01 (0.90)**	**<0.001**
How confident do you feel to implement IDNT into your current practice?	2011 = 218 2014 = 189	2.98 (0.99)	2.11 (0.10)	0.87
How confident do you feel in identifying nutrition diagnosis?	2011 = 218 2014 = 189	2.49 (0.95)	1.95 (0.83)	0.54
How confident do you feel in writing PES statements?	2011 = 218 2014 = 189	2.89 (0.98)	2.10 (0.94)	0.79
Implementation of NCP/IDNT				
(1 Implemented, 2 Very prepared, 3 Somewhat prepared, 4 Not very prepared, 5 Not prepared at all)				
How prepared do you feel to implement NCP and IDNT within your workplace?	2011 = 209 2014 = 203	**2.86 (0.93)**	**2.51 (1.41)**	**0.003**
Difficulty of Implementation				
(1 Very difficult, 2 Difficult, 3 Neutral, 4 Easy, 5 Very easy)				
How difficult do you think implementation will be?	2011 = 207 2014 = 190	2.76 (0.71)	2.79 (0.88)	0.65

Table 2 Continued

Statement	*N*	*Mean (SD)* 2011 Total N = 218	*Mean (SD)* 2014 Total N = 205	*P-value*
Views regarding the implementation of IDNT (1 Strongly agree, 2 Agree, 3 Neutral, 4 Disagree, 5 Strongly disagree)				
Implementing the NCP/IDNT within my own practice is important to me	2011 = 214 2014 = 204	2.26 (0.98)	2.30 (1.05)	0.74
Information on NCP/IDNT is readily available to me	2011 = 217 2014 = 204	**2.90 (0.97)**	**2.26 (0.97)**	**<0.001**
The implications of incorporating NCP/IDNT into practice is not clear	2011 = 218 2014 = 204	**2.71 (0.98)**	**2.94 (0.10)**	**0.02**
There is freedom at my workplace to implement NCP/IDNT	2011 = 215 2014 = 204	2.22 (0.97)	2.07 (1.02)	0.12
I have access to NCP/IDNT mentors	2011 = 216 2014 = 204	**3.30 (1.14)**	**2.74 (1.29)**	**<0.001**
Management is supportive of implementing NCP/IDNT	2011 = 214 2014 = 204	2.43 (0.89)	2.28 (0.10)	0.12
My co-workers are supportive of using NCP/IDNT	2011 = 213 2014 = 204	2.57 (0.80)	2.41 (1.01)	0.07
There is insufficient time on the job to implement new ideas such as NCP/IDNT	2011 = 214 2014 = 204	3.14 (1.00)	3.18 (1.08)	0.65
I have had sufficient training to feel knowledgeable about the NCP/IDNT	2011 = 217 2014 = 204	**3.81 (1.15)**	**2.62 (1.22)**	**<0.001**
I have had sufficient training to feel comfortable implementing the NCP/IDNT into my practice	2011 = 217 2014 = 205	**3.88 (1.11)**	**2.67 (1.21)**	**<0.001**
I require additional training specific to my area of practice	2011 = 218 2014 = 205	**1.90 (1.00)**	**2.60 (1.10)**	**<0.001**

Bolded figures represent a statistically significant finding ($P < 0.05$).
ASK: Attitudes, Support, Knowledge; NCP: Nutrition Care Process, IDNT: International Dietetics and Nutrition Terminology; DAA: Dietitians Association of Australia; PES: Problem, Etiology, Signs and Symptoms.

identified within the study reflect an increasingly conducive environment for NCPT adoption. For example, reported increases in educational resources, training and support and a reduction in implementation barriers were echoed by improvements in familiarity, knowledge, confidence and preparation. The value of support, training and knowledgeable colleagues and their positive effect on knowledge and confidence is evident within the literature.[9] Previous studies found increases in knowledge and confidence following NCPT educational sessions,[3,6,10] some of which also utilised the ASK NCP survey.[3,6] Other authors have reported that respondents were twice as likely to use aspects of NCP and five times more likely to use IDNT if they felt their colleagues were confident in its use.[9] The current study found a shift towards respondents agreeing they had access to mentors and knowledgeable colleagues, suggesting the development of a supportive environment for NCPT adoption. Increases in knowledge, confidence, support and training as well as access to knowledgeable colleagues are all likely to contribute to supportive environments for NCPT adoption.

In contrast, we also observed some increases in negative attitudes towards the NCPT. Attitudes are important for change management, so this is a concern for ongoing NCPT adoption.[11] Compared with the initial survey, more respondents indicated that using NCPT in documentation would provide little benefit, including concern that other health professionals would not read PES statements. Fewer respondents strongly agreed that NCPT would improve patient care, and more respondents anticipated no benefits from NCPT incorporation. A previous study of Australian dietitians also found a decline in respondents' agreement that NCPT improves patient care following implementation.[6] One reason for this may be that complex clinical patient situations are not always well accommodated by the currently predefined NCPT terms.[12] Although there are some less supportive attitudes towards the benefits of NCPT adoption, there were more respondents who recognised multiple benefits of implementation, agreed they saw value in NCPT use and found that NCPT was applicable to their practice.

Professional behaviour change is multifactorial, and many considerations and strategies need to be addressed at individual, departmental and professional levels to facilitate NCPT implementation.[13] At the individual level, the development of knowledge and skills was demonstrated through increases in self-directed readings, familiarity and confidence. The domains of motivation as well as behavioural nature and regulation are also important at the individual level. This study indicates a growth in the utilisation of the NCPT, as well as increases in the identification of many

Table 3 2011 and 2014 responses to the ASK NCP survey[4] questions regarding knowledge; incorporation of PES statements into practice; and identified benefits, concerns, barriers and educational enablers to implementing the NCP/IDNT.

Questions	*Year = N*	***Correct Responses 2011 N (%) Total N = 218***	***Correct Responses 2014 N (%) Total N = 205***	***P-value***
Knowledge regarding NCP and IDNT (% of correct responses from multiple choice options) (Pearson's Chi-square test)				
What is the first step in the NCP?	2011 = 218 2014 = 189	**105 (48%)**	**119 (63%)**	**0.014**
Aetiology is documented in which step of the NCP?	2011 = 218 2014 = 189	**124 (57%)**	**156 (83%)**	**<0.001**
Which is not a nutrition diagnosis?	2011 = 218 2014 = 189	**149 (68%)**	**174 (92%)**	**<0.001**
Which of the following terms is the standardised language to use when describing insufficient intake?	2011 = 218 2014 = 189	**167 (77%)**	**176 (93%)**	**<0.001**
Which of the following are the domains of the nutrition diagnosis in the NCP?	2011 = 218 2014 = 189	**75 (34%)**	**127 (67%)**	**<0.001**
The connectors used in a PES statement are:	2011 = 217 2014 = 189	**136 (63%)**	**175 (93%)**	**<0.001**
The nutrition diagnostic term can be found in which portion of the PES statement?	2011 = 218 2014 = 188	**122 (56%)**	**154 (82%)**	**<0.001**
Biochemistry/Lab values and weight status may be used in which part of the PES statement?	2011 = 217 2014 = 189	**123 (57%)**	**146 (77%)**	**<0.001**
Case study: Choose the response that best describes the better choice of a PES statement and the best rationale for that choice	2011 = 213 2014 = 188	88 (41%)	90 (48%)	0.15
Incorporation of PES statements into current practice:				
Choose the statement that best applies to your current practice:		**Chosen Response 2011 N (%)**	**Chosen Response 2014 N (%)**	***P*-value**
I am not sure what a PES statement is	2011 = 211 2014 = 205	44 (21%)	7 (3%)	
I am not currently using PES statements:				
in my charting and I do not plan to use them	2011 = 211 2014 = 205	89 (42%)	16 (8%)	
in my charting but I intend to implement them within the next three to six months	2011 = 211 2014 = 205	9 (4%)	23 (11%)	
regularly but I will fully adopt them into my practice within three months	2011 = 211 2014 = 205	24 (11%)	4 (2%)	
I have incorporated PES statements into my charting and I have used them for:				
less than three months	2011 = 211 2014 = 205	16 (8%)	14 (7%)	
three to six months	2011 = 211 2014 = 205	21 (10%)	19 (9%)	
more than six months	2011 = 211 2014 = 205	8 (4%)	103 (50%)	
I have used PES statements in the past but I am currently not using them	2011 = 211 2014 = 205	0 (0%)	19 (9%)	**<0.001**
What benefits do you anticipate will occur when you adopt the NCP and IDNT into your practice? (Select all that apply)				

Table 3 Continued

Questions	*Year = N*	*Correct Responses 2011 N (%) Total N = 218*	*Correct Responses 2014 N (%) Total N = 205*	*P-value*
There are no benefits	2011 = 218 2014 = 205	**2 (1%)**	**14 (7%)**	**0.002**
The NCP provides consistent structure and framework for nutrition care	2011 = 218 2014 = 205	**52 (24%)**	**145 (71%)**	**<0.001**
Standardised language provides dietitians with a common vocabulary to identify nutrition problems	2011 = 218 2014 = 205	**52 (24%)**	**153 (75%)**	**<0.001**
It will allow for more concise documentation	2011 = 218 2014 = 205	**34 (16%)**	**91 (44%)**	**<0.001**
It will allow for more consistent care when patients transfer services	2011 = 218 2014 = 205	**43 (20%)**	**114 (56%)**	**<0.001**
It will encourage critical thinking	2011 = 218 2014 = 205	**39 (18%)**	**112 (55%)**	**<0.001**
It will facilitate communication with other health care professionals	2011 = 218 2014 = 205	**33 (15%)**	**71 (35%)**	**<0.001**
It will assist in helping dietitians become recognised as more valuable team members	2011 = 218 2014 = 205	**34 (16%)**	**63 (31%)**	**<0.001**
It will improve patient care	2011 = 218 2014 = 205	**29 (13%)**	**61 (30%)**	**<0.001**
It will be helpful with the introduction of electronic health records	2011 = 218 2014 = 205	**39 (18%)**	**98 (48%)**	**<0.001**
It will help with training of dietetic students[(a)]	2014 = 205	—	93 (45%)	—
It will assist with the evaluation of patient/client care[(a)]	2014 = 205	—	105 (51%)	—
It will support research on patient outcomes[(a)]	2014 = 205	—	78 (38%)	—
What are your main concerns about adopting Nutrition Care Process and IDNT in your practice? (Select all that apply)				
It will decrease productivity during implementation	2011 = 218 2014 = 205	54 (25%)	53 (26%)	0.82
I feel that the NCP will take away from my patient contact time	2011 = 218 2014 = 205	18 (8%)	18 (9%)	0.86
I have difficulty determining PES statements	2011 = 218 2014 = 205	71 (33%)	60 (29%)	0.53
I am concerned that the NCP will move my practice from individualised care plans to generalised care	2011 = 218 2014 = 205	34 (15%)	31 (15%)	1.00
I am concerned that other health care professionals will not read the nutrition diagnosis (PES) statements	2011 = 218 2014 = 205	**54 (25%)**	**73 (36%)**	**0.02**
I do not have any concerns about adopting the NCP and standardised language	2011 = 218 2014 = 205	62 (28%)	59 (29%)	1.00
What are the current barriers to you implementing the NCP/IDNT? (Select all that apply)				
Lack of knowledge	2011 = 218 2014 = 205	**147 (67%)**	**73 (36%)**	**<0.001**
Time	2011 = 218 2014 = 205	87 (40%)	84 (41%)	0.84
Resources	2011 = 218 2014 = 205	**74 (34%)**	**42 (21%)**	**0.002**
Organisational constraints	2011 = 218	42 (20%)	31 (15%)	0.30

Table 3 Continued

Questions	*Year = N*	*Correct Responses 2011 N (%) Total N = 218*	*Correct Responses 2014 N (%) Total N = 205*	*P-value*
	2014 = 205			
Training and support	2011 = 218	**132 (61%)**	**80 (39%)**	**<0.001**
	2014 = 205			
Management support[(a)]	2014 = 205	—	29 (14%)	—
Electronic health records unavailable[(a)]	2014 = 205	—	44 (22%)	—
Do not see a reason to change[(a)]	2014 = 205	—	34 (17%)	—
Which type of educational opportunities or 'enablers' for adopting NCP/IDNT have you experienced? (Select all that apply)				
Presentations	2011 = 218	**53 (24%)**	**100 (49%)**	**<0.001**
	2014 = 205			
Workshops	2011 = 218	**37 (17%)**	**74 (36%)**	**<0.001**
	2014 = 205			
Readings sent out	2011 = 218	**33 (15%)**	**52 (25%)**	**0.011**
	2014 = 205			
Department meetings	2011 = 218	**56 (26%)**	**95 (46%)**	**<0.001**
	2014 = 205			
Self-directed readings	2011 = 218	**66 (30%)**	**104 (51%)**	**<0.001**
	2014 = 205			
Webinars	2011 = 218	**70 (32%)**	**119 (58%)**	**<0.001**
	2014 = 205			
Internet site (of our Dietetic Organisation)	2011 = 218	**54 (25%)**	**71 (35%)**	**0.03**
	2014 = 205			
Internet site (Of the 'Academy')	2011 = 218	27 (12%)	35 (17%)	0.22
	2014 = 205			
Internet site (of the ICDA: International Confederation of Dietetic Associations)[(a)]	2014 = 205	—	18 (9%)	—
Management support[(a)]	2014 = 205	—	52 (25%)	—
Electronic health records[(a)]	2014 = 205	—	10 (5%)	—
Taught at university[(a)]	2014 = 205	—	47 (23%)	—
Do you feel with further training and support that you will feel confident to implement NCP & IDNT within your work practice and use for clinical documentation?				
Yes	2011 = 209	**175 (84%)**	**143 (73%)**	**0.004**
	2014 = 197			
Which terms have you incorporated into your charting? (Select all that apply):				
Assessment:	2011 = 218	**78 (36%)**	**111 (54%)**	**<0.001**
	2014 = 205			
Diagnosis[(a)]	2014 = 205	—	145 (71%)	—
Intervention	2011 = 218	**72 (33%)**	**90 (44%)**	**0.03**
	2014 = 205			
Monitoring and evaluation	2011 = 218	**64 (29%)**	**85 (42%)**	**0.01**
	2014 = 205			
None[(a)]	2014 = 205	—	29 (14%)	—
How are the NCP and IDNT documented in your workplace?[(b)]				
Manual or paper	2014 = 205	—	138 (67%)	—
Electronic	2014 = 205	—	60 (30%)	—
How long have you been using the NCP and IDNT?[(b)]				
0 months	2014 = 179	—	32 (18%)	—
6 months	2014 = 179	—	37 (21%)	—

Table 3 Continued

Questions	*Year = N*	*Correct Responses 2011 N (%) Total N = 218*	*Correct Responses 2014 N (%) Total N = 205*	*P-value*
12 months	2014 = 179	—	23 (13%)	—
18 months	2014 = 179	—	24 (13%)	—
2 years	2014 = 179	—	31 (17%)	—
3 years	2014 = 179	—	25 (14%)	—
4 years	2014 = 179	—	4 (2%)	—
5 years	2014 = 179	—	3 (2%)	—

Bolded figures represent a statistically significant finding ($P < 0.05$).
ASK, Attitudes, Support, Knowledge; NCP, Nutrition Care Process; PES, Problem Etiology, Signs and Symptoms; IDNT, International Dietetics and Nutrition Terminology.
[(a)] Option was not available in 2011 survey.
[(b)] Question was not included in 2011 survey.

benefits, showing that many respondents have been motivated to undergo behavioural change. Whilst many steps towards successful implementation have been achieved, becoming complacent about the conflicting attitudes of the profession may be a risk to long-term implementation. For a successful change, new approaches need to be embedded into organisational culture.[14] As a result, without attitudes supporting the use of NCPT, long-term adoption and effective use may be at risk. In the present study, 85% of respondents reported they saw reason to change. The literature recognises that everyone adapts to change differently, and results show that many respondents are ready to change; however, the remainder may need to see the effects of change before they are ready to adopt it.[15] Our study results showed that changes to knowledge, skills and behaviour have occurred at an individual level.

Whilst behaviour change on an individual level is evident, inconsistent attitudes towards implementation are apparent. Change must align with people's beliefs and values in order to influence human behaviour.[7,14] Benefits from NCPT implementation, such as improved productivity, communication and identifying diagnosis resolution rates, have been reported.[1] The increasing use of electronic health records provides a unique opportunity to enable prompt NCPT documentation as well as automated reports of nutritional diagnoses resolution, thus demonstrating dietetic effectiveness.

As electronic health records continue to gain traction in Australia, attitudes may become more supportive of NCPT implementation in the future. Early studies utilising NCPT within electronic health records suggests it improves documentation time, quality and consistency.[16] In addition, it records nutrition diagnosis resolution and allows for the analysis of intervention effectiveness within specific medical diagnoses. Dietitians have reported that electronic NCPT would be useful in quality control, investigating intervention effectiveness and justifying the role of dietitians on a productivity basis.[16] Therefore, it is predicted that using NCPT as an electronic tool within electronic health records will improve attitudes in the future.

At the departmental level, multiple domains, including beliefs concerning capabilities and consequences, as well as decision processes, environmental contexts and social influences, are pertinent. Respondents identified Vital parameters for fostering an NCPT-supportive environment included department meetings, having access to knowledgeable colleagues and educational enablers. Implementation models indicate that successful implementation requires a supportive departmental environment with social influences that empower dietitians to discuss and use the NCPT.[17] This could be achieved through strategies such as departmental meetings and discussing solutions to incorporation into standard practice, as well as professional development or case study discussions.[6] This is proposed to promote motivation and engrain the NCPT framework into the mindset of the dietetic professional.

At the professional level, determinants of successful implementation include management support, resource availability, policies and practices supporting implementation and production of a climate receptive to change.[7,17] Of these important parameters, appreciation of the value of management support as an enabler has now been acknowledged through the addition of specific questions within the 2014 survey. Additionally, professional organisations such as the DAA[18] and the International Confederation of Dietetic Associations[19] recommend the adoption of NCPT, and survey respondents indicate substantial improvements in resource availability. Respondents perceived increases in training and support as well as resources. The use of resources is evident from increases in access to relevant websites and webinars and a reduction of barriers such as resources, lack of knowledge and training and support. Both surveys confirmed the value of management support for NCPT implementation by professionals. Ensuring continued support from professional dietetic organisations, experienced clinical or managerial colleagues and the supportive health systems infrastructure will provide a strong basis for ongoing NCPT implementation nation-wide.

Multiple factors identified as important for successful behaviour change have been addressed during the NCPT implementation, but not all.[17] Individual development of knowledge and skill needs to continue in order to provide a supportive climate for successful behaviour change. The need to provide ongoing support at both a department level and a professional level was highlighted by respondents and thus needs to be sustained and strengthened to successfully continue change implementation. Regular periodic surveys will enable the ongoing assessment of changes in attitudes as well as the effectiveness of implementation strategies at individual, departmental and professional levels to ensure continued support and enhancement of NCPT implementation.

Broader implementation will offer opportunities to build the evidence regarding both the long- and short-term value of NCPT in patient care, outcomes and service management. Valuable studies would include monitoring and measuring health outcomes of nutrition interventions as well as communication with other allied health and medical staff. It is also important to continue to evaluate attitudes and perceived barriers, in years to come, so that NCPT continues to evolve with the profession. In addition, the introduction of electronic health records provides a new opportunity to design an effective data collection and patient outcome monitoring system by routinely incorporating the NCPT within these records as part of standard practice. This makes it easier to investigate dietetic care in the framework of NCPT. For example, the incorporation of the NCPT has been shown to result in improved monitoring and ability to resolve nutrition diagnoses.[20] NCPT.

Strengths of this study included the use of a validated survey and respondents' completion of all questions once commencing the survey. The sample size at both time points was relatively small compared to overall profession numbers; however, both samples were representative of DAA membership in terms of years of practice and gender. Dietitians have implemented only certain aspects of the NCPT, and so, views concerning the full value of NCPT are yet to be reflected. The use of predefined questions regarding views and attitudes potentially limited some responses; however, we aimed to capture key qualitative themes by including opportunities for comments using text boxes.

The findings of this study have multiple implications for dietetics at individual, departmental and professional levels. This study highlights the value of individual accessibility to supportive information and colleagues, as well as the need for departmental expectations of NCPT integration into standard practice. On a professional level, NCPT's integration into electronic health records can provide the opportunity for collaboration across institutions, including health and professional organisations at district, state, national and international levels.

Knowledge, attitudes and implementation of the NCPT has progressed over three years. There are now fewer implementation barriers; however, some respondents still do not see sufficient reason to adopt the NCPT. Further studies to increase the evidence base regarding attitudes, benefits and ongoing practitioner support, focussing at the departmental and professional level, are recommended.

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Conflict of interest

The authors confirm 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 was involved in the study design. JL and TO were involved in analysis and interpretation and the writing and editing of the manuscript. All authors critically reviewed the manuscript and approved the final version submitted for publication. Thanks are extended to Julie Hulcombe, Maree Ferguson and Jane Porter, the Dietitians Association of Australia and all of our participating dietetic colleagues.

References

1 Ichimasa A. Review of the effectiveness of the nutrition care process. *J Nutr Sci Vitaminol* 2015; **61**: S41–3.
2 Lövestam E, Orrevall Y, Koochek A, Karlström B, Andersson A. Evaluation of Nutrition Care Process documentation in electronic patient records: need of improvement. *Nutr Diet* 2015; **72**: 74–80.
3 Porter J, Devine A, O'Sullivan T. Evaluation of a Nutrition Care Process implementation package in hospital dietetic departments. *Nutr Diet* 2015; **72**: 213–21.
4 Porter J, Devine A, Vivanti A, Ferguson M, O'Sullivan T. Development of a Nutrition Care Process implementation package for hospital dietetic departments. *Nutr Diet* 2015; **72**: 205–12.
5 Hakel-Smith N, Lewis NM. A standardized nutrition care process and language are essential components of a conceptual model to guide and document nutrition care and patient outcomes. *J Am Diet Assoc* 2004; **104**: 1878–84.
6 Vivanti A, Ferguson M, Porter J, O'Sullivan T, Hulcombe J. Increased familiarity, knowledge and confidence with Nutrition Care Process Terminology following implementation across a statewide health-care system. *Nutr Diet* 2015; **72**: 222–31.
7 Helfrich C, Weiner B, McKinney M, Minasain L. Determinants of implementation effectiveness. *Med Care Res Rev* 2007; **64**: 2007.
8 Vivanti A, Ferguson M, Porter J, O'Sullivan T. Staff Knowledge, Confidence and Perceptions Prior to Implementation of the Nutrition Care Process (NCP) and International Dietetics and Nutrition Terminology (IDNT). *J Acad Nutr Diet* 2011; **111**: A73.
9 Parrott JS, Galeos A, Rigassio-Radler D. Colleague influence predicts the use of the international dietetics and nutrition terminology in dietetics practice. *Top Clin Nutr* 2012; **27**: 2–20.
10 Wellnitz L, Parrott J, Rothpletz-Puglia P, Touger-Decker R. Change in registered dietitian knowledge score after completion of a web-based educational intervention on application of

the international dietetics and nutrition terminology in pediatric care settings. *J Acad Nutr Diet* 2013; **113**: A14.
11 Gardner-Cardani J, Yonkoski D, Kerestes J. Nutrition care process implementation: a change management perspective. *J Am Diet Assoc* 2007; **107**: 1429–33.
12 Lövestam E, Orrevall Y, Koochek A, Andersson A. The struggle to balance system and lifeworld: Swedish dietitians' experiences of a standardised nutrition care process and terminology. *Health Sociol Rev* 2016; **25**: 240–55.
13 French S, Green S, O'Connor D *et al*. Developing theory-informed behaviour change interventions to implement evidence into practice: a systematic approach using the Theoretical Domains Framework. *Implement Sci* 2012; **7**: 38.
14 Kotter JP. *Leading Change*. Boston, MA: Harvard Business School Press, 1996.
15 Damanpour F. Organizational innovation: a meta-analysis of effects of determinants and moderators. *Acad Manage J* 1991; **34**: 555–90.
16 O'Sullivan TA. Evaluation of an electronic record prototype incorporating the Nutrition Care Process and International Dietetics and Nutrition Terminology. *Nutr Diet* 2013; **70**: 188–95.
17 Michie S, Johnston M, Abraham C *et al*. Making psychological theory useful for implementing evidence based practice: a consensus approach. *Qual Saf Health Care* 2005; **14**: 26–33.
18 Dietitians Association of Australia. International Dietetics and Nutrition Terminology (IDNT) Working Party Terms of Reference. Dietitians Association of Australia; 2010. (Available from: http://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&cad=rja&ved=0CC8QFjAB&url=http%3A%2F%2Fdmsweb.daa.asn.au%2Ffiles%2FInfo%2520for%2520Professionals%2FAppendix_1_IDNT_Working_Party_TOR.pdf&ei=rytjUvTlM8SSiQfv3YHIAw&usg=AFQjCNHYkQvYzbWpGyN5d9lGfcLQmzGstw, accessed 19 October, 2013).
19 International Confederation of Dietetic Association. Dietetics around the world. *The newsletter for the ICDA*. 2011; **18**.
20 Rossi M, Campbell K, Ferguson M. Implementation of International Dietetics and Nutrition Terminology (IDNT) in a hemodialysis population: characterizing the nutrition care process. *J Acad Nutr Diet* 2011; **111**: A73.

