

Karolinska Institutet

Department of Biosciences and Nutrition
Masters Course in Applied Public Health Science
Master Thesis, 30 ECTS

Nutrition Care Process:

Evaluation of the implementation of nutrition diagnoses, etiology and signs and symptoms in the medical nutritional documentations by dietitians.

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Abstract

Introduction/Background: The healthcare setting is evolving and expecting increased efficiency of all caregivers and evidence of treatment efficiency. A standardized work process and improved and consistent documentation by the means of standardized terminology for dietitians are essential to generate outcome research and to promote evidence-based practice. The Nutrition Care Process, NCP, together with the international dietetics and nutrition terminology, IDNT, provides dietitians with a tool to aid in the critical thinking process and to structure the care given, as well as the documentation process. This will enable outcomes to be measured and results that can be aggregated and evaluated. **Aim:** The aim of this thesis was to analyze the effects on the chart documenting process among clinical dietitians after initial implementation of the second step of the nutrition care process model, including nutrition diagnosis and PES statements according to IDNT. **Method:** A retrospective chart review was performed using a validated chart audit instrument, analyzing 60 nutritional notes. The notes were divided into two groups; A) charts written with nutrition diagnosis and PES statements according to the IDNT, and B) charts not including nutrition diagnosis and PES statements. **Results:** Nutritional notes from group A achieved higher score for 13 out of 14 measured variables, with six showing significant difference ($P < 0.001$). 73% of the charts from group A qualified as high quality documentation in contrast to 0% of the notes from group B. **Conclusion:** it can be concluded that the implementation of a PES statement with a nutrition diagnosis significantly improves the documentation practice for clinical dietitians within an acute care hospital in Sweden.

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*Kristina Rosén
2012*

Abbreviations

The Academy	Academy of Nutrition and Dietetics
DRF	Dietisternas Riksförbund (Swedish Association of Clinical Dietitians)
EFAD	European Federation of Associations of Dietitians
IDNT	International Dietetics and Nutrition Terminology
NCP	Nutrition Care Process
PES	Problem Etiology Signs & Symptoms
WHO	World Health Organization

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1. Introduction

The constant evolution of the healthcare environment worldwide is not only creating more complex medical care with improved outcomes, but also expecting increased efficiency of all actors within the health care system (1-4). The healthcare system and its actors are facing demands of increased financial return and evidence of treatment efficiency. In order to meet the expectations, it is crucial to provide care according to best practice, and also to document that care is given, to be able to systematically evaluate and revise practice to strive for improvements (3, 5, 6). This has aroused an interest among dietitians worldwide to standardize the nutrition care process and nutrition terminology, and increase the quality of nutrition documentation (7, 8).

In Sweden, dietitians are obligated according to law and ethical standards to document the nutritional care provided (6, 9). According to Swedish Association of Clinical Dietetics, DRF; the care should also be given in compliance with the framework of the Swedish nutrition care process; including nutrition assessment, nutrition prescription, intervention, documentation and follow-up (6).

However, individual working approaches and ways of documenting the nutritional therapy currently differs largely between different health care settings and different dietitians in Sweden (5, 10, 11). Swedish dietitians are lacking national nutrition care plans, which in turn ought to build upon evidence. In order to establish evidence that could be used by clinical dietitians to create care plans and by public health dietitians to create health strategies; there is a need for improved possibilities for quality evaluations of the care provided and research within the field of dietetics.

Dietitians worldwide struggle with the same dilemma and as a result the American dietitians and the Academy of Nutrition and Dietetics, the Academy, have implemented a common nutrition care process, the NCP, and a related standardized terminology, the International Dietetics and Nutrition Terminology, IDNT. In 2010 a project was initiated by DRF and the department of Clinical Nutrition and Dietetics at Karolinska University Hospital, to translate the NCP model as well as the IDNT into Swedish to be able to implement the system among dietitians in Sweden (12).

Before the start of the implementation of the NCP and IDNT at Karolinska University Hospital, a pilot study was conducted with the objective to evaluate the quality of the

nutritional documentations, and the extent to which the current dietetics documentation in the medical records matched the requirements of the NCP. A chart audit instrument was designed to assess both quantitative and qualitative aspects of the nutrition care process within current documentation (13). The study revealed a lack of uniform notes with inadequately documented nutrition assessments, diffuse descriptions of the nutritional problems, as well as no or incomplete documentation of goals. With this review tool, the different steps of the NCP model were identified, but often not structured and interconnected in a logical manner (13).

Considering the above-mentioned flaws in documentation, the American NCP model has gradually started to get implemented at the department of Clinical Nutrition and Dietetics at Karolinska University Hospital, and dietitians have now been introduced to the standardized terminology IDNT. At this point all dietitians have received training in how to write a nutrition diagnosis according to IDNT, state a PES statement and communicating a goal. With this in mind, a major question is to what extent the NCP model and the nutrition diagnoses has been adapted by the dietitians, and if the quality of the documentation has improved.

2. Background

2.1 Importance of collecting evidence from clinical nutrition to incorporate into public health nutrition.

The Academy defines the word dietetics as “the integration and application of principles derived from several disciplines; including nutrition, biochemistry, physiology, food science and food composition, management of foodservices, as well as behavioral and social sciences, in order to achieve and maintain optimal human health” (6). The science of dietetics involves many disciplines that together have the intention to both develop new knowledge, but also applying and integrating it into practice, both on a clinical and public health level (3, 8). A study by Eck et al revealed that nutrition research, most often is generated by nutritionists within academia or persons with PhD or MD degrees, and who do not have applied clinical nutrition experience (3). This type of research is useful for the fundamentals of nutrition information, and is often referred to as core research; however, outcome research from the clinical setting, evaluating outcomes associated with nutrition intervention in true patient cases is equally important (3, 14). Slawson et al emphasize the importance for clinical

dietitians to reconsider the value of the research that supports the profession, and to acknowledge the importance of them playing a role in the process of collecting research (7). By enabling outcome research into the clinical practice of nutrition, efficiency of different nutritional interventions can be evaluated, and the results of the dietetic research can be useful when creating nutrition policy and health interventions also on a public health level.

2.2 Monitoring of nutrition outcomes

For clinical dietitians, commonly reported outcome indicators today are quantitative measures including number of patient visits, amount of time spent with each patient and selected clinical outcomes such as laboratory work and weights, yet not necessary in relation to any intervention plan. On an individual level, clinical documentation in the patient records is used as the main source of information for evaluation of care; however, the electronic health record system is currently lacking a way of collecting statistics on qualitative indicators for dietitians (5). One reason for this is due to the fact that dietitians have not yet adopted a standardized nomenclature for their documentations.

Improvements in public health care cannot be determined by solely measuring the time spent with patients. What is important to capture is the quality outcomes and effectiveness of treatments (1, 15). An important first step in the evaluation process is to clearly define exactly what will be measured and how, and establish an appropriate time frame (16). Through evaluation, one can find out if the nutritional problem was solved or improved, and by the means of which type of intervention. Information retrieved from evaluations regarding the intervention is imperative when discussing patient safety and treatment efficiency (17). Without documentation of single treatment outcomes and possibility of collecting cumulative data on nutrition outcomes, it is difficult to evaluate treatment effectiveness and demonstrating the value of the care (18).

As the clinical setting have adapted to use an evidence-based approach during the 20th century (19), it is also important to develop a working process with the capacity to systematically monitor the use of different interventions and its impacts on clinical outcomes (1, 19). The Academy declared in 2003 that by adapting to a common working process for dietitians with standardized definitions, researchers would be enabled to more clearly describe and distinguish between nutrition problems, the interventions provided and the

outcomes of the interventions (20, 21). A principle function of having a common work process and standardized language is to enable the function of tracking outcomes both on an individual level, but also collect data from interventions performed by dietitians at multiple departments and generate new evidence for the effectiveness of current practices (10, 22).

2.3 History of the Nutrition Care Process

The Academy have through ongoing efforts strived towards a more structured nutrition care process and expansion of the body of evidence, connecting nutrition care with positive outcomes (23). This was a vital adjustment in order to stimulate dietetic research, underscore the importance of the profession and ensure that patients benefit from the work of the dietitian (19, 23).

The Academy formed a health service research task force in 1998 to scrutinize research on actual outcomes and effectiveness of nutrition therapy. The investigation group revealed difficulties to develop dietetics research within clinical practice due to lack of common definitions and lack of a common work-process (23).

Other healthcare providers saw barriers for nutrition focus due to inadequate evidence of the effect of provided nutrition therapy (24).

The task force recognized the need to establish a work process model with measurable outcomes that could be used in outcome research, to support the clinical practice (23, 25). This also called for a common set of terminology for documentation among the dietitians (20, 21, 23). Other allied health professionals, such as nursing, physical therapists and occupational therapists had already defined care processes specific to their profession to structure the care according to a scientific model. It also incorporated standardized terminology to describe their unique functions and contributions to the patient care and its outcomes, and to aid in communication between caregivers (19, 26, 27).

In 2003, the Academy presented a common work-process model for nutrition care based upon earlier models expressed by Whitney, Brylinsky, Williams, Splett and Myers, and Kight (19, 23). This model was created to mirror direct nutrition care provided by dietitians in all health care settings in the United States (25). It was designed to structure the critical thinking process by providing a framework guiding the nutrition care and aiding in problem solving and in the decision making process (22, 28). The purpose was not to

standardize the care, but to standardize the care process and enable consistent nutrition therapy and documentation among dietitians. In 2003 the Academy formally approved the integration of a standardized nutrition care process and model into clinical practice, research and education (20).

2.4 International Dietetics and Nutrition Terminology, IDNT

The development of the standardized language for dietitians emerged in 2003, to complement the NCP model and facilitate communication between health care providers (29). The standardized terminology is an important component of the NCP, to ensure that the terms used by different dietitians have the same meaning, regardless of the situation or the setting (29). This was a timely emerge in the US due to the fact that many hospitals were starting to use computerized health records. With the implementation of electronic health records there were also increased possibilities to accumulate data and measure outcomes. However, this required that the documentations were standardized (18). A common terminology was also suggested to promote the communication of patient information across the care continuum, as other allied health professionals had shown (18, 19).

Sixty-two diagnostic terms were published in the first edition of the IDNT in 2005, but has since then been updated to include terms for all four steps of the NCP model. The terms are coded in a similar manner as the Systemized Nomenclature of Medicine Snomed-ct, but adapted for the unique profession of dietetics and its conditions (30). Dietitians in US have initiated collaboration to include nutrition diagnoses in Snomed-ct (5). Snomed codes and the nutrition diagnostic codes are developed to eventually be mapped and used together with WHO's international standard diagnostic classification system, ICD, for secondary data purposes (25, 31).

By structuring the nutritional documentation and standardizing the terminology used for assessment, diagnosis, intervention and evaluation/monitoring the activities of the dietitians will be easy to track, which will enable dietetics research to be conducted. Improved possibilities for nutrition research are imperative due to the fact that dietitians ought to develop their practice based on evidence (6).

The Academy hosted an international conference in 2010 with representatives from dietetics associations from seven countries to promote the usage of IDNT (26, 32). Since

then, many national dietetic associations have adopted the use of IDNT (26), and in 2011 the International Confederation of Dietetics Associations, ICDA, officially stated their support of the use of the NCP and related IDNT by dietitians all over the world (33).

The Nutrition Care Process and Model

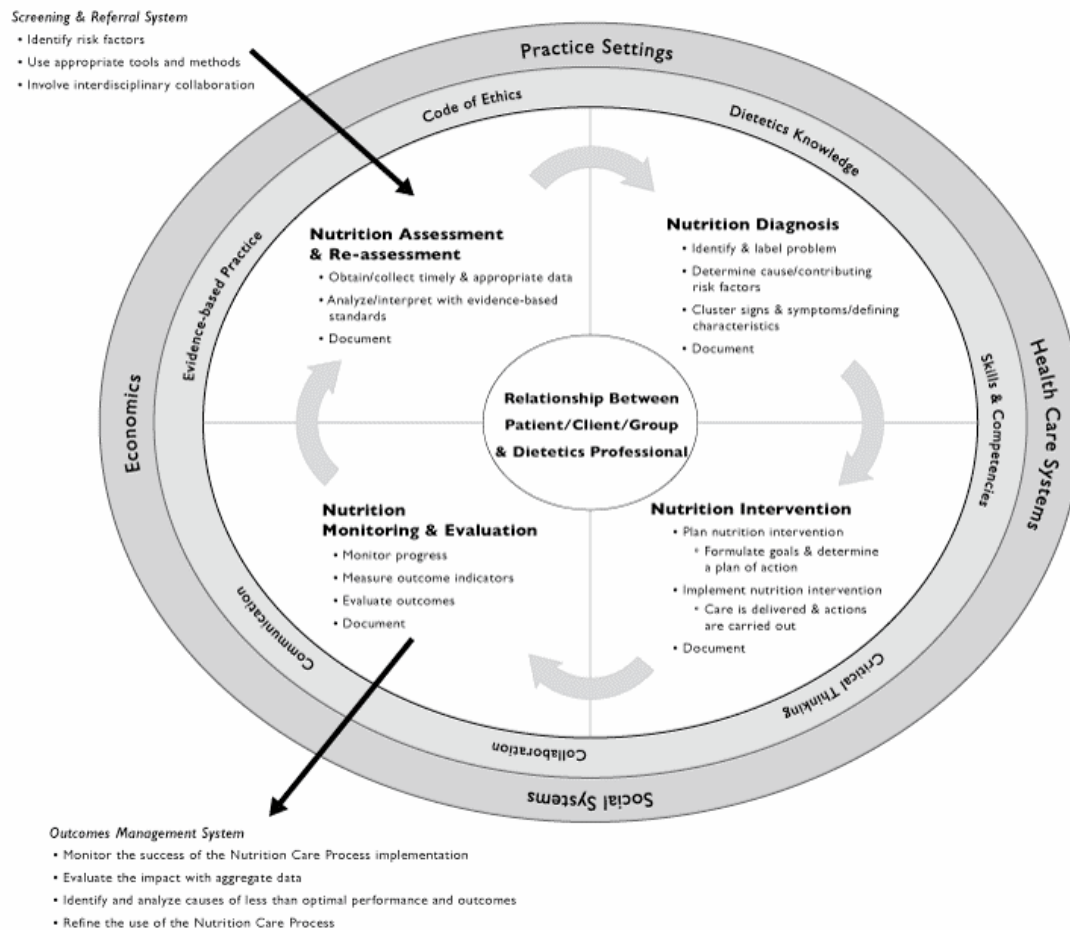


Figure 1, The Nutrition Care Process Model, reprinted with permission from the Academy of Nutrition and Dietetics 2012.

2.5 The Nutrition Care process and model

The NCP model involves four interrelated steps that are logically distributed according to the scientific method of problem solving (34). The four steps, as can be seen in the middle of figure 1 are; Nutrition assessment, diagnosis, intervention and nutrition monitoring and evaluation. However, surrounding the center are two rings representing external factors that affects the provision of care. The first circle includes environmental factors that the dietitian

has limited control over, but must be aware of since it can affect the care, such as the practice setting, the healthcare system, social systems and economics. The inner circle represents the strength and expected skills of the individual dietitians, for example; dietetics knowledge, critical thinking, collaboration, communication, evidence-based practice skills and knowledge of the code of ethics (22). Two components that are not integrated within the NCP cycle are nutrition risk screening, represented by the arrow pointing into the circle, and outcomes management system presented by the arrow pointing out from the system. These can be performed by other health care professionals than dietitians, but are important factors for successful implementation and evaluation of the NCP model (22).

The first step of the NCP model, nutrition assessment, is an ongoing process that accomplishes the purpose to find, verify and interpret subjective and objective data needed to detect the impact and etiology of nutritional problems (35).

The second step, and newest addition to the dietitians' work process, involves identifying the nutrition diagnosis; a critical step between the assessment and intervention since it is linking the two and guiding the interventions. A nutrition diagnosis is a specific nutritional problem that can be improved or totally resolved through a nutrition intervention (35). There are three components to a nutrition diagnosis, written as a statement describing the problem (P), its cause or etiology (E) and the signs and symptoms to assess (S). This statement is formally called a PES statement.

The third step is the nutrition intervention, which is driven by the nutrition diagnosis and its etiology. The purpose of the intervention is to resolve or improve the identified nutritional problem and/or its signs and symptoms. Intervention strategies are to be tailored after the patients' specific needs and circumstances, and involve two interrelated components; planning and implementation. Planning refers to prioritizing nutrition diagnoses, linking the problem to evidence based clinical guidelines, determining expected results and setting up a plan and goal for the patient. Actual implementation follows the planning step (35). The last step of the nutrition care process and model is the nutrition monitoring and evaluation, where data is recollected to find out the amount of progress made, and if goals are being met. Data is collected again on selected nutritional indicators to measure changes in nutritional status (35).

Nutrition care is always client focused and individualized, and this relationship

between the client and the dietitian is depicted in the central core of the model (figure 1).

2.6 Current situation for dietitians in Sweden

The DRF formed an ethics committee in 2003 to establish a code of ethics for clinical dietitians in Sweden. The group sent out questions regarding the practice of dietetics to dietitians nationwide. Upon collecting the answers, it was evident that dietitians at different parts of the country and within different healthcare settings, used the nutritional terminology with a great variance. Due to this finding, the ethics group decided to also put together a national glossary for dietitians (36). The code of ethics for dietitians including a glossary was published for the first time in 2005. Also included in the code was a linear model of the Swedish nutrition care process (37). A third edition of the ethical code and terminology was published in 2009, and around this time the operations manager Lotta Klinge Härberg at the department of Clinical Nutrition and Dietetics at Karolinska University Hospital decided to put together a developmental group to look at the nutrition care process within its own organization of about 50 dietitians. No national investigation of the documentation practice among dietitians in Sweden has been published (11), and according to the chairman of DRF, Elisabeth Rothenberg, there may be significant local differences among dietitians, but to what extent is uncertain (11).

The dietetic developmental group at the department of Clinical Nutrition and Dietetics scrutinized the care process and the documentations of the dietitians and discovered large variances between individual documentations, and that many dietitians did not seem to follow the proposed linear nutrition care process suggested by DRF (5). An initiative was started to assess if the American NCP was appropriate for the dietitians at Karolinska given that it had a diagnostic statement included which would clarify the nutrition assessment, both for the dietitians but also for the other caregivers in need of reading the nutritional notes (10). Initial training and implementation of the second step of the NCP started in January of 2010 and had included all sections of dietitians at the Karolinska University Hospital within one year, including dietitians working within acute care, pediatrics, in-patient and out-patient care.

2.7 Gaps in the literature

Not much research has been conducted on the effects of implementing the NCP and IDNT due to its fairly recent emerge into the field of dietetics. A study done by Hakel-Smith et al in 2005 showed that dietitians who prior to the study had received orientation and reinforcement in the use of the NCP, documented approximately three times as many nutrition care process steps per case as compared to dietitians that had not received education in the use of NCP (34). Significant difference in inclusion of nutritional problem/diagnosis, etiology, goal and intervention was seen. However, this study compared clinical documentations by dietitians at two different institutions, using two different documentation formats. Foremost, the study was made in two institutions in the United States, the country and its population for which the NCP model was originally intended.

The only identified study of the NCP outside of North America was a doctoral thesis by Ibrahim that looked at current nutritional documentation practices in Australia in 2010, before NCP and IDNT was implemented in Australia on a national level. Ibrahim emphasized the chart audit on evaluating whether or not the steps of the Academy's NCP were included and if a common terminology was used among the dietitians. Ibrahim concluded that the audited nutritional documents consisted of incomplete documented steps of the NCP and that the dietitians did not document according to a common terminology (32). The second phase of the same study investigated the current extent of- and potential for implementation of standardized terminology for nutritional diagnosis in a context outside the US.

Ibrahim surveyed dietitians in Australia, United States, Canada, United Kingdom, New Zealand, and Malaysia to explore if dietitians were able to apply nutrition diagnoses to nutrition documentation. Findings showed that the dietitians did not yet demonstrate ability to accurately apply nutrition diagnosis according to IDNT, even though the majority reported having some experience with nutrition diagnoses (32). Ibrahim concluded that the feasibility of applying standardized nutrition diagnosis outside of the US remains uncertain but that the complex list of standardized nutrition diagnoses may be a possible barrier for successful implementation (32). However, Ibrahim further concludes that the potential for successful implementation of nutrition diagnosis is dependent on adequate and appropriate education (32). The surveyed countries in Ibrahim's study are all English speaking countries, except for

certain parts of Malaysia; hence the potential obstacle of translating the terms into a different language was not accounted for.

Currently, no published studies have looked at the implementation and use of the NCP in Europe. However, an initiative was done by the professional practice committee of EFAD to map the usage of IDNT in Europe (38). A survey about the usage and extent of knowledge of IDNT was sent out to EFAD delegates all over Europe. Out of twenty-five responses from delegates of different European countries, fifteen respondents (60%) of the surveyed countries were aware of IDNT, including those who had started training dietitians and fully implemented IDNT. The same 15 delegates were positive to implementation of IDNT. Five delegates (20%) stated that members of their national association had started to use IDNT in clinical practice, with Sweden being one of them (38).

Little is known about the concept of implementing IDNT and the NCP into a European care setting, and using IDNT that is translated into a language other than English. In other words, there is a present gap in the literature studying the use of NCP and its implementation in the European care setting, but also a need to extend the suggested research from the two studies by Hakel et al and Ibrahim.

3. Aim

The aim of this thesis is to investigate the chart documenting process at the Department of Nutrition and Dietetics at Karolinska University Hospital and its compliance with the second step of the nutrition care process model, a year and a half after the start of the implementation of nutrition diagnosis and PES statements according to IDNT. Also, this study aims to examine the difference in nutrition documentation between dietitians who have implemented nutrition diagnosis and PES statements, and dietitians who have not implemented this into their documentations.

3.1 Research questions and hypotheses

- How many dietitians have started to implement nutrition diagnosis and PES statement after the initial training one and a half years ago?

Hypothesis: Not all dietitians document according to the second step of the NCP.

- Does the implementation of nutrition diagnosis and PES statement increase the quality of the documentation process?

Hypothesis 1: Dietitians using PES statement and nutrition diagnosis will achieve higher scores when auditing using a validated chart audit instrument.

4. Methods & Material

4.1 Material

The study included sixty nutritional notes, written by dietitians at the Department of Clinical Nutrition and Dietetics, Karolinska University Hospital during November of 2011. All employed dietitians went through initial training given by NCP subject matter experts covering the second step of the four-step Nutrition Care Process during spring of 2010 and 2011. During the five informative sessions and two workshops with Ester Myers from the Academy (2010 and 2011), the dietitians were educated in the standardized language, nutrition diagnosis, how to put together PES statements according to the IDNT manual (39) and how to state appropriate goals. Reference books with IDNT terms and definitions translated into Swedish, and access to a full IDNT online reference manual was provided to all employed dietitians. A learning support group with members from each section was created among the employees to be available to discuss questions concerning the NCP.

The study is based on a chart audit instrument and manual that was developed, validated and launched in 2012 (40). It is a content analysis tool created to assess the documentation process and its compliance with the NCP methodology, not the quality of care provided by the dietitian. The tool requires fundamental knowledge in Medical Nutrition Therapy and the NCP, which corresponds to a university degree in nutrition and dietetics. It consists of thirteen questions developed from the framework of a four-step nutrition care process. Each question, and how it should be rated is further explained in a manual provided with the tool. The Academy launched a general tool (41) for evaluating nutritional chart notes adapted from the doctoral dissertation by Dr Nancy Hakel Smith, from which the chart check tool is developed even further and validated for a Swedish health care setting.

Inclusion criteria

All selected nutritional notes included in the study represent an initial visit or initial contact with the dietitian; both inpatient care and outpatient care at the Department of Nutrition and Dietetics at Karolinska University Hospital. The initial visit is a personal meeting, a meeting or conversation with relatives or caregivers, or a telephone conversation. Notes excluded

were those recorded after nutrition information sessions in which no assessment was performed, as well as notes where the dietitian clearly stated that there was no identified nutritional problem and no intervention was performed.

4.2 Data collection

A retrospective review of dietitians' documentation was conducted in the medical records at Karolinska University Hospitals. The Dietetic Development group at the Department of Nutrition and Dietetics at Karolinska University Hospital systematically selected sixty nutritional notes written in November 2011 as a representative sample of currently employed dietitians (42). The sample of nutritional notes were originally selected as part of a quality review by the developmental group at Karolinska University Hospital. The same sixty nutritional notes were used for this study with an exception of two notes that did not meet the inclusion criteria and had to be replaced using the same selection method. The nutritional notes in the medical journals were identified and retrieved through a search in the electronic health record system Take Care, which is the system employed by Karolinska University Hospitals. All selected records were coded and converted to anonymous samples in order to protect the identity of the patient and the dietitian. Records were selected starting from week 46, 2011, extending retrospectively until all currently employed dietitians were represented with at least one nutritional note in the selected sample. There were 53 dietitians currently working during the above-mentioned week, thus some dietitians were represented by two nutritional records. Written approval for the study was obtained from the Head of the Department of Nutrition and Dietetics at Karolinska University Hospital.

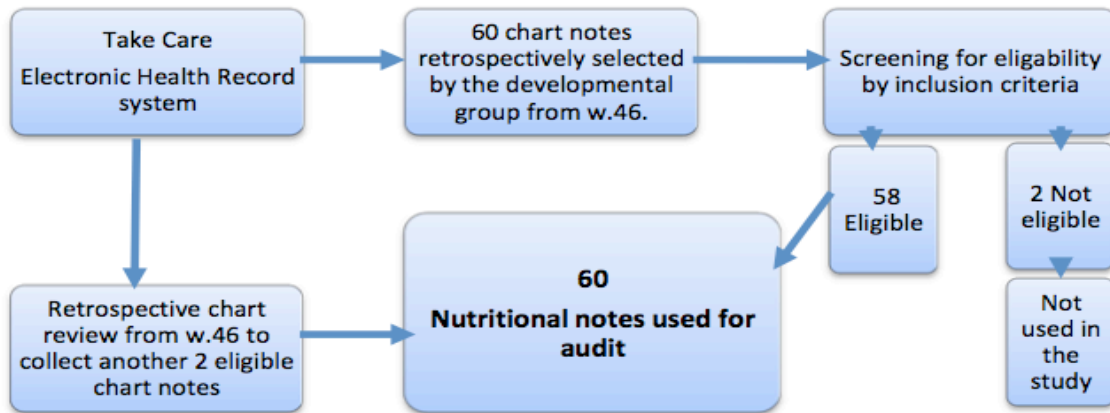


Figure 2. Description of selection process of nutritional charts for the audit

4.3 Data analysis

An initial practice rating and group discussion was performed including the developer of the tool, the author and two of the NCP subject matter experts from the implementation group. An initial inter-rater reliability analysis was performed between the author and the experts to determine consistency among the raters. Consistency was tested by a comparison of the three different reviewers' scores given to the same nutritional notes. This was done on a total of ten records. SPSS version 20 was used for statistical analysis of all data (43).

To control inter-rater reliability for each question, Cohen's Kappa was calculated. Cohen's Kappa is a correlation measure investigating the agreement among the raters, and results in a value from 0 to 1.0, where a value of 1.0 represents perfect coherence between the raters and zero represents no agreement between the raters (45). Consensus between all three raters was measured by calculating the Intraclass Correlation Coefficient, ICC.

After the initial test of inter-rater reliability, the author performed the final chart review of the sixty nutritional charts collected. The validated chart audit instrument used for reviewing was constructed to quantify the nutritional documentation and measure to what extent the dietitians documented according to best practice. The tool consisted of 13 questions divided between four different clusters (as can be seen in appendix A): four questions reflecting the presence of an assessment and diagnosis, four questions pertaining to intervention, two questions regarding the monitoring and evaluation of care, and three

questions concerning overall quality aspects of the documentation. The chart audit tool rated each question on a scale from zero to two, where zero indicated the answer “no”, one indicated the answer “partly” and two indicated the answer “yes”, which imply favorable documentation. The total possible score to attain ranged from 0 to 26 points with a positive increase.

After reviewing, the population was split into two groups; group A which included a PES statement and nutritional diagnosis, and group B that did not include a PES statement or diagnosis according to the IDNT. Exploratory data analysis was performed to reassure normal distribution of the scores. Due to the nature of the distribution, parametric tests were used throughout this thesis. Independent sample t-tests were used to assess differences in total mean score and mean score per cluster between the records that had a PES statement, and records that did not. To compare the impact of including PES statements on each of the thirteen questions, cross tabulations with Chi-squares were used.

5. Results

5.1 Results from the reliability testing

The interrater reliability test during the initial review showed satisfactory agreement between the raters. Cohen’s Kappa was calculated for each of the thirteen questions to establish internal consistency reliability. With the exception of four questions, the values indicated moderate to perfect coherence between the expert raters and the author (44) (45). Consensus between all three raters, measured by ICC, ranged between 0.72-1.0, with the exception of one question of 0.64, showing satisfactory results. According to statisticians, interrater reliability and intraclass correlation of .40-.60 are regarded as fair or moderate, and results between .60 and .80 are considered satisfactory or good (44, 46)

5.2 Results from the chart audit

Two groups were created on the basis of inclusion of PES statement with a nutrition diagnosis or not. The fourth question of the chart audit instrument was used as the question dividing the sample population. Of the sixty nutritional chart notes included in the audit, exactly thirty chart notes (50%) included a PES statement with a nutrition diagnosis according to IDNT, and were therefore grouped together as group A. Group B consisted of the thirty chart notes that did not have a PES statement with a nutrition diagnosis

documented according to IDNT. Maximum score possible to obtain per chart through the chart audit was 26 points, however the actual scores given to the chart notes ranged between six to twenty-five points, with a mean score of 17.29 points (SD= 4.6).

The scores were also divided into three quality levels, based on a range of scores from the tool manual. Charts receiving 0-13 points in the chart audit was considered to have low quality, 13.5-19.5 points were marked as medium quality, and 20-26 points indicated high quality documentation. Division between the three quality levels can be seen in figure 3.

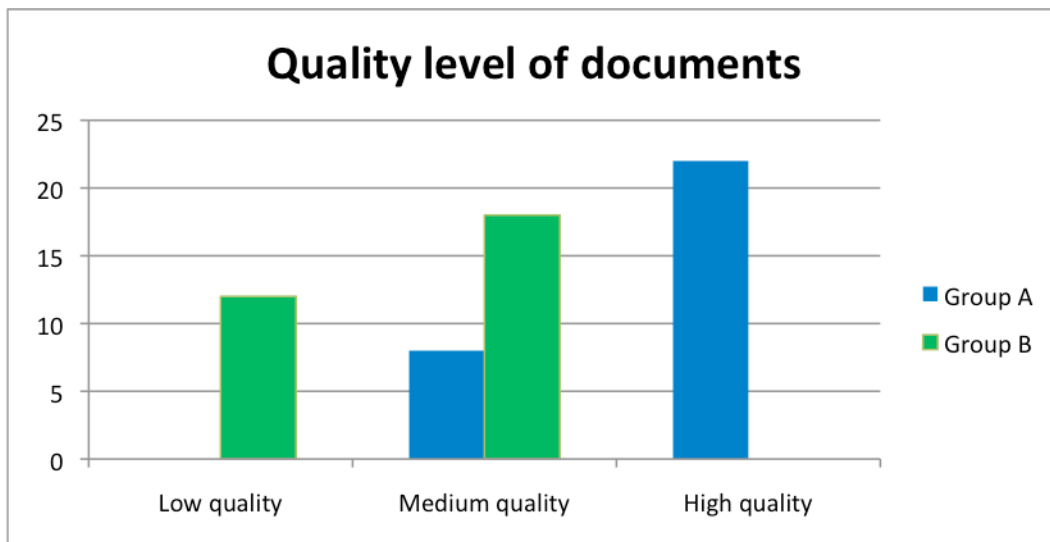


Figure 3. Distribution of documented notes within three different quality levels for group A and B

Parametric t-test splitting the group into subgroup A and B showed that group A had a significantly ($p < 0.0001$) higher mean score than group B. (Table 1)

Table 1. Individual sample t-test comparing the means between group A and B and looking at

Group:	A=PES vs. B= Not PES	Mean	Standard deviation	Significance	t
Total score	Group A	20.85	±2.4	0,000	-9,51
	Group B	13.85	±3.2		
Total score with question 4 excluded**	Group A	18.88	±2.36	0,000	-7,21
	Group B	13.75	±3.1		
Clusters:					
Assessment	Group A	7.6	±0.77	0,000	-11,07
	Group B	3.67	±1.79		
Intervention	Group A	5.47	±1.07	0,000	-5,31
	Group B	3.87	±1.25		
Monitoring & Evaluation	Group A	2.33	±0.84	0,27*	-1,13
	Group B	2.1	±0.76		
Quality aspects	Group A	5.45	±1.02	0,000	-5,42
	Group B	4.22	±0.72		

differences on a cluster level.

* Not significant to 0.05

** Question 4: “The documentation includes a link between the nutritional problem, etiology and its signs and symptoms, for example a PES statement.” This question was used to split the two groups A and B.

Mean score of the rated charts per group are presented in table 1. Mean scores are presented from total score, but also from four cluster scores representing assessment, intervention, monitoring/evaluation and lastly quality aspects of documentation. Dietitians including a PES statement in the nutritional documentation had a significantly ($p < 0.0001$) higher mean score than dietitians who did not include a PES statement, for all examined cluster variables with an exception of monitoring/evaluation that was not significant to 0.05 (Ind. Sample t-test, $t = -1.13$, $p = 0.27$). Each cluster variable represents a set of auditing questions with individual outcomes reported below in figure 4 and 5.

5.3 Outcomes from review of individual variables

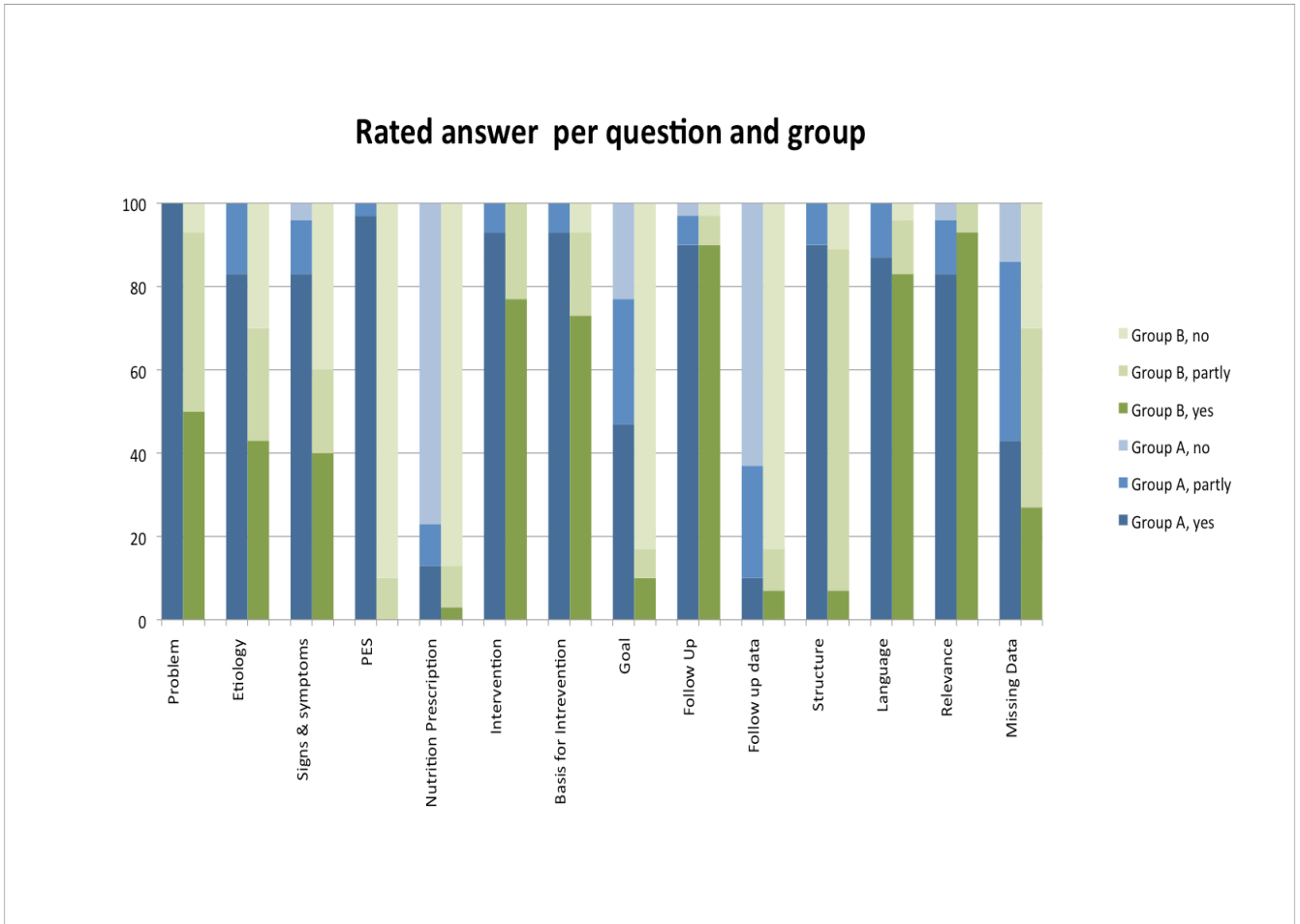


Figure 4. Presentation of the answers for each question from the chart audit. Answers are divided between group A and B.

Figure 4 is a stacked bar chart that presents the rated answers for each of the questions in the audit, and is divided between group A and group B. Figure 5, as can be seen on the next page, presents percentages obtained from maximum score for each question for group A and group B. When reviewing the sixty sample chart notes as an estimation of the effects of the implementation of PES statement and nutrition diagnosis, the audit showed that out of 14 items measured, six items differed significantly ($p < 0.001$; Fig. 5) between the two groups. Out of the six items with a significant difference, group A scored higher on all six items.

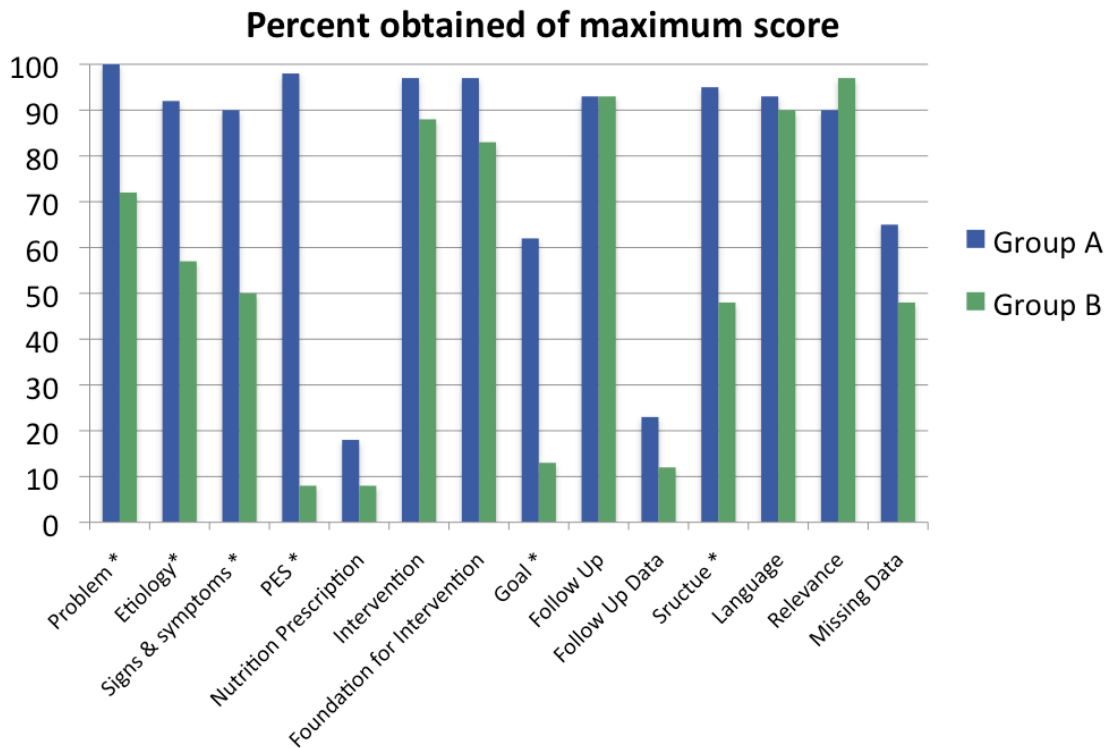


Figure 5. Presentation of rated answers. Divided between group A and B. Each bar represents the percent obtained of the maximum possible score.

5.3.1 Assessment

While all nutritional documents in group A included a nutritional problem (100%), half of the notes in group B either stated a medical diagnosis that indicated a nutritional problems (43%), or did not indicate a problem at all (7%) $\chi^2(2.60)=20, p\leq 0.000$. Etiology and signs and symptoms were identified in twice as many nutritional notes from group A than group B (83% and 40-43% respectively, $\chi^2(2.60)=13.48, p\leq 0.001$. Even though inclusion of PES was the variable splitting group A from group B, group B obtained a total of 8.3% of maximum score since 10% of the nutritional notes in group B included statements linking the diagnosis with etiology, or diagnosis with signs and symptoms.

5.3.2 Intervention

Five notes of the sample population had a complete documented nutrition prescription (8.3%); four (13%) of the notes in group A and one (3%) of the notes in group B, however the difference between the two groups was not proven to be significant $\chi^2(2.60) = 1.98, p=0.371$. Both groups scored high on the two questions regarding intervention and inclusion

of assessment data supporting the chosen intervention. There was a slight tendency of attaining higher score among the documents in group A (93% and 77-73% respectively, $p < 0.071-0.094$), however no statistically significant results were found. Goals related to the nutritional problem and etiology was not identified at all in half (53%) of the notes, but group A had a significantly higher score from documented goals than group B (61.7% and 13.3% respectively, $\chi^2(2.60) = 21.7, p \leq 0.000$).

5.3.3 Monitoring and evaluation

There was not a significant difference between the groups in terms of documenting if a date for a follow up visit/referral was scheduled or if the treatment was completed. In fact both groups obtained 93% of the maximum possible score. In spite of this high score, only 8.3% of the notes stated an actual plan for monitoring and evaluating the patient during the follow up visit.

5.3.4 Overall quality aspects

The obtained score from evaluating the structure of the documentation differed significantly between group A and B (95% and 48.3% respectively, $p < 0.000$).

The last three questions did not show any significant differences between groups A and B. Most nutritional notes (85%) were written in a clear language where no misunderstandings were made (group A scored 93.3% and group B 90%). The majority of the documents were only recording relevant data (88.3%). From the documents included in group A, 83.4% were free from irrelevant data while the same number for documents in group B was 93.4% $\chi^2(2.60) = 1.84, p = 0.399$. This, however, was not significant.

Lastly, documents including a PES statement with diagnosis according to IDNT showed a tendency to have a higher rate of documented relevant data pertaining to the nutritional problem included in the assessment and/or intervention $\chi^2(3.60) = 3.11, p = 0.211$.

6. Discussion

This study assesses nutrition documentations for the compliance with inclusion of PES statements and nutrition diagnosis, after initial training in the second step of the nutrition care process model at Karolinska University Hospital. The study also compared the quality of

nutrition documentations based on the inclusion of a PES statements and nutrition diagnosis (group A), or not including this (group B), with the use of a chart audit instrument. Half of the audited documents were written in compliance with the 2nd step of NCP. The quality of the nutritional documents differed significantly between the two groups. Documents in group A averaged higher scores on thirteen out of fourteen questions with six being significantly different. As an overall review, the results indicate a favorable inclusion of PES statement and nutrition diagnosis within the population. However, considering the fact that all participants had received the same training and worked within the same institution, the considerable amount of documentations without PES statement and nutrition diagnosis indicate the need for evaluation, further research and additional training to foster the application of NCP. Implementation of a new concept within the healthcare setting is a science by itself. Roger's theory of diffusion of innovation suggests that the success of an implementation is dependent on the social structure where the concept is to be implemented, its norms, and opinions of the group and its direct and indirect leaders (47).

According to Ibrahim, students who prior to her study had received some theoretical exposure to nutrition diagnosis still struggled to correctly applying their knowledge; indicating that one cannot expect a convincing result after a few training sessions. Ibrahim backed up the results by stating that previous studies conducted in the US had required comprehensive approaches including lectures, case study training, mock counseling sessions and continuous in-service training in order to successfully implement a correct usage of nutrition diagnosis (32).

6.1 Results Discussion

6.1.1 Assessment

The first cluster of the chart audit instrument was composed of four questions, including nutritional problem, etiology to the problem, whether or not signs and symptoms were stated and if a PES statement was included.

Based on the construction of the chart audit tool; including a correct PES statement within the documentation leads to the obtainment of maximum score in the audit for the first cluster. In fact, the inclusion of the variable 'PES statement' proved to be a strong indicator of a high assessment score, since group A and B were split due to inclusion of PES or not. In

other words, one could see a significant difference in all four questions in the assessment cluster with PES statement being a decisive factor. According to Susan Ramsey, member of the Academy's research committee, the PES statement "is the culture shift that brings the whole assessment into one clear vision" (48).

Many of the nutritional notes from group B did not include sufficient assessment information, such as the documentation of etiology of the problem, or evident signs and symptoms. Typical signs and symptoms could include anthropometric data, calorie counts or laboratory data to explain the nutritional problem. In relation to this, conclusions made by Hakel-Smith and Chima indicate that this type of assessment data provides a basis towards the recommended intervention, especially for other health professionals involved in the patient's treatment and nutritional care. Lacey et al stress the value of completely understanding the causality of the problem, and not just stating the presence of a nutritional problem (19). Hakel et al. also state that the precision of the nutrition diagnosis is dependent on the accuracy of the evidence gathered, for example signs, symptoms and etiology (34).

The diagnosis within the PES statement has the role of determining the other steps of the care process, such as selection of intervention, that provides the basis from which outcomes will be measured and evaluated (34, 49).

Looking at the results of the assessment in relation to the discussed research, this indicates the importance of incorporating a PES statement in order to assure the inclusion of a nutritional problem, its etiology and evidence for the problem. It is also demonstrating possible consequences of including an incomplete PES statement, or the absence of PES for other aspects of the documentation.

6.1.2 Intervention

Nutrition prescription, nutrition intervention, information justifying the intervention, and goals, represented the second cluster of the chart audit instrument. The overall results from the review of this cluster suggest a significant difference between notes in group A and group B. Yet, goal setting proved to be the only singled out significant variable in this cluster (figure 5). Despite the fact that documentation of goal setting was included in the NCP training given to all employees, goals related to the nutritional problem and etiology were not identified at all in half of the notes reviewed. Nevertheless, group A had a significantly

higher score from documented goals than group B indicating that the notes including a PES statement was also more likely to have a goal established for the care process. The rather low number of documented goals in group B is consistent with the pilot study performed in 2010 before the initial training in NCP (11). This suggests that the training sessions have not been sufficient conveying the message to all intended users, such as the importance of stating patient goals within the medical records. According to the Academy, the goals stated in accordance to the nutrition intervention provides the basis for monitoring the progress (35). When outcomes are measured, they must be benchmarked with the goal in order to see if the intervention was successful and if treatment can be considered completed (23). One can also look at the process from a different angle; by identifying a clear goal in the beginning of the treatment process, the goal will follow the patient through the care process. With this, research suggests an increase of the dietitian's awareness of the importance of benchmarking the collected data with the initially stated goal (20).

Looking at nutrition prescription, at the time of documentation, none of the dietitian had gone through training for this step. This may partly explain the overall low score by both groups. Another influencing factor for the low score might be the absence of a pre-printed search word for nutrition prescription within the documentation format. However, within the low score, group A shows a tendency of achieving higher scores than group B, and one can only speculate the factors leading to this result.

Both groups achieved very high scores on the question asking if an intervention was planned, which corresponds to the study done by Hakel-Smith where intervention was the most documented step of the NCP process among the dietitians who had received training in the NCP (34). Yet, the dietitians in this study had not yet received training in the particular interventional step of the NCP process at the time of the chart audit. The high rate of documented interventions may partly be due to the fact that there is a specific and pre-printed search word for intervention within the documentation form. The national dietetic curriculum and the intervention-focus of the dietetic education may also be an influencing factor explaining the high rate of documented interventions (50). Results from the pilot study performed in 2010 also report similar rates of planned interventions, indicating that this has not really been affected by the training of the second step of the NCP process. Bieseimer et al state that dietitians may be prioritizing the assessment and intervention before follow up

visits due to time restraints and a desire to provide care to as many patients as possible (18) .

Trends were indicating that group A had documented more clearly on what basis certain interventions were chosen. According to the writing group of the NCP, the intervention is typically aimed at resolving the nutrition diagnosis and its signs and symptoms, therefore, in order to justify the chosen intervention it is also important to include signs and symptoms as evidence to why the intervention was selected (28). If the dietitians fail to justify the chosen intervention in the documentation, other health care givers may not understand why the particular intervention was chosen and the importance of intervening.

6.1.3 Monitoring and evaluation

The third cluster of the chart audit instrument, looking at evaluation and monitoring, involved the two questions whether or not a follow up visit was planned, and if it included data to evaluate. This was the only cluster that did not show significant difference between group A and B. In fact both groups obtained the same exact score, 93%, on the question whether a date was set for a follow up visit. In spite of this high score, less than 10% of the notes stated an actual plan for monitoring and evaluating the patient during the follow up visit. This substantiates the claim by previous researchers that a follow up plan to evaluate outcomes is seldom included in the documentation (5, 11, 18, 34). This, on the other hand, may be a reflection of the lack of goals in the care plan. Since all of the notes were initial notes, there were not any sections including patient outcomes. However, with less than 10% of the initial notes including a follow up plan with variables to monitor, this would have made it difficult to evaluate the effectiveness of the intervention if that would have been a variable to consider.

This fourth step of the NCP model had not yet been taught to the dietitians during the NCP workshops when this study was conducted. This may explain the very low rate of documented evaluation plans.

In conclusion for this cluster, there was no overall significant difference between the two groups, however, the reason for finding no significant difference between the groups was not due to the fact that both groups had included perfect follow up plans, but rather the opposite, that follow up plans were lacking for both groups.

6.1.4 Overall Quality aspects

The fourth and last cluster considered the overall quality aspects of the documentations including structure, language, relevance of data, and if relevant data was mentioned but not further assessed. There was a significant difference between group A and B on a cluster level, due to the large difference between the groups based on their answers for the question concerning the structure of the nutritional note. Group A attained a score twice the score of group B (figure 5), however, looking at the spread of the score (figure 4), one can see that greater than 80 percent of the chart notes in group B scored partial points. This indicates that the components of the nutrition care process were documented but possibly not in the right order, or that one or two of the components were missing. All documents were documented in the same electronic health record system and structured documentation format, as well as uniform set of search words. Hence, almost all documents were written in similar order, but most of the documents by group B were lacking one or two of the components of the NCP, or stated the nutritional problem before the assessment due to the set up of the search words. In contrast to the study made by Hakel-Smith where the arrangement of the variables were not mentioned, this chart audit looked at both the inclusion of the components of the NCP model, but also the arrangement of the NCP components within the note. Documentation is an important part of the NCP, and should be structured with the objective to reflect the care process (23), since an inadequate structured chart note reduces its usefulness. This finding is consistent with a retrospective chart review conducted to analyze nurses documentation before and after the implementation of electronic health records (51). In this study the author concludes that the fixed templates with predefined search words facilitates the structure and overall documentation (51).

The other three individual variables within the cluster did not show any significant differences between notes in group A and B, however certain trends were present. Most nutritional notes were written in a clear language. The translated IDNT had only been incorporated into the documentation of documents in group A. However, as the use of IDNT is in an initial implementation phase, this may prove a challenge for its users. According to a member of the Swedish terminology group: “the terminology must be translated into other languages than English, but that also requires processing of the terminology to fit into other cultures and treatment traditions” (30).

A great majority of the documents were only documenting relevant data. Inclusion of irrelevant data in patient records, and the occurrence of double documentation have been brought up in several studies and reports. For example a report by Grufman Reje Management from 2002 investigated documentation practices at 17 hospitals in southern Sweden written by all caregivers. It revealed that vital information often was missing or incomplete, considerable inclusion of irrelevant data, and a substantial degree of repetition of information (52). Another study from 2008 scrutinized the documentation at a large hospital in Sweden and revealed that 15% of the nurses' notes in patient records were repeated within the same journal (53).

Grufman Reje Management stated that the usage of checklists, templates or documentation outlines improves the documentation (52, 54). The findings from this study contradict the statement of Grufman Reje since group A actually has a moderately higher rate of documented irrelevant data or double documentation. However, both groups had a rather low rate of documenting irrelevant data, and the difference between them was not significant. On the other hand, both groups showed a tendency to occasionally fail to connect relevant data in the assessment or intervention that as initially brought up in the assessment.

6.2 Methods discussion

This study builds upon a quantitative approach, evaluating the scores of rated journal documentations audited by the use of a validated chart audit instrument. However, when testing the interrater reliability to make sure a fair audit was performed, the experts used for the reliability test were purposively selected due to their great knowledge in the subject matter. This is not a preferred selection method, and may possibly introduce selection bias, however it was considered necessary to perform this interrater reliability test to calibrate the author to reduce the risk of subjectivity in the chart audit.

To further minimize subjectivity in the chart audit process, an associated chart audit manual was provided with guidance for the audit; however it still includes certain measures of subjectivity. The subjectivity aspect was accounted for through the calibration process before the actual audit, and also by making all documents anonymous for the rater. When performing the statistical Chi-square test on each of the fourteen variables, one of the assumptions of the chi-square were violated due to the fact that some cells representing

answer variables had expected cell counts less than five. This may partly be due to the quite small sample size, but also due to the very obvious direction of most of the data.

6.3 Limitations

Although the rather small sample size of sixty nutritional notes may be a limitation to generalisability of the results, it provides some insight into how the concept of NCP and IDNT currently is used by dietitians at Karolinska University Hospital. Included in the sample are dietitians working within acute care, pediatrics, geriatrics, in-patient and out-patient, which is a relatively well diverse population. However, these are all nutritional notes from a hospital setting, which can make it difficult to apply the research towards the large group of dietitians within primary care in Sweden. Also, considering the sample size relative to the diversity of patient groups and medical diagnoses, it is difficult to interpret if certain groups of patients represent a higher degree of complexity to which the NCP is more difficult to apply. With the anonymous journals and unidentifiable patient groups, the results do not provide a targeted group of patients where additional training in the application of NCP is needed. In a recently published study by Memmer it is suggested that the implementation process of the NCP ought to be tailored to specific care units and patient groups (54). Also, the chart audit instrument in itself does not take into account how well the nutrition therapy is performed according to care plans, but only assess the quality of the documentation.

Lastly, the fact that the dietitians at Karolinska University Hospital were aware that a chart audit was to be performed sometime during the fall of 2011 may have affected the outcome.

6.4 Proposals for further studies

Future studies are needed to follow up and analyze qualitative aspects of the implementation of the NCP and IDNT among dietitians outside of the US. In this study, only half of the sampled notes reviewed had actually implemented the parts of the NCP and IDNT that was taught to all of the dietitians. A useful study might be the investigation of the perceived barriers for implementing the practice. Similar studies about barriers to the implementation have been conducted in the US (55-57), however, since there may be large language and culture differences, addressing perceived barriers among dietitians in Europe may help other

institutions to fully implement the NCP and IDNT.

Once the documentation practice has improved and outcome data is commonly included in the nutritional records, the next step will be to evaluate the follow up notes, assess patient outcomes and the effectiveness of nutrition interventions.

Further research is also needed on the usage of the NCP model and IDNT within primary care in a Swedish care setting. A replication of this study can be performed with a larger sample size, including nutritional notes from both acute care but also primary care to see if the NCP is applicable in all care settings in Sweden. Lastly, in order to target barriers and weaknesses of the NCP and IDNT implementation for dietitians working with specific patient groups, studies evaluating the implementation of the NCP might benefit from increased categorization of patient groups.

7. Conclusion

Results from this study shows that although all dietitians had been given the opportunity to learn about the second step of the NCP, and use of the IDNT, only half of the notes in this selected sample had implemented the particular aspects of NCP and IDNT. One can only speculate if this actually mirrors the number of dietitians who on a regular basis are using the concept of NCP and IDNT. However, it can be concluded that the implementation of a PES statement with a nutrition diagnosis significantly improves the documentation practice for clinical dietitians within an acute care hospital in Sweden.

A standardized terminology is needed when determining nutrition diagnosis, interventions and outcomes in order to be able to aggregate patient data. Collected cumulative data can contribute to evaluation of interventions and to establish evidence-based practice. In order to increase the standardization of the NCP practice, the education covering proper usage and its benefits must be leveraged and provided on a continuous basis.

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Appendix A:

Table 1. Chat audit questions translated by the author.

Category	Definition	Question in documentation audit tool
1. Assessment & Diagnosis	To obtain, verify and interpret data needed to identify nutrition-related problems, their causes and significance	
Problem	Describes alterations in the patient's nutritional status.	One or more nutritional problems has been identified and prioritized?
Etiology	Contributing risk factor linked to the nutrition problem	Possible etiology to one or more nutritional problems is documented?
Signs & symptoms	Data used to determine that the patient has the nutrition diagnosis specified.	The chart note includes sign or/and symptoms to one or more nutritional problem?
PES	To describe the problem, its root cause and the assessment data that provides evidence for the nutrition diagnosis.	The nutritional chart includes a connection between problem, etiology and signs & symptoms?
2. Intervention	To resolve or improve the identified nutrition problem by planning and implementing appropriate nutrition interventions, tailored to the patient's needs.	
Diet order	A general or modified diet prescribed and documented in patient records by an RD, stated as a diet label	A diet order/recommendation is documented, or it is clearly stated that the RD has chosen not to give a diet order/recommendation?
Intervention	To resolve or improve the identified nutrition problem by planning and implementing appropriate nutrition interventions, tailored to the patient's needs.	Performed or planned nutrition intervention is documented, or reasons are stated why intervening is not appropriate?
Intervention criteria	For a person with university degree in dietetics there is evidence provided in the assessment section backing up the chosen intervention. *See signs and symptoms.	The nutritional chart includes assessment information supporting the chosen intervention or decision not to put in an intervention?
Goal	The goal should express what the nutrition therapy is aiming at resulting in.	One or more goals are stated for the nutrition therapy?
3. Monitoring & Evaluation	To determine the amount of progress made between assessment and re-assessment, and whether goals are being met.	
Follow up	To plan for a follow up meeting with the patient to reassess predetermined indicators, or coordinate care with another more appropriate actor.	The nutritional note states whether a follow up visit is scheduled, a referral is done or if the patient treatment is completed?
Evaluation	Comparing nutrition care markers against standards shown to produce the preferred effect.	The nutritional note includes a plan for monitoring and evaluating progress or an explanation why no follow up and evaluation is planned?
4. Overall Quality Aspects	Overall quality aspects is looking at the documentation structure, is the data is relevant and if important data mentioned in the assessment is considered in the intervention.	
Structure	Assessment → Nutrition diagnosis → Intervention → Monitoring and Evaluation	The structure of the chart note follows the order listed in the nutrition care process?
Language	Chart document free from linguistic ambiguity, made up abbreviations and obvious dangling modifiers.	The document is written in a clear language that could not lead to misunderstandings?
Relevance	The data should be free from unnecessary information or double documentation, however it is also important that all relevant data further is discussed and included in the nutrition diagnosis or intervention.	a) All information provided is relevant for the assessment of the nutritional problem b) All relevant data from the assessment is further deliberate in the PES/intervention.

